718-724 Sydney Road Coburg North

Ark Resources Pty Ltd
ABN 29 086 461 369
Suite 8, 10 Northumberland Street
South Melbourne VIC 3205 Australia

+61 3 9636 0280
info@arkresources.com.au
arkresources.com.au

Issue	Date	Prepared	Checked	Status
A	25.11.2022	FP/MT/JW	MR	TP Draft
B	24.05.2023	FP/MT	MR	TP Draft
C	16.06.2023	FP/MT/BJ	MR	TP Draft
D	05.07.2023	FP/MT/BJ	MR	Final

Contents

Appendices

1.0 Executive Summary

The proposed mixed-use development at 718-724 Sydney Road, Coburg North has been designed to meet the objectives of the Merri-bek City Council's Policy Clauses 15.01-2S, 19-03-3S and the 15.02-1L (Environmentally Sustainable Development Policy) and 53.18 (WSUD Policy) of the City of Merri-bek Planning Scheme. This report demonstrates how the development meets policy objectives of Clauses 15.02 and 53.18 of the Planning Scheme.

This report confirms that a combination of sustainable building management practices, design initiatives, fixtures, systems, appliances, materials and finishes will be integrated into the building in order to attain a 4-star Green Star Buildings performance standard. The standard achieved is defined as Best Practice in terms of environmental design.

The development also meets the Best Practice standard for Urban Stormwater Quality and is therefore also consistent with the Moreland City Council's Stormwater Management objectives.

The site already has a planning permit for an analogous building and the revised design is limited to a largely internal redesign of apartment layouts to meet current apartment design standards. Ark Resources have been engaged from the outset of the redesign process to work iteratively with the project architect to inform the internal reconfiguration of apartments to achieve improved internal daylight access and amenity.

As demonstrated in Appendix F the current design is a significant improvement in terms of daylight access over the existing permit. There is a significant reduction in the number of kitchen/ living areas which do not meet the 'best practice' standard. Generally, the rooms which do not meet 'best practice' still have better daylight access in comparison to the approved scheme.

Accordingly, the performance outcomes achieved by the proposed development considered to be appropriate for a mixed-use development of this scale.

2.0 Introduction

Ark Resources has been engaged by Sky Jade Corporation to provide advice in relation to environmentally sustainable development outcomes from the proposed development at 718-724 Sydney Road, Coburg North.

The proposed mixed-use development at 718-724 Sydney Road, Coburg North has been designed to meet Clauses 15.02-1L (Environmentally Sustainable Development Policy) and 53.18 (WSUD Policy) of the City of Merri-bek Planning Scheme. This report demonstrates how the development meets policy objectives of Clauses 15.02 and 53.18 of the Planning Scheme.

This report contains a summary of:

- Environmental objectives adopted for the development
- Sustainable design initiatives integrated into the design of the project

Performance outcomes in this report are based on:

- Discussions and correspondence with Jonathan Lee, Konzepte

Architectural drawings prepared by Konzepte set out below.

Description	Drawing No.	Revision	Date
DRAWING REGISTER & DEVELOPMENT SUMMARY	X000	TP5	06/06/2023
SITE ANALYSIS PLAN	X001	TP5	06/06/2023
SITE CONTEXT/ NEIGHBOURHOOD DESCRIPTION PLAN	X002	TP5	06/06/2023
SITE FEATURE SURVEY	X003	TP5	06/06/2023
APARTMENT TYPES	X004	TP5	06/06/2023
APARTMENT TYPES	X005	TP5	06/06/2023
APARTMENT TYPES	X006	TP5	06/06/2023
APARTMENT TYPES	X007	TP5	06/06/2023
APARTMENT TYPES	X008	TP5	06/06/2023
APARTMENT TYPES	X009	TP5	06/06/2023
APARTMENT TYPES	X010	TP5	06/06/2023
APARTMENT TYPES	X011	TP5	06/06/2023
APARTMENT TYPES	X012	TP5	06/06/2023
APARTMENT TYPES	X013	TP5	06/06/2023
APARTMENT TYPES	X014	TP5	06/06/2023
APARTMENT TYPES	X015	TP5	06/06/2023
APARTMENT TYPES & SUMMARY	X017	TP5	06/06/2023
SHADOW STUDIES PROPOSED BUILDING/ENVELOPE	X018	TP5	06/06/2023
SHADOW STUDIES PROPOSED BUILDING/ENVELOPE	X019	TP5	06/06/2023
CONTEXT NEIGHBOURHOOD ELEVATION	X020	TP5	06/06/2023
SITE PLAN	X090	TP5	06/06/2023
BASEMENT PLAN 2	X100	TP5	06/06/2023
BASEMENT PLAN 1	X101	TP5	06/06/2023
GROUND FLOOR PLAN	X102	TP5	06/06/2023
LEVEL 01 & 02 PLAN	X103	TP5	06/06/2023
LEVEL 03 PLAN	X105	TP5	06/06/2023
LEVEL 04 PLAN	X106	TP5	06/06/2023
LEVEL 05 PLAN	X107	TP5	06/06/2023
ROOF PLAN	X108	TP5	06/06/2023
NORTH ELEVATION	X210	TP5	06/06/2023
SOUTH ELEVATION	X211	TP5	06/06/2023
EAST (PARK FACING) ELEVATION	X212	TP5	06/06/2023
WEST (SYDNEY ROAD) ELEVATION	X213	TP5	06/06/2023
EAST ELEVATION - INTERNAL COURTYARD	X214	TP5	06/06/2023
WEST ELEVATION - INTERNAL COURTYARD	X215	TP5	06/06/2023
SECTION A-A	X310	TP5	06/06/2023
SECTION B-B	X311	TP5	06/06/2023
SECTION C-C	X312	TP5	06/06/2023
SECTION D-D	X313	TP5	06/06/2023
PEDESTRIAN LINK STAIR/STEP DOWN TO PARK DETAILS	X600	TP5	06/06/2023
EXTERNAL MATERIAL & FINISHES	X820	TP5	06/06/2023

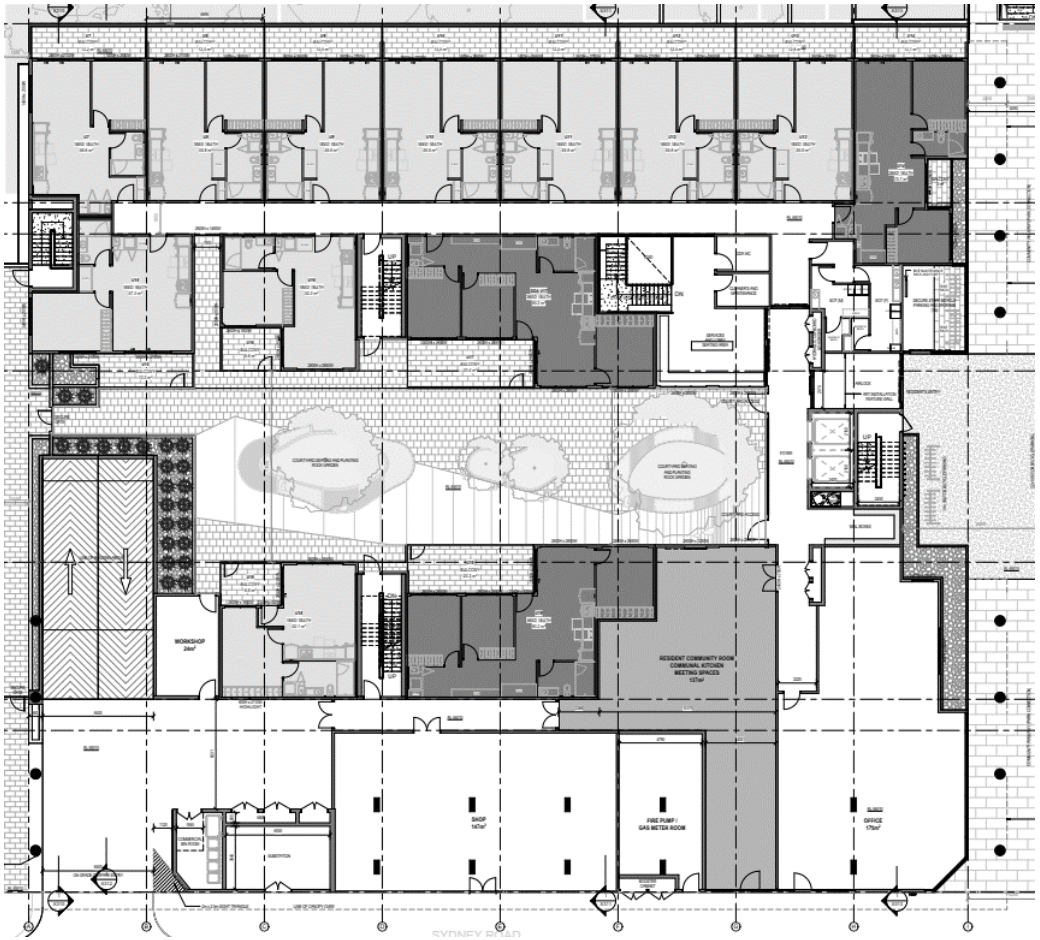
3.0 Site Description

The building comprises the following uses:

- 147 apartments/189 Bedrooms
- Commercial tenancies with a total NLA of approximately 320m^2; and
- Located within the Merri-bek City Council
- Site area 3177m2 (approximately)
- Surrounds mix of residential and commercial uses

A plan of the proposed development is provided below.

An image of the site and the surrounding locale is provided on the following page.




Mercy College - Stop 39
Renown St
Convent Ct
Merri Creek Trail
Carr St
Renown St
Alexander Ave
Renown St/Sydney Rd
Doug Hull
Adventure Park
Carr St/Sydney Rd
De Chene Playground
Merri Creek Trail
Alexander Ave
Nola St
De Chene Parade
Lake Grove
Batman Station
Gaffney St/Sydney Rd
Newlands Rd
Gaffney Street
Playground
Gaffney Street - Stop 37
Gaffney St
Golf Rd
Coburg Lake Reserve
Outdoor Gym
Cope St
Armstrong St
Ross St
Murray Rd
Deans St
Rani's Patch Library
Moonering Dr
Ryan St
Pentridge
Community Garden
Murray Rd
Rogers St/Sydney Rd

4.0 Key ESD Initiatives

A detailed analysis has been undertaken in order to nominate the ESD initiatives required and confirm the performance outcomes achieved. The results of this analysis are set out in the remainder of this report.

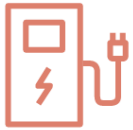
The following key sustainable design initiatives have been incorporated into this project:

Renewable Energy

Rooftop photovoltaic systems with a peak capacity of 76.4kW

Transport

Electric vehicle chargers and infrastructure



Water

Rainwater harvesting system for toilet flushing and irrigation

Performance

High-performance glazing and energy efficient building services, appliances and fixtures

An assessment of sustainable design outcomes of the proposed development has been undertaken with Green Star Buildings and MUSIC benchmarking tools. The information presented in this report demonstrates that:

Green Star Buildings

The development achieves a 4 Star Green Star Buildings performance standard

4 star

NatHERS Energy Ratings

The development achieves a 7 Star average NatHERS energy rating

7.0star

Stormwater

The development meets the Best Practice standard for stormwater quality.

5.0 MUSIC Modelling

To assess the quality of stormwater runoff from the site, an analysis has been undertaken using MUSIC Modelling software.

The proposed development exceeds the pollutant load reduction targets set out in the Best Practice Environmental Management Guidelines (BPEMG)

Reduction in Total Suspended Solids (TSS) load: **90.4**	Reduction in Total Phosphorus (TP) load: **66.4**
Reduction in Total Nitrogen (TN) load: **65.0**	Reduction in Gross Pollutants (GP) load: **100.0**

The results indicate that the project meets both the flow reduction, and pollutant (particulate and nutrient) reduction requirements of Green Star Buildings credit 39 Waterway Protection.

Refer to Appendix B.5 for the MUSIC rating results, Appendix B.6 for rainwater harvesting and reliability results and Appendix D for the WSUD Maintenance Manual.

A rainwater harvesting system will be installed comprising:

- Rainwater harvesting from all roofs, level 3 terraces, ground level East terraces (U7-U14), and ground level paving in other shared areas (approx. 2,726 m2):
- Filtration and treatment of all rainwater prior to draining into the tank
- Total storage volume of 85kL rainwater tanks
- Re-use of captured water for flushing of all toilets, and ground level irrigation.

In addition to the harvesting and re-use of rainwater, the following features will be incorporated into the proposed design to facilitate treatment of stormwater runoff:

A SPEL Vortceptor gross pollutant trap (or equivalent primary treatment device) located near stormwater Legal Point of Discharge to capture suspended solids and litter generated onsite.

6.0 NatHERS Energy Ratings

FirstRate5 (Version 5.3.1a (3.21)) energy ratings have been undertaken for a representative sample of the apartments.

The development achieves a 7.0 star average NatHERS rating which exceeds the Councils 'best practice' standard of 6.5 stars and represents a high standard of thermal efficiency.

Please refer to Appendix C for details of energy ratings and building construction assumptions.

NatHERS Rating Each dwelling in the development will achieve a minimum NatHERS energy rating of: 7.0 star	
Average Heating Load 75.0 MJ/m²	Average Cooling Load 17.7 MJ/m²

The results of the modelling confirm that:

- The development achieves a 7 star average NatHERS rating which exceeds the Councils 'best practice' standard of 6.5 stars and represents a high standard of thermal efficiency;
- All individual apartments have cooling loads of less than 22 MJ/m2 and therefore meet the energy efficiency objectives set out in clause 58.03-1 of the Planning Scheme for the relevant climate zone (NatHERS Climate Zone 60 Tullamarine);
- The average heating load of 75.0 MJ/m2 and the cooling load of 17.7 MJ/m2 are significantly less than the relevant threshold loads set out in NCC 2019 for Class 2 dwellings (average heating load <113 MJ/m2, average cooling load <47 MJ/m2), and;
- The individual apartment heating and cooling loads are significantly less than the relevant threshold loads set out in NCC 2019 for Class 2 dwellings (heating load <160 MJ/m2, cooling load <48 MJ/m2).

Apartment	Star Rating	Energy Demand (MJ/m2)		
		Total	Heating	Cooling
U1	8.1	61.7	60.0	1.7
U2	8.6	42.2	40.0	2.2
U6	8.6	41.9	34.8	7.1
U7	8.8	36.6	20.2	16.4
U13	8.7	39.7	25.6	14.1
U14	7.3	90.3	81.2	9.1
U15	7.1	97.7	78.7	19.0
U16	6.4	119.2	104.4	14.8
U18	6.4	118.4	102.9	15.5
U20	6.6	113.9	103.6	10.3
U23	8.3	52.9	31.3	21.6
U29	7.7	75.8	57.8	18.0
U30	7.0	98.5	79.6	18.9
U39	6.9	102.0	88.6	13.4
U41	7.8	71.7	50.2	21.5
U43	7.6	77.6	57.7	19.9
U75	7.1	94.7	73.5	21.2
U77	8.6	45.3	26.7	18.6
U78	8.9	31.3	10.1	21.2
U80	8.7	38.9	24.4	14.5
U98	7.9	64.7	47.7	17.0
U103	7.6	79.1	57.6	21.5
U120	6.8	107.6	89.0	18.6
U122	6.5	117.5	96.4	21.1
U124	6.2	123.6	101.8	21.8
U126	6.5	116.6	94.7	21.9
U127	6.4	123.1	102.9	20.2
U128	7.4	84.2	67.2	17.0
U131	6.8	106.8	85.4	21.4
U132	6.3	126.6	106.7	19.9
U134	7.1	95.8	74.2	21.6
U135	6.3	124.1	105.0	19.1
U137	6.1	132.4	110.6	21.8
U138	6.6	115.6	94.5	21.1
U140	7.9	67.1	46.6	20.5
U141	7.2	94.0	75.4	18.6
U142	7.6	79.1	59.5	19.6
U143	6.6	113.2	91.3	21.9
U144	6.1	135.9	117.7	18.2
U145	6.1	134.9	115.1	19.8
U146	6.1	134.4	114.0	20.4
U147	6.2	130.8	110.1	20.7
U148	6.2	128.8	110.1	18.7
Estimated Development Average	**7.0**	**92.7**	**74.9**	**17.8**

The energy ratings set out above indicate that the development will exceed the standard required by the National Construction Code 2019 in relation to residential sustainability.

Please refer to Appendix C for details of energy ratings and building construction assumptions

7.0 Green Star Building

The Green Star Buildings (v1 Rev B) tool has been used as a benchmarking framework for the proposed scheme and demonstrates that the development has the preliminary design potential to achieve a 4 Star standard.

A detailed Green Star assessment has been undertaken to confirm the credits achievable by the proposed scheme.

The initiatives which contribute to the 4 Star Green Star Buildings rating are detailed in Appendix A below.

Please note that this analysis is based on the best information currently available in relation to the technical and commercial feasibility of the initiatives proposed. Further investigation will be undertaken during design development which may result in change to the package of initiatives specified in order to meet the 4 Star Green Star standard.

Green Star Building Rating

4 star

Total Points Targeted

22 pts

Note that a minimum of 15 points must be achieved for a 4 star Green Star Buildings rating to be achieved. The development will attain a 4 star Green Star standard certified with the Green Building Council. A points margin of 30% has been incorporated into the pathway presented in this report as a contingency to allow for the inevitable change to the pathway inclusive of attrition which typically occurs during the detailed design and construction phases. This does not imply that the applicant commits to delivering more than the points required for the rating targeted.

Summary of Green Star Building credits targeted.

Credit		Target	Points
1	Industry Development	Credit Achievement	1
2	Responsible Construction	Credit Achievement	1
3	Verification and Handover	Minimum Expectation	
4	Operational Waste	Minimum Expectation	
5	Responsible Procurement		
6	Responsible Structure		
7	Responsible Envelope		
8	Responsible Systems		
9	Responsible Finishes	Credit Achievement	1
10	Clean Air	Minimum Expectation	
11	Light Quality	Minimum Expectation	
12	Acoustic Comfort	Minimum Expectation	
13	Exposure to Toxins	Credit Achievement	2
14	Amenity and Comfort		
15	Connection to Nature		
16	Climate Change Resilience	Minimum Expectation	
17	Operations Resilience		
18	Community Resilience		
19	Heat Resilience	Credit Achievement	1
20	Grid Resilience		
21	Upfront Carbon Emissions	Minimum Expectation	
22	Energy Use	Credit Achievement	3
23	Energy Source	Exceptional Performance	6
24	Other Carbon Emissions		
25	Water Use	Minimum Expectation	
26	Life Cycle Impacts		
27	Movement and Place	Credit Achievement	3
28	Enjoyable Places		
29	Contribution to Place		
30	Culture, Heritage and Identity		
31	Inclusive Construction Practices	Minimum Expectation	
32	Indigenous Inclusion		
33	Procurement and Workforce Inclusion		
34	Design for Inclusion		
35	Impacts to Nature	Credit Achievement	2
36	Biodiversity Enhancement		
37	Nature Connectivity		
38	Nature Stewardship		
39	Waterway Protection	Credit Achievement	2
40	Market Transformation		
41	Leadership Challenges		

Refer to Appendix A for details of credit requirements.

8.0 Conclusion

This report provides details of a comprehensive package of sustainable design features which will be integrated into the design and specification of the proposed mixed-use development in order to improve environmental outcomes during occupation.

In terms of performance outcomes, the analysis presented in this report demonstrates that the proposed development will:

- attain a 4 star Green Star standard based on the Buildings rating tool (V1 Rev B);
- achieve a 7.0 average star rating for the apartments; and
- attain the Best Practice standard for urban stormwater quality

Accordingly, the sustainable design outcomes from the proposed development are considered to be consistent with the objectives of Clauses 15.02-1L (Environmentally Sustainable Development Policy) and 53.18 (WSUD Policy) of the City of Merri-bek Planning Scheme. This report demonstrates how the development meets policy objectives of Clauses 15.02 and 53.18 of the Planning Scheme.

Please note that this analysis is based on the best information currently available in relation to the technical and commercial feasibility of the initiatives proposed. Further investigation will be undertaken during design development which may result in change to the package of initiatives specified in order to meet the 4 star Green Star Buildings

Green Star

The combination of design features and services initiatives meets all the standards for a Green Star Building Rating of:

4 star

NatHERS Energy Ratings

The development will have an average rating of:

7.0 star

Best Practice

The development meets the Best Practice standard for stormwater Quality

Appendix A. Green Star Building Pathway

The key design elements and processes which underpin the preliminary Green Star rating are summarised in the table below. The design attributes will be incorporated into the design in accordance with the technical criteria for each credit set out in the Green Star Buildings Technical Manual (v1 Revision B, 10 December 2021).

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
1 Industry Development The development facilitates industry transformation through partnership, collaboration, and data sharing	The building owner or developer appoints a Green Star Accredited Professional (GSAP).	1	Strategy Brief Concept Design Tender Construction Handover Use
	The building owner or developer discloses the cost of sustainable building practices to the GBCA. The project team must complete, and include in the submission, the Green Star Financial Transparency disclosure template. The template requires and enables the project team to submit the cost of sustainable building practices of the project including design, construction, and documentation to the GBCA.		
	The building owner or developer markets the building's sustainability achievements. The project team must: – Provide information from the project's marketing team must answer the questions in the submission form for a Green Star Case Study. The case study seeks information on the sustainability initiatives that the building targeted to enable it being featured on the GBCA's website – Detail how the building will detail its sustainability achievements to its stakeholders. The stakeholders are defined as the typical building occupants and visitors.		
	The building owner or developer appoints a Green Star Accredited Professional (GSAP).		
2 Responsible Construction The builder's construction practices reduce impacts and promote opportunities for improved environmental and social outcomes	The builder must have an environmental management system (large builders will need to be ISO14001 accredited).	MINIMUM EXPECTATION	Tender Construction
	The site must have a project specific Environmental Management Plan (EMP). The EMP must be developed to cover the scope of construction activities to assist the head contractor and its service providers to manage environmental performance conditions and impacts arising from demolition, excavation, and construction. It must be implemented from the start of construction and include all works within the project scope.		
	80% of Construction and demolition waste must be recycled.		
	The builder must have an environmental management system (large builders will need to be ISO14001 accredited).		
	Sustainability training is provided to construction workers.		

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
	The head contractor must provide the following training: – Information on the sustainable building certification(s) sought, including: · the sustainability attributes of the building and their benefits the value of certification · the role site worker(s) play in delivering a sustainable building		
	90% of construction and demolition waste is diverted from landfill, and waste contractors and facilities comply with the Green Star Construction and Demolition Waste Reporting Criteria	1	
3 Verification and Handover The building has been optimised and handed over to deliver a high level of performance in operation	The building is set up for optimum ongoing management due to its appropriate metering and monitoring systems. The building must have accessible energy and water metering for all common uses, major uses, and major sources. The meters must be connected to a monitoring system capable of capturing and processing the data produced by the meters. The monitoring system must accurately and clearly present the metered data and include reports on consumption trends for the automatic monitoring system.	MINIMUM EXPECTATION	Design Tender Construction Handover Use
	The building has set environmental performance targets, designed and tested for airtightness, been commissioned, and will be tuned. The project team must perform the following: – Prior to construction: · Set environmental performance targets · Perform a services and maintainability review · Design for airtightness – During construction and practical completion: · Commission the building · Engage building tuning service provider · Test for airtightness – After practical completion: · Tune the building over the next 12 months		
	The project team create and deliver operations and maintenance information to the facilities management team at the time of handover. Information is available to building users on how to best use the building. The project team must provide operations and maintenance information for all nominated building systems to the building owner (or designated representative). This means: – Appropriate content for all nominated building systems has been developed and provided		

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
	– The appropriate user group has access to the information they require to deliver best practice environmental outcomes – Guidance on keeping information up to date is provided to the facilities management team in these documents		
4 Operational Waste Operational waste can be separated and recovered in a safe and efficient manner The building must have appropriate spaces for waste management and an appropriately sized loading dock	The building is designed for the collection of separate waste streams. The building must provide bins or storage containers to building occupants to enable them to separate their waste. These bins must be labelled and easy to access, and evenly distributed throughout the building. They must also allow for separating the following as a minimum: – General waste going to landfill – Recycling streams to be collected by the building's waste collection service, including: · paper and cardboard · glass · plastic – One additional waste stream identified by the project team. This may include collecting any of the following waste types: · organics, e-waste, batteries etc.	MINIMUM EXPECTATION	Design Handover Use
	The building provides a dedicated and adequately sized waste storage area. A dedicated area, or areas, for the storage and collection of the applicable waste streams must be provided. The storage area must be sized to accommodate all bins or containers, for all applicable waste streams, for at least one collection cycle.		
	The building ensures safe and efficient access to waste storage areas for both occupants and waste collection contractors. A waste specialist and/or contractor must sign-off on the designs to confirm they are adequately sized and located for the safe and convenient storage and collection of the waste streams identified.		
9 Responsible Finishes The building's internal finishes are comprised of responsibly manufactured products	40% of all internal building finishes (by cost) meet a Responsible Products Value of at least 7 in accordance with the GBCA's Responsible Products Framework. Internal finishes include flooring, plasterboard, paints, ceilings, partitions, doors, internal windows or similar. Joinery used as part of a wall finish may be counted, e.g. wall panelling or fixed shelving/cupboards that make up a partition. Sealants and adhesives used for finishes are also included. Loose furniture is not included.	1	Design Tender Construction
10 Clean Air	Class 2 building ventilation systems must be designed to comply with the separation distances as outlined in the table in page 81 of the Green Star Buildings Submission Guidelines v1 Rev B. The table is based on the Australian Standards 1668.2:2012 (table 3.4) and applied in the same way.	MINIMUM EXPECTATION	Design Tender

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
Pollutants entering the building are minimised, and a high level of fresh air is provided to ensure levels of indoor pollutants are maintained at acceptable levels	All new and existing ductwork that serves the building must be cleaned prior to occupation in accordance with a recognised Standard.		Construction Handover Use
	The building must be provided with at an adequate amount of outside air. The regularly occupied areas must be provided with good access to outdoor air, appropriate for the activities and conditions by using one of the following options: Where ventilation is by mechanical means, the building must provide outdoor air as per AS1668.2:2012 for the default occupancy. Where ventilation is by natural means, the building must meet natural ventilation requirements as per AS1668.4:2012. Where active heating or cooling is provided, a dedicated and controlled outside air path must be constructed and commissioned at a rate of at least 2.5L/s per bedroom and living space, with a minimum of 5L/s per unit. Outside air must be provided to each space that is heated or cooled.		
	Point source pollutants must be exhausted directly outside (printers, kitchens).		
11 Light Quality The building provides good daylight and its lighting is of high quality	Lighting within the building meets minimum comfort requirements. Lighting within the building must meet the following requirements: – All LED lighting installed has no observable effect as per the standard IEEE 1789-2015 – Light sources must have a minimum Colour Rendering Index (CRI) 85 or higher – Light sources must meet best practice illuminance levels for each task within each space type with a maintained illuminance that meets the levels recommended in AS/NZS 1680.1:2006 – The maintained Illuminance values must achieve a uniformity of no less than that specified in Table 3.2 of AS/NZS 1680.1:2006, with a maintenance factor method as defined in AS/NZS 1680.4 – All light sources must have a maximum of 3 MacAdam Ellipses deviation.	MINIMUM EXPECTATION	Concept Design Tender
	Good lighting levels suitable for the typical tasks in each space are available.		
	Internal daylight levels within habitable rooms have been assessed using the BESS daylight factor method. The results of the analysis confirm that the proposed design provides significantly improved daylight levels compared to the Approved scheme. · Refer to Appendix F for details of the daylight simulation results for the Approved scheme and the proposed design.		

<table>
<tr><th>Green Star Credit
Project Outcomes</th><th>Credit outcomes</th><th>Target</th><th>Project Stage</th></tr>
<tr><td>12 Acoustic Comfort

The building provides acoustic comfort for building occupants</td><td>Internal noise levels from services and the outside is limited through an acoustic comfort strategy.
The Acoustic Comfort Strategy is to include:
– A summary of the Standards, legislation, guidelines, and other requirements that apply to the project
– The proposed performance metrics for each of the Acoustic Comfort criteria relevant to the different uses within the building and whether this exceeds minimum legislative or best practice guidelines
– Description of how the design solution is intended to achieve the proposed performance metrics</td><td>MINIMUM EXPECTATION</td><td>Design
Tender
Construction
Handover</td></tr>
<tr><td>13 Exposure to Toxins

The building’s occupants are not directly exposed to toxins in the spaces they spend time in</td><td>The building’s paints adhesives, sealants, and carpets are low in TVOC or non-toxic.
At least 95% of internally applied paints, adhesives, sealants (by volume) and carpets (by area) must meet stipulated ‘Total Volatile Organic Compounds (TVOC) Limits’ below.
Paints, Adhesives and Sealants
<table><tr><th>Product category</th><th>Max. Total Volatile Organic Compounds (TVOC) content in grams per litre (g/L) of ready to use product</th></tr><tr><td>General purpose adhesives and sealants</td><td>50</td></tr><tr><td>Interior wall and ceiling paint, all sheen levels</td><td>16</td></tr><tr><td>Trim, varnishes, and wood stains</td><td>75</td></tr><tr><td>Primers, sealers, and prep coats</td><td>65</td></tr><tr><td>One and two pack performance coatings for floors</td><td>140</td></tr><tr><td>Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives</td><td>250</td></tr><tr><td>Structural glazing adhesive, wood flooring and laminate adhesives and sealants</td><td>100</td></tr></table>Carpets
<table><tr><th>Compliance option</th><th>Test protocol</th><th>Limit</th></tr><tr><td rowspan="2">ASTM D5116</td><td>ASTM D5116 - Total VOC limit*</td><td>limit* 0.5mg/m² per hour</td></tr><tr><td>ASTM D5116 - 4-PC (4-Phenylcyclohexene) *</td><td>0.05mg/m² per hour</td></tr><tr><td>ISO 16000 / EN 13419</td><td>ISO 16000 / EN 13419 - TVOC at three days</td><td>0.5 mg/m² per hour</td></tr><tr><td>ISO 10580 / ISO/TC 219 (Document N238)</td><td>ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours</td><td>0.5mg/m² per hour</td></tr></table></td><td>MINIMUM EXPECTATION</td><td>Design
Tender
Construction
Handover</td></tr>
</table>

<table>
<tr><th>Green Star Credit Project Outcomes</th><th>Credit outcomes</th><th>Target</th><th>Project Stage</th></tr>
<tr><td></td><td>The building's engineered wood products are low in TVOC or non-toxic.
Either no new engineered wood products are used in the building, or at least 95% (by area) of all engineered wood products meet specified formaldehyde emission limits, as per the following:
<table>
<tr><th>Test protocol</th><th>Emissions Limit / Unit of Measurement</th></tr>
<tr><td>AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood</td><td>≤1mg/L</td></tr>
<tr><td>AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16</td><td>≤1.5 mg/L</td></tr>
<tr><td>AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16</td><td>≤1mg/L</td></tr>
<tr><td>AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)</td><td>≤1mg/L</td></tr>
<tr><td>Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL</td><td>≤1mg/L</td></tr>
<tr><td>JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460</td><td>≤1mg/L</td></tr>
<tr><td>JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460</td><td>≤1mg/L</td></tr>
<tr><td>JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)</td><td>≤0.1 mg/m²hr*</td></tr>
</table>
<table>
<tr><th>Test protocol</th><th>Emissions Limit / Unit of Measurement</th></tr>
<tr><td>ASTM D5116 (applicable to high pressure laminates and compact laminates)</td><td>≤0.1 mg/m²hr</td></tr>
<tr><td>ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates</td><td>≤0.1 mg/m²hr (at 3 days)</td></tr>
<tr><td>ASTM D6007</td><td>≤0.12mg/m³**</td></tr>
<tr><td>ASTM E1333</td><td>≤0.12mg/m³***</td></tr>
<tr><td>EN 717-1 (also known as DIN EN 717-1)</td><td>≤0.12mg/m</td></tr>
<tr><td>EN 717-2 (also known as DIN EN 717-2)</td><td>≤3.5mg/m²hr</td></tr>
</table>
</td><td></td><td></td></tr>
<tr><td></td><td>Occupants are not exposed to banned or highly toxic materials in the building.
A comprehensive hazardous materials survey must be carried out on any existing buildings or structures on the project site, in accordance with the relevant Environmental and Work Health and Safety (WHS) legislation.</td><td></td><td></td></tr>
<tr><td></td><td>On-site tests verify the building has low Volatile Organic Compounds (VOC) and formaldehyde levels as follows:
<table>
<tr><th>Element</th><th>Concentration</th></tr>
<tr><td>TVOC</td><td>0.27 ppm</td></tr>
<tr><td>Formaldehyde</td><td>0.02 ppm</td></tr>
</table>
</td><td>2</td><td></td></tr>
<tr><td>16 Climate Change Resilience
The building has been built to respond to the direct and indirect impacts of climate change</td><td>The project team completes the climate change pre-screening checklist. The project team communicates the building's exposure to climate change risks to the applicant</td><td>MINIMUM EXPECTATION</td><td>Strategy
Brief
Concept
Design</td></tr>
</table>

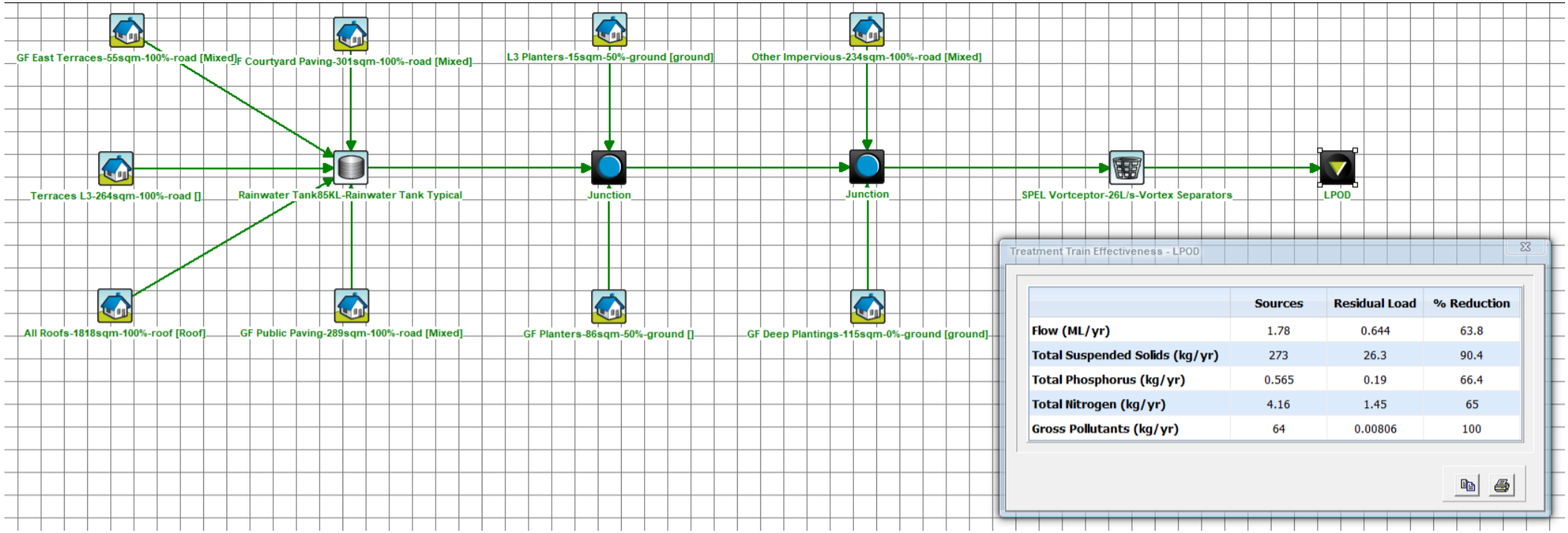
Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
19 Heat Resilience The building reduces its impact on heat island effect	At least 75% of the whole site area comprises of one or a combination of strategies that reduce the heat island effect. The strategies that can be used to reduce the heat island are: Vegetation – Green roofs – Roofing materials, including shading structures, having the following: · For roof pitched <15°– a three-year SRI of minimum 64 For roof pitched >15°– a three-year SRI of minimum 34 – Unshaded hard-scaping elements with a three-year SRI of minimum 34 or an initial SRI of minimum 39 – Hardscaping elements shaded by overhanging vegetation	1	Design Tender Construction
21 Upfront Carbon Emissions The building's upfront carbon emissions from materials and products have been reduced and offset	The building's upfront carbon emissions are at least 10% less than those of a reference building, calculated using the Upfront Carbon Emissions calculator.	MINIMUM EXPECTATION	Strategy Brief Concept Design
22 Energy Use (Residential Pathway) The building has low energy consumption	The building has a weighted-area average of NatHERS 6.5 stars The building meets at least NatHERS 5 stars for each sole-occupancy unit The building addresses domestic hot water demand.	MINIMUM EXPECTATION	Brief Concept Design Tender
	The building has a weighted-area average of NatHERS 7 Stars and at least NatHERS 5.5 Stars for each sole-occupancy unit. - All NatHERS ratings certified and produced by an Accredited Assessor. The building addresses four out of nine building services energy initiatives as described in the submission guidelines.	3	
23 Energy Source The building's energy comes from renewables	The building provides a Zero Carbon Action Plan. The Zero Carbon Action Plan must include a target date by when the building is expected to operate as fossil fuel free. The Zero Carbon Action Plan must cover all energy consumption, procurement, and generation and cannot rely on procuring renewable fuels as its only solution. It must also include infrastructure provided for tenants or future occupants such as gas installations for cooking.	MINIMUM EXPECTATION	Brief Concept Design Tender

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
	100% of the building's electricity comes from renewable electricity	3	
	100% of the building's energy comes from renewables (all electric)	3	
25 Water Use The building has low water use	The building installs efficient water fixtures: Taps 5 star Toilets 4 star Urinals 5 star Showers 3 star (<= 7.5 l/m) Dishwashers 5 star	MINIMUM EXPECTATION	Design Tender Construction Use
27 Movement and Place The building's design and location encourage occupants and visitors to use active, low carbon, and public transport options instead of private vehicles	There are showers, lockers, and change rooms in the building	MINIMUM EXPECTATION	Strategy Brief Concept Design Tender Construction
	The facilities are accessible, inclusive, and located in a safe and protected space		
	The building's access prioritises cycling and includes bicycle parking facilities – 149 secure bicycle spaces – Cycle maintenance rack and foot-pump – Staff EoT facilities including: – 2 showers, – 4 lockers – changing area with benching & ironing facilities Clear, safe and inclusive access to cyclist facilities via 2 lifts. 2-way ramp also provided (non-dedicated) – gradients of 1:10 or greater to incorporate minimum slip resistance classification of P5 in accordance with AS 4586.	3	
	Sustainable Transport Plan to be prepared and implemented.		
	EV charging infrastructure: – Chargers to 5% of car spaces: 6 chargers (minimum 7kW capacity) – EV charging to include load management supervisor hardware – Electrical containment e.g. trunking/conduit installed to facilitate future installation of cabling supplying a further 20% of car spaces (21spaces)		

Green Star Credit Project Outcomes	Credit outcomes	Target	Project Stage
	Transport options that reduce the need for private fossil fuel powered vehicles are prioritised.		
	Walkability encouraged via access to at least 10 amenities across 5 categories		
31 Inclusive Construction Practices The builder's construction practices promote diversity and reduces physical and mental health impacts	There are provisions for providing gender appropriate facilities and personal protective equipment The head contractor also installs policies on-site to increase awareness and reduces instances of discrimination, racism, and bullying	MINIMUM EXPECTATION	Strategy Brief Tender Construction
35 Impacts to Nature Ecological value is conserved and protected	The building was not built on, or significantly impacted, a site with a high ecological value	MINIMUM EXPECTATION	Strategy Brief Concept Design
	The building's light pollution has been minimised. All outdoor lighting on the project complies with AS/NZS4282:2019 Control of the obtrusive effects of outdoor lighting.		
	There is ongoing monitoring, reporting, and management of the site's wetland ecosystem		
	The project team must demonstrate how they have attempted to understand their site's historical and current ecological context by documenting the site's current ecological values by type and biomass. This includes terrestrial and aquatic ecological values, geologic features, and soils (including interaction with living things). When determining biodiversity value, the project must reference local, regional, state, and national priorities and strategies.	2	
	If deemed necessary by an Ecologist, at least 50% of existing site with high biodiversity value is retained.		
39 Waterway Protection Local waterways are protected, and the impacts of flooding and drought are reduced	The project demonstrates a reduction in average annual stormwater discharge (ML/yr) of 40% across the whole site (Refer to Appendix C.4 for discharge rates).	2	Concept Design Construction Handover
	Specified pollution reduction targets are met (Refer to Section 0 and 0 for MUSIC modelling results and assumptions)		
Total Green Star Points		**22**	
Green Star Rating		**4 Star**	

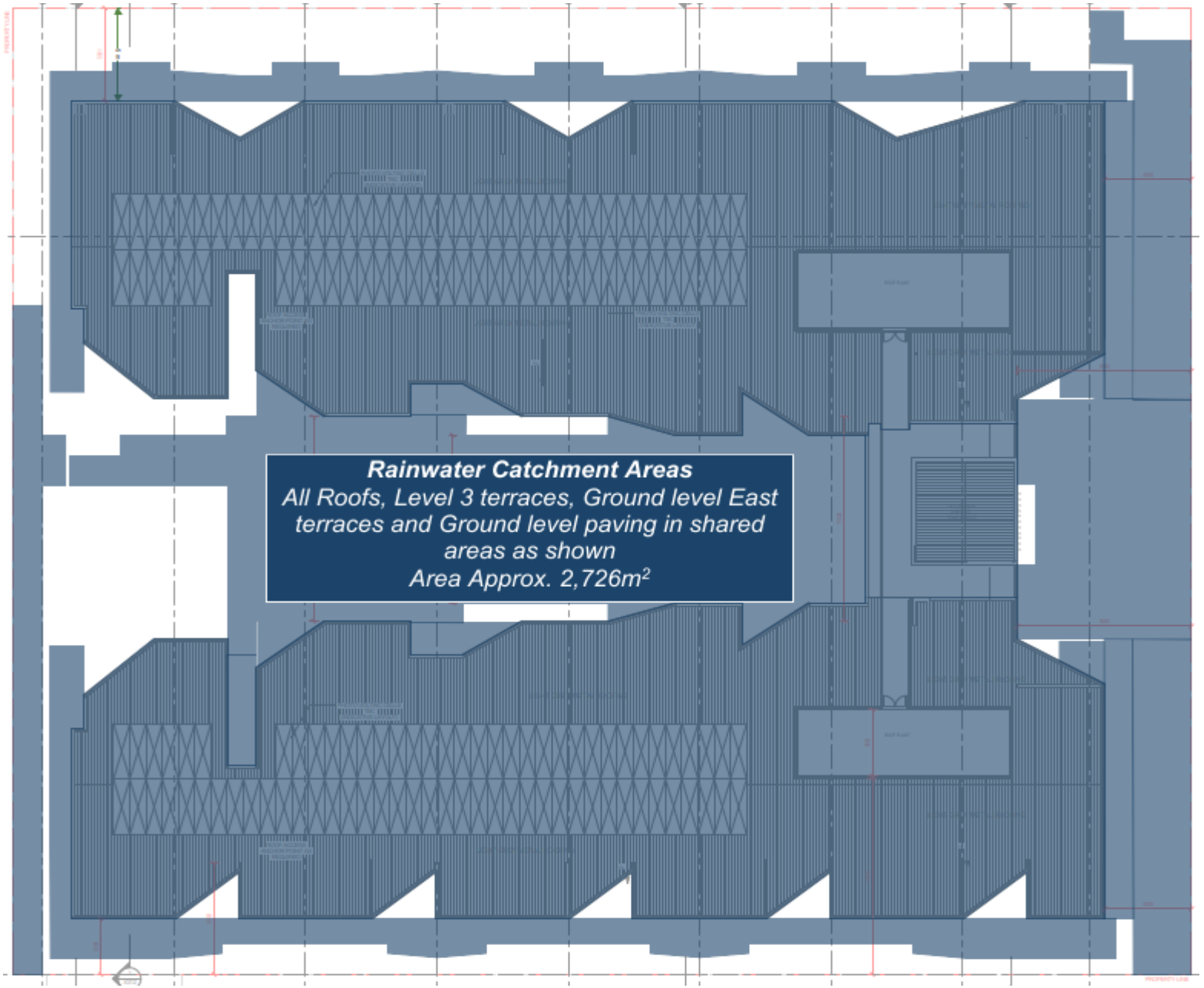
Appendix B. MUSIC Modelling

B.1 MUSIC Schematic



	Sources	Residual Load	% Reduction
Flow (ML/yr)	1.78	0.644	63.8
Total Suspended Solids (kg/yr)	273	26.3	90.4
Total Phosphorus (kg/yr)	0.565	0.19	66.4
Total Nitrogen (kg/yr)	4.16	1.45	65
Gross Pollutants (kg/yr)	64	0.00806	100

B.3 Rainwater Catchment Areas



B.4 MUSIC Modelling Assumptions and Inputs

Table 1: MUSIC Modelling Assumptions and Inputs

Area Name	Area [m^2]
Total Roof Areas to Rainwater Tank	2,727
All roofs including garages	1,818
Level 3 Terraces	264
Ground Courtyard paving	301
Ground East terraces (U7-U14)	55
Ground Public paving	289
Pervious Landscape Areas including permeable paving	115
Landscaping over basement	86
Level 3 Planters	15
Remaining Area	234
Total Site Area	**3,177**

Treatment Devices Features	
RWT	85 kL
Est. daily water demand for TF	3.96 kL/day
Explanation of which toilets	
Est. annual demand for irrigation	73 kL/yr
**Primary Treatment System 1 (GPT)	SPEL Vortceptor (26L/s) (or equivalent)

NOTES:

**Nutrient reduction (Phosphorous and Nitrogen) not attributed to GPT as per Melbourne Water MUSIC guidelines.

MUSIC v6.3.0 Input Parameters	
Rainfall data	
Rainfall Range & Station Name	C - Melbourne City (650-750mm)
10 Year Period	C - 1952-1961
Mean annual rainfall	C - 708mm
Evapotranspiration	C - 995
Time step	6 minutes
Estimation method	Stochastically generated
Soil properties - Melbourne	
Soil store capacity	120mm
Field capacity	50mm
GPT Pollutant Removal Rates	
Total Suspended Solids	70%
Total Phosphorous	0%
Total Nitrogen	0%
Gross Pollutants	98%
Validation report	CRC for Catchment Hydrology

Acronyms

RWT: Rain Water Tank
RG: Rain Garden
TF: Toilet Flushing
GPT: Gross Pollutant Trap

B.5 MUSIC Results

Table 2: MUSIC Results

Pollutant	MUSIC Model Results	Green Star Building Targets (Credit Achievement)	Melbourne Water Targets
Reduction in Stormwater Discharge	63.8%	40.0%	-
Reduction in Total Suspended Solids (TSS)	90.4%	85.0%	80.0%
Reduction in Total Phosphorus (TP)	66.4%	65.0%	45.0%
Reduction in Total Nitrogen (TN)	65.0%	45.0%	45.0%
Reduction in Total Gross Pollutants	100.0%	90.0%	70.0%
Compliance with Project Targets		**YES**	**YES**

B.6 Rainwater Harvesting and Tank Reliability

Propert 718-724 Sydney Rd, Cobu
Version

Inputs:

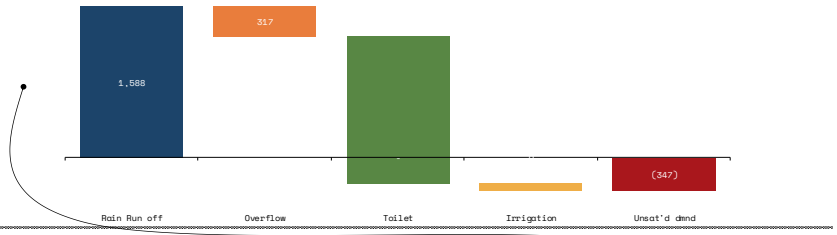
Commercial	Floor Area - NLA (m2)	384	
	PPL [M / F]	38	38
	Flush/Person/Day [M - Urin	2	
	Flush/Person/Day [M / F -	0.3	2.3
	Litres/Flush [Urinal / WC]	1	3.3
	Total Daily usage (litres)	406	
Residential	PPL	191	
	Flush/Person/Day	5	
	Litres/Flush	4	
	Total Daily usage (litres)	3820	
Development	Total Daily usage (litres)	4226	
	Roof area (m2)	2726	
	Collection Evaporation	5%	
	Tank Capacity (litres)	85000	
	Irrigation Area (m2)	190	
	T'off if Total Rain (mm)	10	
	in the last	5	days

Recalc, update pivots, table and graphs

Irrigation Schedule

	l /m2	S	M	T	W	Th	Fr	S
Jan	10		y			y		
Feb	10		y			y		
Mar	10		y			y		
Apr	5		y					
May	5			y				
Jun	5			y				
Jul	5				y			
Aug	5				y			
Sep	5					y		
Oct	5					y		
Nov	10						y	
Dec	10		y				y	

System components (kls per year)



System components (kls per year) based on 12 years of actual historical daily rainfall

12 years of Averages (kl)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	T
Rain Run off	107	111	97	165	134	138	122	138	133	124	172	148	1,5
Overflow	(8)	(3)	(0)	(9)	(9)	(6)	(9)	(4)	(9)	(6)	(0)	(4)	
Rain Water saved	89	87	78	126	116	112	113	124	114	97	121	93	1,2
Toilet	(131)	(119)	(131)	(127)	(131)	(127)	(131)	(131)	(127)	(131)	(127)	(130)	(1
(Shortfall)/Surplus before Irrigation	(42)	(32)	(53)	(1)	(15)	(15)	(18)	(7)	(13)	(34)	(5)	(37)	(2
Irrigation	(13)	(12)	(13)	(3)	(3)	(3)	(3)	(3)	(3)	(8)	(5)	(11)	(
Unsatisfied Demand	(55)	(44)	(67)	(4)	(18)	(17)	(21)	(10)	(16)	(36)	(10)	(48)	(3

Actual Years (kl)

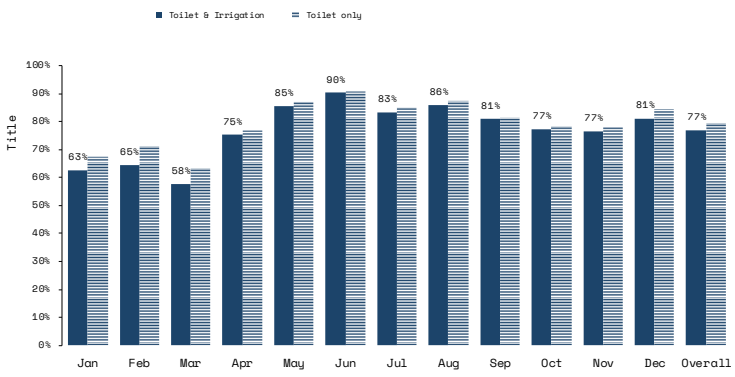
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	T
Rain Run off	1,297	2,020	2,005	1,629	1,756	1,228	1,262	1,747	1,616	1,448	1,082	1,974	19,0
Overflow	(221)	(620)	(619)	(273)	(389)	(105)	(35)	(312)	(324)	(309)	(35)	(567)	(3,4
Rain Water saved	1,076	1,401	1,386	1,356	1,367	1,122	1,228	1,435	1,293	1,140	1,048	1,407	15,2
Toilet	(1,543)	(1,543)	(1,543)	(1,547)	(1,543)	(1,543)	(1,543)	(1,547)	(1,543)	(1,543)	(1,543)	(1,538)	(18
(Shortfall)/Surplus before Irrigation	(466)	(142)	(156)	(191)	(176)	(420)	(315)	(112)	(250)	(403)	(495)	(131)	(3,2
Irrigation	(81)	(67)	(68)	(72)	(71)	(77)	(74)	(70)	(71)	(79)	(89)	(62)	(
Unsatisfied Demand	(547)	(209)	(225)	(263)	(247)	(497)	(389)	(183)	(321)	(482)	(584)	(193)	(4,1

box

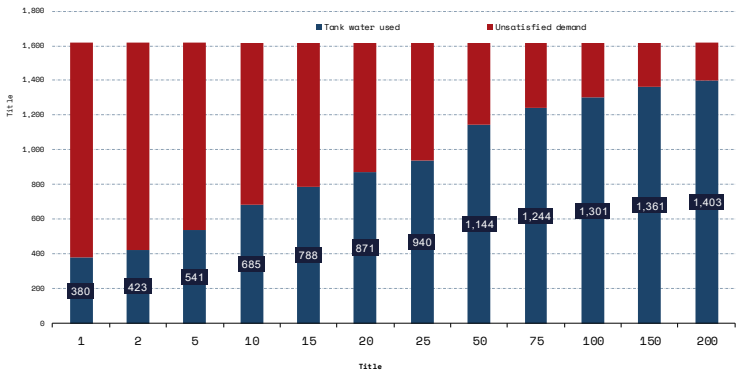
Reliability of supply (daily demand met)- Tank size what ifs

Tank	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Overall
1k	12%	10%	11%	16%	22%	21%	20%	26%	20%	18%	17%	13%	17%
2k	12%	10%	11%	16%	23%	22%	22%	27%	22%	19%	17%	15%	18%
5k	19%	18%	19%	26%	34%	33%	33%	38%	31%	28%	28%	22%	28%
10k	24%	24%	25%	34%	47%	46%	44%	50%	40%	37%	35%	31%	36%
20k	30%	32%	33%	47%	63%	60%	58%	64%	52%	50%	46%	46%	49%
50k	48%	53%	49%	70%	83%	81%	73%	82%	74%	65%	68%	72%	68%
100k	67%	68%	60%	77%	87%	91%	89%	88%	82%	79%	79%	82%	79%
200k	78%	76%	77%	82%	91%	97%	93%	95%	88%	81%	88%	84%	86%

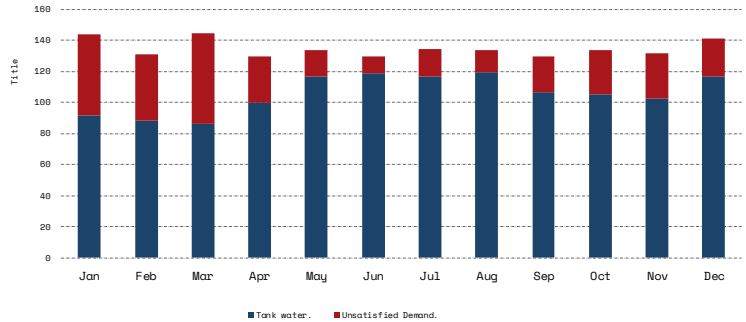
Graph 2 - Reliability of supply from tank (average across 12 years)



Graph 3 -Tank water used (per year) V Tank size Kls per year



Graph 4 - Tank water used v unsatisfied demand by month (kls per month)



Appendix C. NatHERS Energy Rating Assumptions

C.1 Building Materials

Element	Description		Added R Value
Floor Type	Basement 2: Concrete slab on ground Basement 1 to Level 5: Suspended concrete		
Floor Insulation	50mm Kingspan Kooltherm: Underside of level ground floors shared with car park and outside		R 2.3
	50mm Kingspan Kooltherm: Underside of level 1 to 5 floors shared with outside below		R 2.3
Wall Insulation	Lightweight party walls: Insulation R 2.0		R 2.0
	Lightweight corridor walls: Insulation R 1.5		R 1.5
	Precast concrete Lift & stairwell walls: Insulation R 0.7		R 0.7
	Precast concrete external walls: Insulation R 2.5		R 2.5
	Lightweight clad walls: Insulation R 2.5		R 2.5
Wall Colour	Solar Absorptance – 0.40 Light Grey Solar Absorptance – 0.80 Dark Charcoal	Solar Absorptance – 0.60 Light Bronze Solar Absorptance – 0.99 Night Sky	
Roof Insulation	Metal Deck roof: R 5.0 bulk insulation to ceiling; Anticon 60 to roof R 1.3		Roof R1.3 Ceiling R 5.0
	All apartment concrete ceilings shared with terraces above: R 2.30 insulation		R 2.30
Roof Colour	Solar Absorptance – 0.40		
Window Frames	Aluminium frames to all windows and glazed doors		

Element	Description	Added R Value
Window Colour	Solar Absorptance – 0.64 (Colorbond Wallaby or equivalent SA)	
Sky Lights	None	

NOTES

The added insulation R value must be equal to or higher than that specified above to meet the energy rating results.

All insulation specified for construction must meet Fire Engineer requirements

C.2 Glazing

Glazing Table 1: General Aluminium Double Glazed Argon filled Low e windows/Glazed Doors

Window Type	Description	Whole of Window Value		Location
		U	**SHGC**	
Aluminium Sliding Door	Capral 900 Series: Clear Double Glazed Low-e 6EA/12Ar/6	3.19	0.48	All apartments unless otherwise specified below
Aluminium Fixed Window	Capral 419 Series: Clear Double Glazed Low-e 6/12Ar/6EA	2.71	0.58	All apartments unless otherwise specified below
Aluminium Awning Window	Capral 35 Series: Clear Double Glazed Low-e 6EA/12Ar/6	4.42	0.41	All apartments unless otherwise specified below
Aluminium Hinged Door	Capral 200 Series: Clear Double Glazed Low-e 6EA/12Ar/6	3.6	0.44	All apartments unless otherwise specified below

Glazing Table 2: General Aluminium Double Glazed Argon filled Low e windows/Glazed Doors with Low SHGC (Insulglass or equivalent)

Window Type		Description	Whole of Window Value		Location
			U	SHGC	
Aluminium Awning Window		CAP 051-07 Double Glazed 24mm InsulglassMax 564-Air	4.4	0.20	As shown on Floor Plan Markups below
Aluminium Fixed Window	Specified Glazing	CAP -059-071 Double Glazed 24mm InsulglassMax 564-Air	2.7	0.26	As shown on Floor Plan Markups below
	Energy Rating Software Equivalent	CAP-055-50 419 Flushline Double glazed 8.38mm CPGy37/12Argon gap/6mm Clear	2.70	0.26	
Aluminium Sliding Door		CAP-057-19 Double Glazed Sliding door 24mm InsulglassMax 564-Air	2.69	0.25	As shown on Floor Plan Markups below
Aluminium Hinged Door		CAP-048-11 Double Glazed 24mm InsulglassMax 564-Air	3.6	0.21	As shown on Floor Plan Markups below

Glazing Table 3: Thermally Broken Aluminium Double Glazed Argon filled Low e windows/Glazed Doors sone with Low SHGC (Insulglass or equivalent)

Window Type		Description	Whole of Window Value		Location
			U	SHGC	
Aluminium TB Futureline 54W Series Awning Window		CAP-116-04 Double glazed 6mm EnergyTech Clear/12mm Argon/6mm Clear	2.87	0.39	Apartment U147
Aluminium TB Futureline Lift & Slide Door	Specified Glazing	CAP-133-03 Double glazed 24mm Insulglass Max 564 - Air	2.40	0.19	Apartment U147
	Energy Rating Software Equivalent	GJA-068-10 GJames Type 448 TB AL door DG 6mm DLE55(S2)Azur/12mm Air gap/6m Clear	2.46	0.19	
Aluminium TB Futureline 419TB Series Fixed		CAP-157-03 Double glazed 24mm Insulglass Max 564 - Air	2.16	0.23	Apartment U147

GLAZING NOTES

The energy rating software accredited by the Australian Building Codes Board contains a relatively limited library of window systems. When the glazing systems specified are not available in the software, the protocol requires that the glazing type which most closely matches the specified glazing is selected for the purpose of calculating the energy rating.

The table above sets out the glazing specified for the purposes of calculating the energy rating.

The whole of window U – Value must be equal or lower than the energy rating software value and the whole of window SHGC – Value must be within +/-5% of the energy rating software value.

Level 1 & 2 – Insulglass locations required for NatHERS

Level 3 – Insulglass locations required for NatHERS

Level 5 - Insulglass locations required for NatHERS

General Rating Assumptions

Item	Details
Floor Coverings	Tiles to bathrooms and laundries Carpet to bedrooms Timber boards to kitchen, living and all other areas
Window Coverings	Holland blinds to all windows. (Regulation Mode)1
Draught Proofing	Weather strips to all entry & external doors and windows. Seal all exhaust fans.
Down lights	Recessed down lights in ceiling /roof space to be fitted with fire proof unvented down light covers (external roof areas only) to provide air tightness and contact with insulation
General	All party walls are classed as neighbour walls.
Shading	Overshadowing from adjoining buildings has been incorporated into the energy ratings
Ceiling Calculation	Calculation for loss of ceiling insulation due to down lights, exhaust fans, ceiling speakers etc. have been incorporated into the energy rating where applicable

NOTES

Changes to any of the above stated specifications may affect energy performance and invalidate the energy ratings detailed in this report.

Sealing of gaps and cracks: inadequate sealing of gaps and cracks can negatively affect the energy performance of a dwelling. Provide sealing in accordance with NCC 2019 Part J3.

[1] Holland blinds are assumed as required by VBA Practice Note 55 (Clause 5.2). This assumption is for regulatory purposes only.

Appendix D. WSUD Maintenance Manual

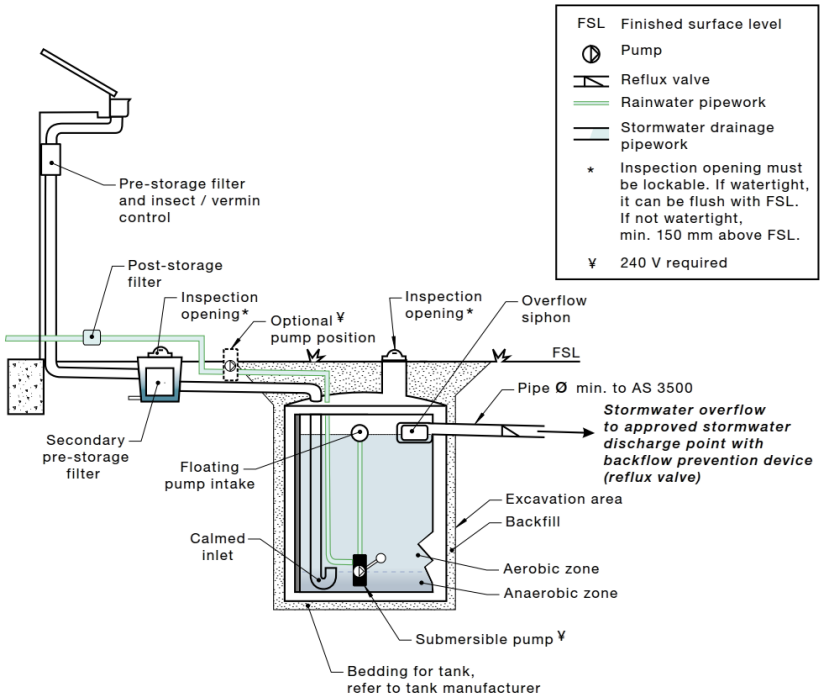
Once installed, a systematic maintenance program will be implemented by the owner's corporation maintenance contractor to ensure the rainwater harvesting system operates as designed and water quality is maintained.

The scope of the maintenance program will include inspection and rectification of issues associated with:

- Roof gutters and downpipes
- First flush screens and filtration devices
- Pumps
- Distribution pipework and reticulation systems
- Overflow systems

Inspections of the system and any maintenance works required will be undertaken on a quarterly basis or as per manufacturers guidelines.

The rainwater harvesting system will be installed in accordance with the guidelines set out in the Rainwater Design & Installation Handbook published by the National Water Commission[2]. A schematic diagram of the rainwater tank installation is provided below.



Rainwater Tank Element	Inspection Item	Y/N	Likely Maintenance Task
Roof gutters and downpipes	Is there leaf litter or debris in the gutters?		Remove by hand and dispose responsibly
First flush diverter	Is there anything blocking the first flush diverter (Leaves etc.)?		Remove by hand and dispose responsibly
Potable mains back up device	Is the potable mains back up switch operating correctly?		Repair or replace devise. Consider a manual switching device.
Mesh cover	Has the mesh cover deteriorated or have any holes in is?		Replace mesh cover.
Tank volume	Is there large amounts of sediment or debris sitting in the bottom of the tank, reducing the volume available in the tank to store water?		Remove sediment and dispose responsibly.
Pump	Is the pump working effectively? Have you heard it on a regular basis?		Check the potable mains back up is not permanently on. Repair or replace pump.
Pipes and taps	Are pipes and taps leaking?		Repair as needed.
Overflow	Is the overflow clear and connected to the storm water network?		Remove blockages and/or restore connections to stormwater network.

Maintenance Frequency												
	J	F	M	A	M	J	J	A	S	O	N	D
All tasks	X			X			X			X		

D.1 Gross Pollutant Trap (GPT) Maintenance Program

Once installed, a systematic maintenance program will be implemented by the landowner to ensure the GPT operates as designed and water quality is maintained.

Cleaning and maintenance will be carried out in accordance with the manufacturer's written guidelines. Maintenance requirements and frequencies are dependent on the pollutant load characteristics.

The scope of the maintenance program will include inspection and rectification of issues associated with:

- Manhole cover
- Inlet pipe
- Outlet
- Screening area
- Collection area

Inspections of the GPT and any maintenance works required will be undertaken as outlined as a guide in the maintenance schedule below. Manufacturer's guidelines will take precedence.

Component	Maintenance Action
3-6 MONTHLY	
	Check components for damage. Check that the inlet and outlet are free from debris or obstructions. Remove large floating pollutants. Measure sediment depth.
12-24 MONTHLY (or as guided by sediment depth)	
	Removal of accumulated sediment and gross pollutants. Inspection of screen and cleaning if required.

Appendix E. Solar Photovoltaics

During the construction phase, high-efficiency solar PV modules with a total capacity of 76.4 kWp will be installed at roof level as per the preliminary layout indicated below.

PV modules should be oriented in pairs to the east and west at 10-15° tilt and have at least 400Wp capacity (i.e. over 33% more efficient than traditional 300Wp 60-cell modules). High-efficiency modules deliver more compact arrays with inherently lower embodied ecological impact per unit of generation than standard efficiency modules.

The undulating east-west configuration prevents self-shadowing of the array and provides a low-profile installation with maximised packing factor. It also helps maximise self-consumption due to its flatter and broader power output yield profile.

Total yield of this array will be approximately 92 MWh per annum equating to an estimated annual carbon emissions offset of 92 tonnes C02-e per annum.

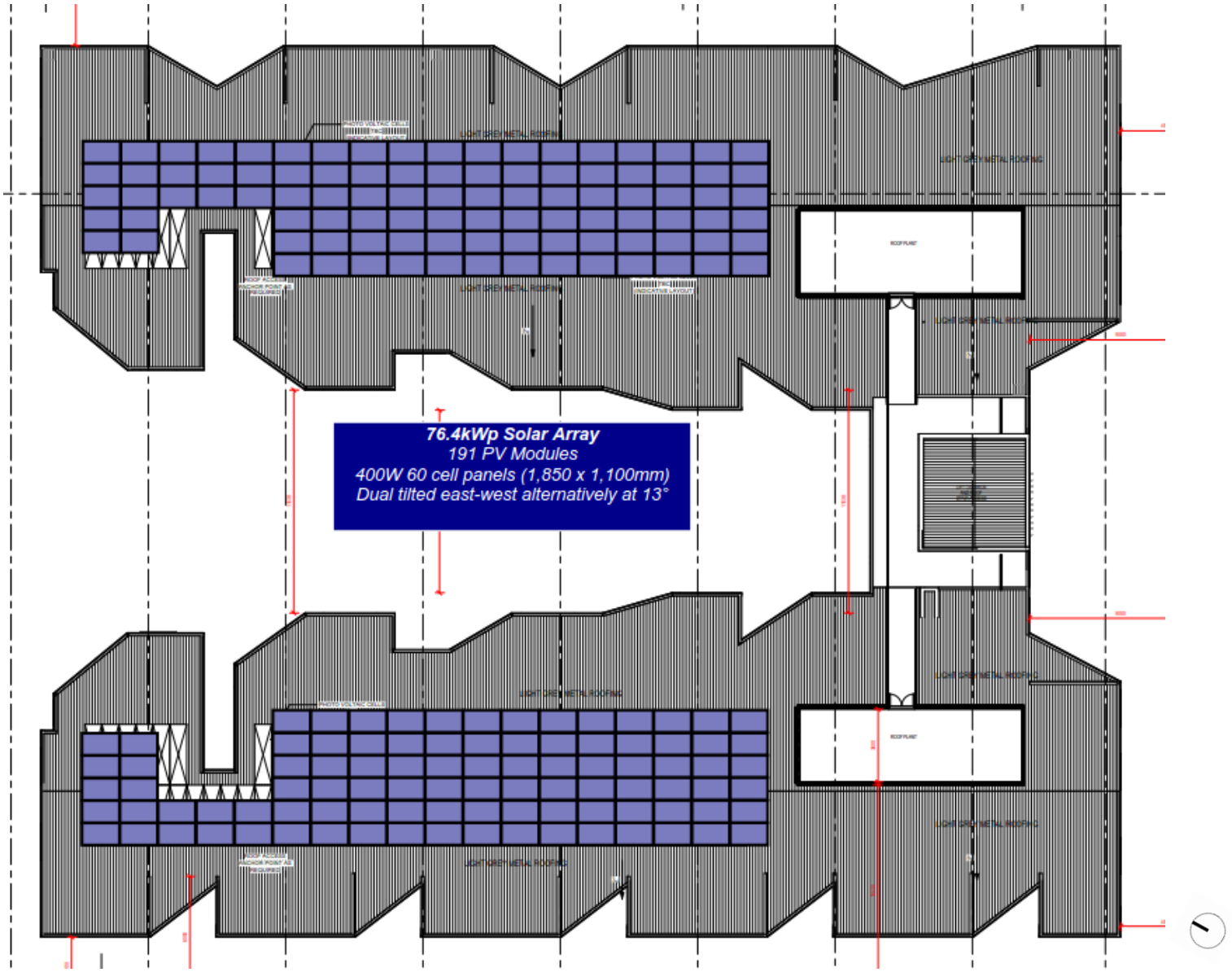


Figure 1 Indicative Solar Photovoltaic array layout

East facing array output

RESULTS

48,641 kWh/Year*

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	6.87	6,247
February	6.16	5,137
March	5.10	4,822
April	3.60	3,298
May	2.47	2,375
June	2.20	2,078
July	2.19	2,142
August	2.95	2,873
September	4.10	3,834
October	5.02	4,765
November	5.52	5,016
December	6.67	6,055
Annual	4.40	48,642

Location and Station Identification	
Requested Location	718 Sydney Road Coburg Victoria Australia
Weather Data Source	Lat, Lng: -37.75, 144.98 1.2 mi
Latitude	37.75° S
Longitude	144.98° E

PV System Specifications	
DC System Size	38.2 kW
Module Type	Premium
Array Type	Fixed (open rack)
System Losses	11.42%
Array Tilt	13°
Array Azimuth	63°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics	
DC Capacity Factor	14.5%

West facing array output

RESULTS

43,713 kWh/Year*

Month	Solar Radiation (kWh / m^2 / day)	AC Energy (kWh)
January	6.84	6,243
February	5.86	4,892
March	4.52	4,262
April	2.99	2,698
May	1.97	1,845
June	1.62	1,434
July	1.63	1,518
August	2.35	2,243
September	3.55	3,299
October	4.61	4,361
November	5.43	4,941
December	6.55	5,978
Annual	3.99	43,714

Location and Station Identification	
Requested Location	718 Sydney Road Coburg Victoria Australia
Weather Data Source	Lat, Lng: -37.75, 144.98 1.2 mi
Latitude	37.75° S
Longitude	144.98° E

PV System Specifications	
DC System Size	38.2 kW
Module Type	Premium
Array Type	Fixed (open rack)
System Losses	11.42%
Array Tilt	13°
Array Azimuth	243°
DC to AC Size Ratio	1.2
Inverter Efficiency	96%
Ground Coverage Ratio	0.4%
Albedo	*From weather file*
Bifacial	No (0)

Monthly Irradiance Loss	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

Performance Metrics	
DC Capacity Factor	13.1%

Appendix F. Daylight Modelling Comparison

F.1 Comparative Daylight Assessment

An analysis of internal daylight levels within habitable rooms has been undertaken using IES VE software to benchmark the outcomes of the proposed design in comparison to the Approved scheme (Permit MPS/2015/595/A). The results are summarised in the tables below.

F.2 Summary of Results

Room Type	Level	Total number of rooms		Number of rooms meeting 'best practice'		Percentage of rooms meeting 'best practice'	
		Approved Scheme	Proposed Design	Approved Scheme	Proposed Design	Approved Scheme	Proposed Design
Kitchen/ Living	Basement 2	3	3	3	3	100%	100%
	Basement 1	4	3	4	3	100%	100%
	Ground Floor	12	13	0	9	0%	69%
	Level 1	22	28	4	17	18%	61%
Bedrooms	Basement 2	7	6	4	6	57%	100%
	Basement 1	9	6	5	6	56%	100%
	Ground Floor	24	18	16	16	67%	89%
	Level 1	45	35	27	33	60%	94%

F.3 Whole of Development Extrapolation

Room Type	Number of rooms meeting 'best practice'		Percentage of rooms meeting 'best practice'	
	Approved Scheme	Proposed Design	Approved Scheme	Proposed Design
Kitchen/ Living	68	112	56%	76%
Bedrooms	194	183	80%	97%

Expected results developed from extrapolation of simulated rooms located on B2-L1

F.4 Individual Room Results

Kitchen/ Living Areas

Room (Approved Scheme)	Level	DF % > 1	Room (Proposed Design)	Level	DF % > 1
Unit 1	Basement 2	100	Unit 1	Basement 2	92.7
Unit 2	Basement 2	96.4	Unit 2	Basement 2	100
Unit 3	Basement 2	95.4	Unit 3	Basement 2	100
Unit 4	Basement 1	99.3	Unit 4	Basement 1	100
Unit 5	Basement 1	98.4	Unit 5	Basement 1	100
Unit 6	Basement 1	99.4	Unit 6	Basement 1	100
Unit 7	Basement 1	97.8	Unit 7	Ground Floor	100
Unit 8	Ground Floor	54.1	Unit 8	Ground Floor	100
Unit 9	Ground Floor	57.6	Unit 9	Ground Floor	100
Unit 10	Ground Floor	57.8	Unit 10	Ground Floor	100
Unit 11	Ground Floor	59.4	Unit 11	Ground Floor	100
Unit 12	Ground Floor	83.9	Unit 12	Ground Floor	100
Unit 13	Ground Floor	20.5	Unit 13	Ground Floor	100
Unit 14	Ground Floor	0.0	Unit 14	Ground Floor	97.0
Unit 15	Ground Floor	0.0	Unit 15	Ground Floor	80.1
Unit 16	Ground Floor	0.0	Unit 16	Ground Floor	62.4
Unit 17	Ground Floor	8.4	Unit 17	Ground Floor	60.8
Unit 18	Ground Floor	13.7	Unit 18	Ground Floor	96.1
Unit 19	Ground Floor	5.5	Unit 19	Ground Floor	70.8
Unit 20	Level 1	44.6	Unit 20	Level 1	93.1
Unit 21	Level 1	61.6	Unit 21	Level 1	100
Unit 22	Level 1	63.5	Unit 22	Level 1	100
Unit 23	Level 1	63.7	Unit 23	Level 1	100
Unit 24	Level 1	100	Unit 24	Level 1	100

Room (Approved Scheme)	Level	DF % > 1	Room (Proposed Design)	Level	DF % > 1
Unit 25	Level 1	71.1	Unit 25	Level 1	100
Unit 26	Level 1	48.8	Unit 26	Level 1	100
Unit 27	Level 1	10.1	Unit 27	Level 1	93.7
Unit 28	Level 1	0.0	Unit 28	Level 1	100
Unit 29	Level 1	14.9	Unit 29	Level 1	71.0
Unit 30	Level 1	43.9	Unit 30	Level 1	58.1
Unit 31	Level 1	65.5	Unit 31	Level 1	51.0
Unit 32	Level 1	22.5	Unit 32	Level 1	42.5
Unit 33	Level 1	0.4	Unit 33	Level 1	60.5
Unit 34	Level 1	21.8	Unit 34	Level 1	100
Unit 35	Level 1	41.4	Unit 35	Level 1	73.1
Unit 36	Level 1	100	Unit 36	Level 1	62.3
Unit 37	Level 1	100	Unit 37	Level 1	54.5
Unit 38	Level 1	69.1	Unit 38	Level 1	41.8
Unit 39	Level 1	69.7	Unit 39	Level 1	51.8
Unit 40	Level 1	100	Unit 40	Level 1	91.4
Unit 41	Level 1	45.3	Unit 41	Level 1	100
			Unit 42	Level 1	100
			Unit 43	Level 1	100
			Unit 44	Level 1	100
			Unit 45	Level 1	100
			Unit 46	Level 1	100
			Unit 47	Level 1	82.8

Table 2: Internal Daylight Factor Results for Kitchen/ Living areas.

Bedrooms

Room (Approved Scheme)	Level	DF % > 0.5	Room (Proposed Design)	Level	DF % > 0.5
Unit 1 Bedroom 1	Basement 2	16.9	Unit 1 Bedroom 1	Basement 2	100
Unit 1 Bedroom 2	Basement 2	100	Unit 1 Bedroom 2	Basement 2	100
Unit 1 Bedroom 3	Basement 2	100	Unit 2 Bedroom 1	Basement 2	100
Unit 2 Bedroom 1	Basement 2	46.9	Unit 2 Bedroom 2	Basement 2	100
Unit 2 Bedroom 2	Basement 2	100	Unit 3 Bedroom 1	Basement 2	100
Unit 3 Bedroom 1	Basement 2	47.2	Unit 3 Bedroom 2	Basement 2	100
Unit 3 Bedroom 2	Basement 2	100	Unit 4 Bedroom 1	Basement 1	100
Unit 4 Bedroom 1	Basement 1	18.1	Unit 4 Bedroom 2	Basement 1	100
Unit 4 Bedroom 2	Basement 1	100	Unit 5 Bedroom 1	Basement 1	100
Unit 4 Bedroom 3	Basement 1	100	Unit 5 Bedroom 2	Basement 1	100
Unit 5 Bedroom 1	Basement 1	48.7	Unit 6 Bedroom 1	Basement 1	100
Unit 5 Bedroom 2	Basement 1	100	Unit 6 Bedroom 2	Basement 1	100
Unit 6 Bedroom 1	Basement 1	48.4	Unit 7 Bedroom 1	Ground Floor	100
Unit 6 Bedroom 2	Basement 1	100	Unit 8 Bedroom 1	Ground Floor	100
Unit 7 Bedroom 1	Basement 1	48.3	Unit 9 Bedroom 1	Ground Floor	100
Unit 7 Bedroom 2	Basement 1	100	Unit 10 Bedroom 1	Ground Floor	100
Unit 8 Bedroom 1	Ground Floor	24.5	Unit 11 Bedroom 1	Ground Floor	100
Unit 8 Bedroom 2	Ground Floor	100	Unit 12 Bedroom 1	Ground Floor	100
Unit 9 Bedroom 1	Ground Floor	40.3	Unit 13 Bedroom 1	Ground Floor	100
Unit 9 Bedroom 2	Ground Floor	100	Unit 14 Bedroom 1	Ground Floor	100
Unit 10 Bedroom 1	Ground Floor	44.5	Unit 14 Bedroom 2	Ground Floor	80.4
Unit 10 Bedroom 2	Ground Floor	100	Unit 15 Bedroom 1	Ground Floor	100
Unit 11 Bedroom 1	Ground Floor	45.6	Unit 16 Bedroom 1	Ground Floor	100
Unit 11 Bedroom 2	Ground Floor	100	Unit 17 Bedroom 1	Ground Floor	100
Unit 12 Bedroom 1	Ground Floor	46.6	Unit 17 Bedroom 2	Ground Floor	100
Unit 12 Bedroom 2	Ground Floor	100	Unit 17 Bedroom 3	Ground Floor	100

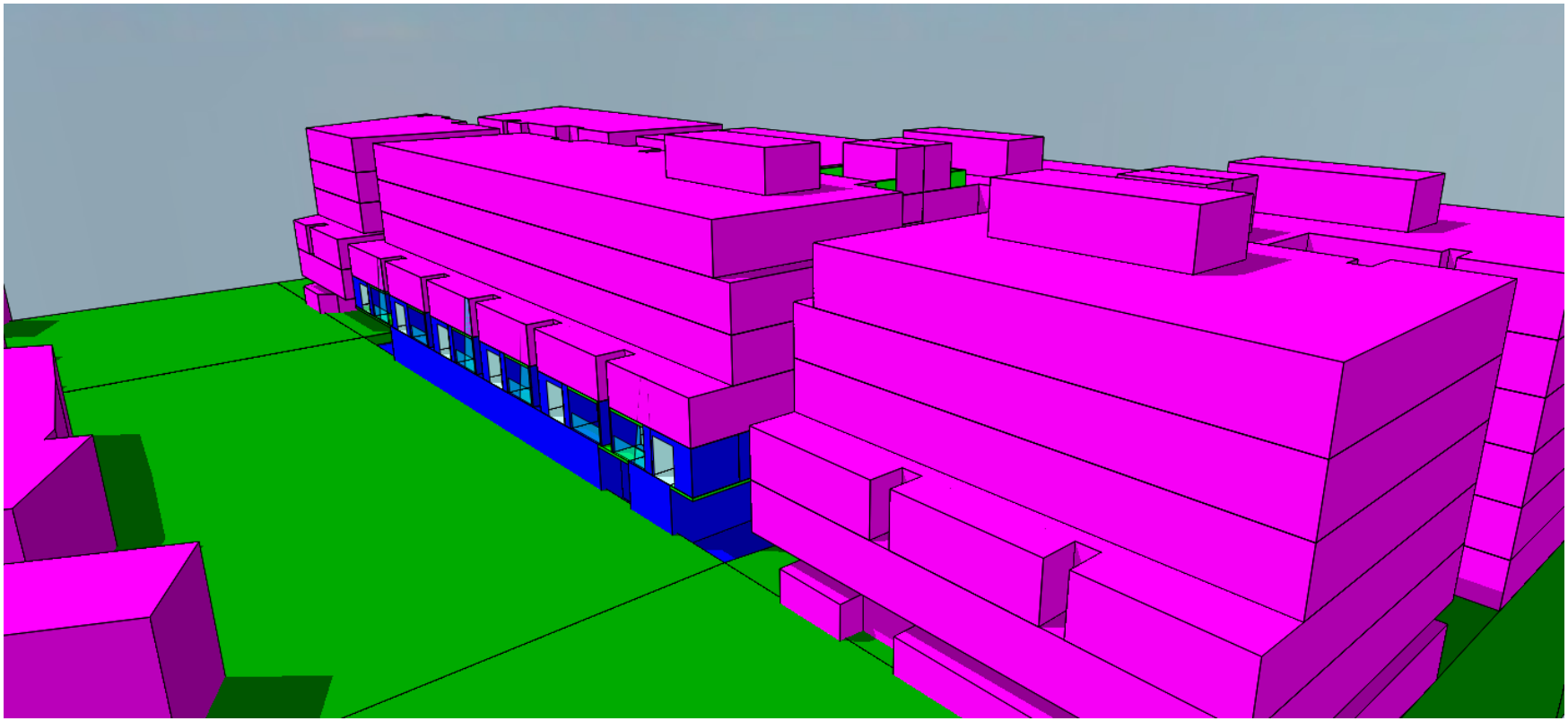
Room (Approved Scheme)	Level	DF % > 0.5	Room (Proposed Design)	Level	DF % > 0.5
Unit 12 Bedroom 3	Ground Floor	100	Unit 18 Bedroom 1	Ground Floor	28.0
Unit 13 Bedroom 1	Ground Floor	100	Unit 19 Bedroom 1	Ground Floor	100
Unit 13 Bedroom 2	Ground Floor	100	Unit 19 Bedroom 2	Ground Floor	100
Unit 14 Bedroom 1	Ground Floor	100	Unit 19 Bedroom 3	Ground Floor	100
Unit 14 Bedroom 2	Ground Floor	100	Unit 20 Bedroom 1	Level 1	100
Unit 15 Bedroom 1	Ground Floor	100	Unit 20 Bedroom 2	Level 1	100
Unit 15 Bedroom 2	Ground Floor	100	Unit 21 Bedroom 1	Level 1	100
Unit 16 Bedroom 1	Ground Floor	37.4	Unit 22 Bedroom 1	Level 1	100
Unit 17 Bedroom 1	Ground Floor	100	Unit 23 Bedroom 1	Level 1	100
Unit 17 Bedroom 2	Ground Floor	100	Unit 24 Bedroom 1	Level 1	100
Unit 18 Bedroom 1	Ground Floor	6.7	Unit 25 Bedroom 1	Level 1	100
Unit 18 Bedroom 2	Ground Floor	100	Unit 26 Bedroom 1	Level 1	100
Unit 19 Bedroom 1	Ground Floor	100	Unit 27 Bedroom 1	Level 1	100
Unit 19 Bedroom 2	Ground Floor	51.0	Unit 27 Bedroom 2	Level 1	100
Unit 20 Bedroom 1	Level 1	27.6	Unit 28 Bedroom 1	Level 1	100
Unit 20 Bedroom 2	Level 1	49.9	Unit 29 Bedroom 1	Level 1	97.5
Unit 20 Bedroom 3	Level 1	100	Unit 30 Bedroom 1	Level 1	100
Unit 21 Bedroom 1	Level 1	45.9	Unit 31 Bedroom 1	Level 1	93.5
Unit 21 Bedroom 2	Level 1	100	Unit 32 Bedroom 1	Level 1	49.2
Unit 22 Bedroom 1	Level 1	45.7	Unit 33 Bedroom 1	Level 1	100
Unit 22 Bedroom 2	Level 1	100	Unit 33 Bedroom 2	Level 1	92.5
Unit 23 Bedroom 1	Level 1	48.0	Unit 34 Bedroom 1	Level 1	100
Unit 23 Bedroom 2	Level 1	100	Unit 35 Bedroom 1	Level 1	96.0
Unit 24 Bedroom 1	Level 1	47.2	Unit 36 Bedroom 1	Level 1	100
Unit 24 Bedroom 2	Level 1	100	Unit 37 Bedroom 1	Level 1	96.2
Unit 25 Bedroom 1	Level 1	100	Unit 38 Bedroom 1	Level 1	53.9
Unit 25 Bedroom 2	Level 1	92.2	Unit 39 Bedroom 1	Level 1	92.4

Room (Approved Scheme)	Level	DF % > 0.5	Room (Proposed Design)	Level	DF % > 0.5
Unit 25 Bedroom 3	Level 1	64.0	Unit 39 Bedroom 2	Level 1	100
Unit 26 Bedroom 1	Level 1	43.3	Unit 40 Bedroom 1	Level 1	100
Unit 26 Bedroom 2	Level 1	70.0	Unit 40 Bedroom 2	Level 1	100
Unit 27 Bedroom 1	Level 1	100	Unit 41 Bedroom 1	Level 1	100
Unit 28 Bedroom 1	Level 1	100	Unit 42 Bedroom 1	Level 1	100
Unit 28 Bedroom 2	Level 1	100	Unit 43 Bedroom 1	Level 1	100
Unit 29 Bedroom 1	Level 1	100	Unit 44 Bedroom 1	Level 1	100
Unit 29 Bedroom 2	Level 1	100	Unit 45 Bedroom 1	Level 1	100
Unit 30 Bedroom 1	Level 1	100	Unit 46 Bedroom 1	Level 1	100
Unit 30 Bedroom 2	Level 1	100	Unit 47 Bedroom 1	Level 1	100
Unit 31 Bedroom 1	Level 1	100	Unit 47 Bedroom 2	Level 1	100
Unit 31 Bedroom 2	Level 1	100	Unit 47 Bedroom 3	Level 1	100
Unit 32 Bedroom 1	Level 1	100			
Unit 32 Bedroom 2	Level 1	100			
Unit 33 Bedroom 1	Level 1	100			
Unit 33 Bedroom 2	Level 1	100			
Unit 34 Bedroom 1	Level 1	75.6			
Unit 35 Bedroom 1	Level 1	33.7			
Unit 35 Bedroom 2	Level 1	100			
Unit 36 Bedroom 1	Level 1	85.0			
Unit 36 Bedroom 2	Level 1	82.8			
Unit 36 Bedroom 3	Level 1	100			
Unit 37 Bedroom 1	Level 1	100			
Unit 37 Bedroom 2	Level 1	39.4			
Unit 38 Bedroom 1	Level 1	100			
Unit 38 Bedroom 2	Level 1	45.4			
Unit 39 Bedroom 1	Level 1	100			

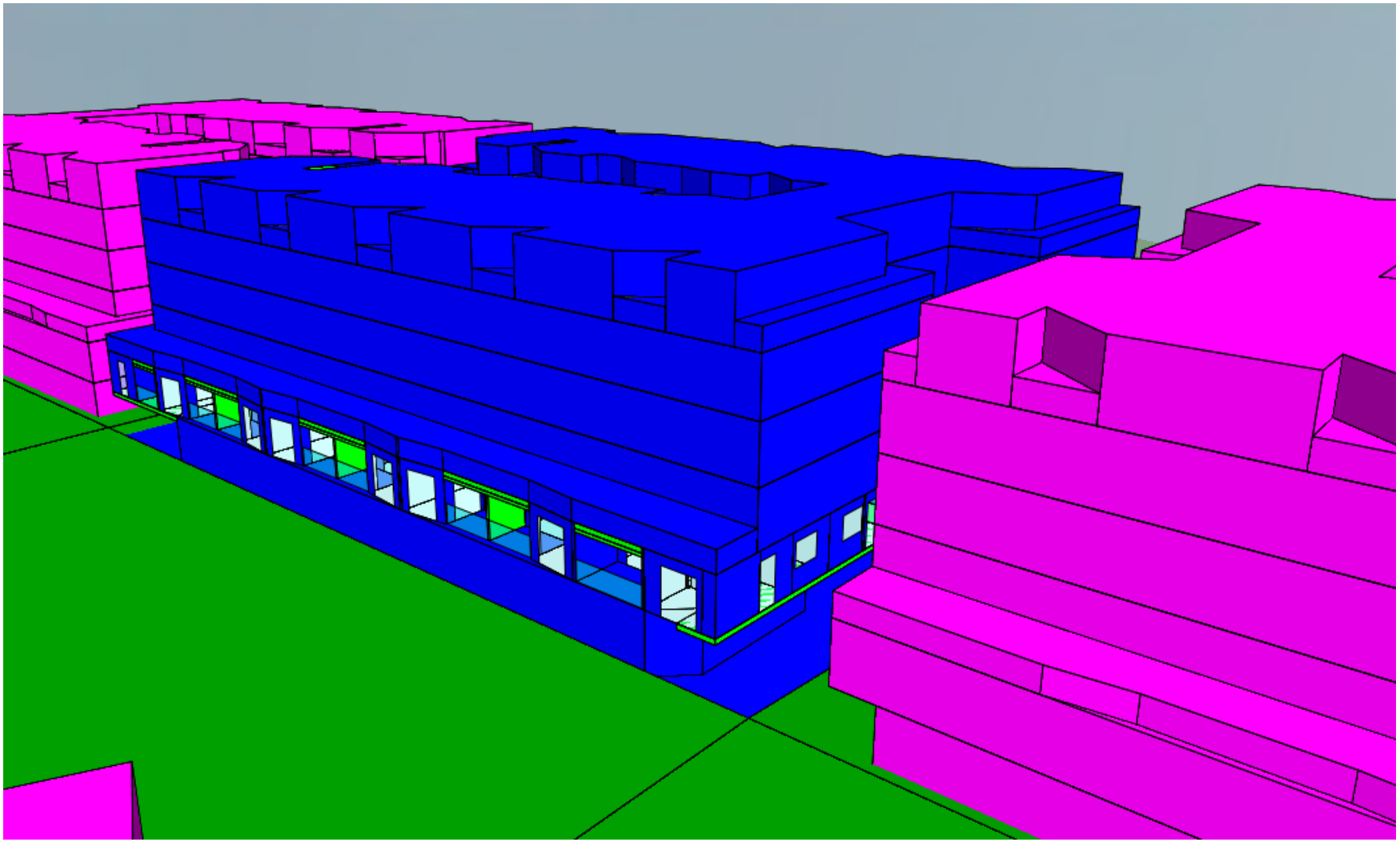
Room (Approved Scheme)	Level	DF % > 0.5	Room (Proposed Design)	Level	DF % > 0.5
Unit 39 Bedroom 2	Level 1	39.1			
Unit 40 Bedroom 1	Level 1	100			
Unit 40 Bedroom 2	Level 1	40.4			
Unit 41 Bedroom 1	Level 1	100			
Unit 41 Bedroom 2	Level 1	52.4			
Unit 41 Bedroom 3	Level 1	31.2			

Table 3: Internal Daylight Factor Results for Bedrooms.

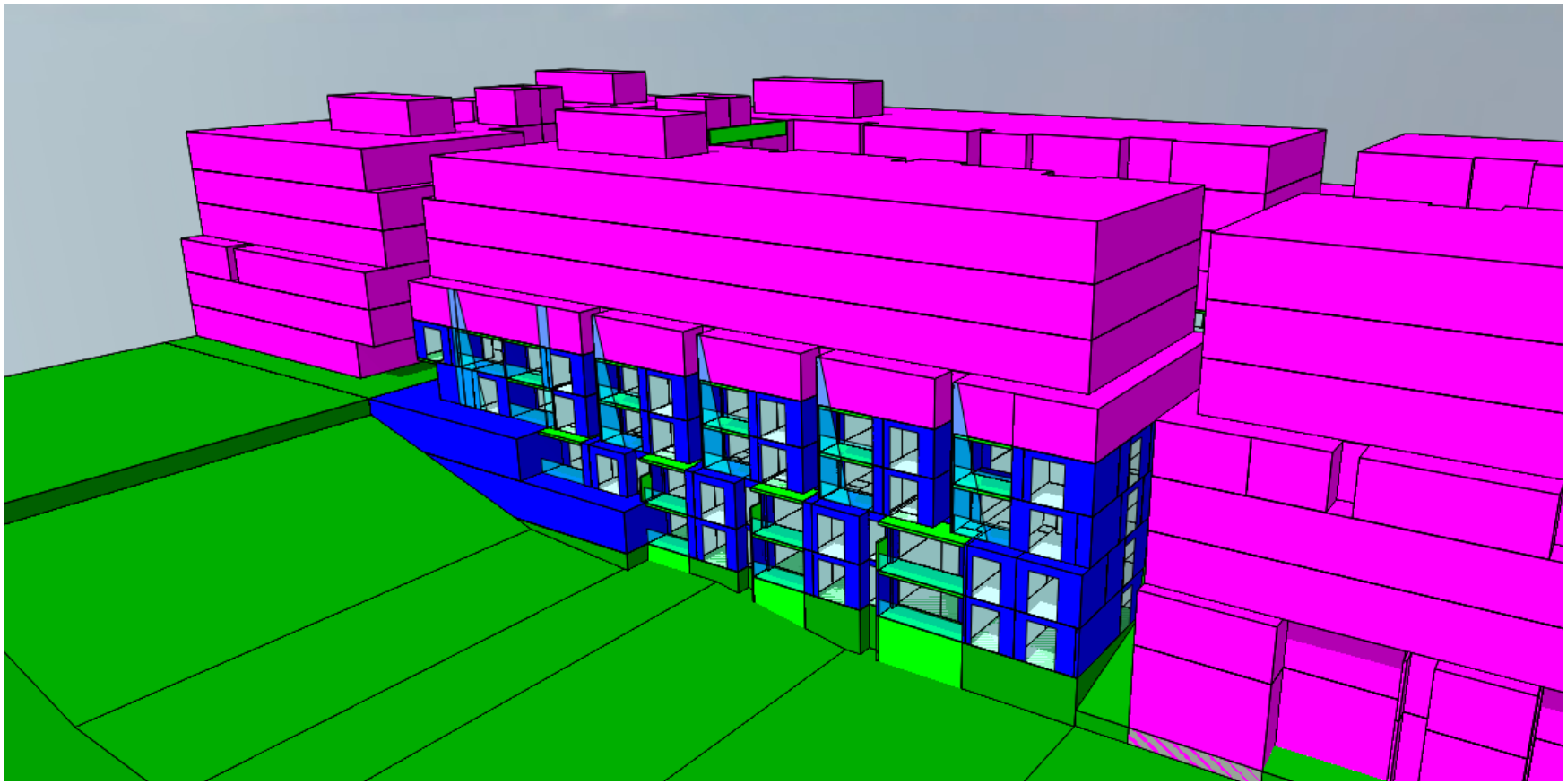
F.5 Model Images



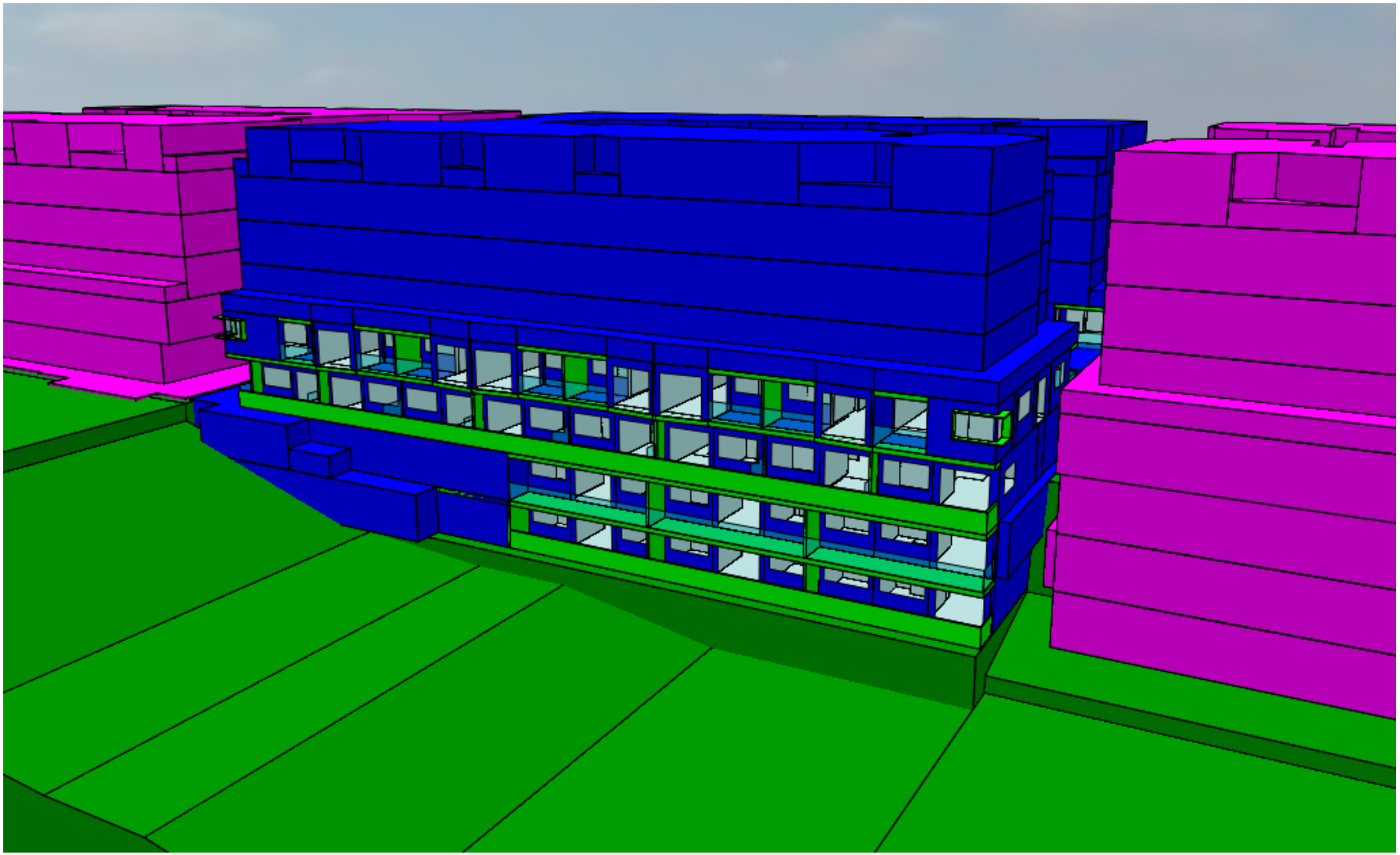
Approved Scheme: Model view from South



Proposed Design: Model view from South

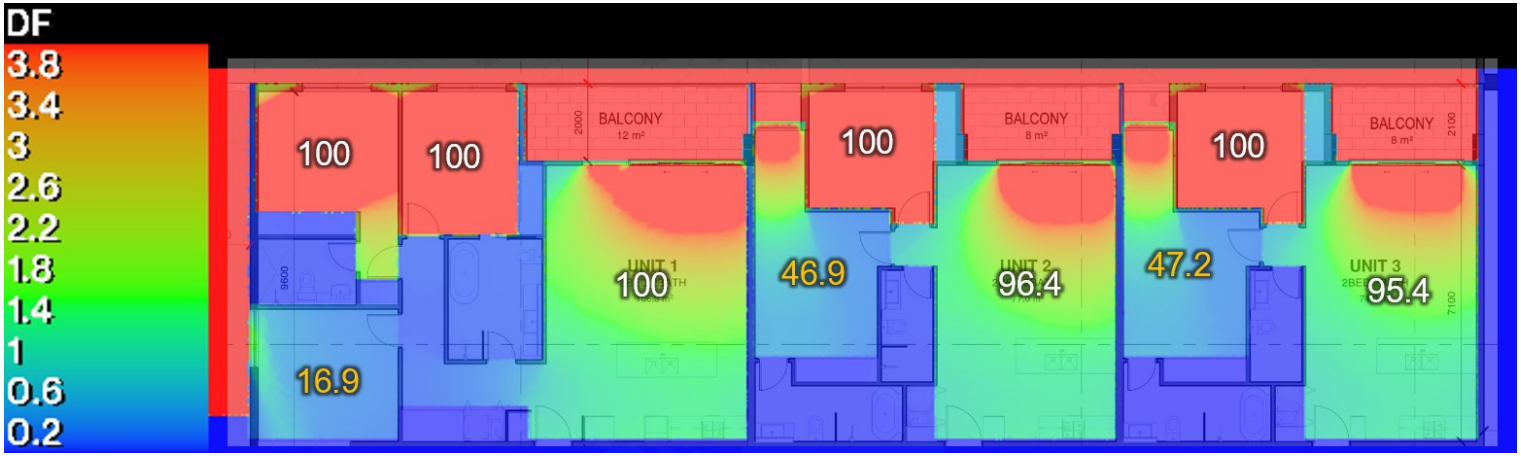


Approved Scheme: Model view from North

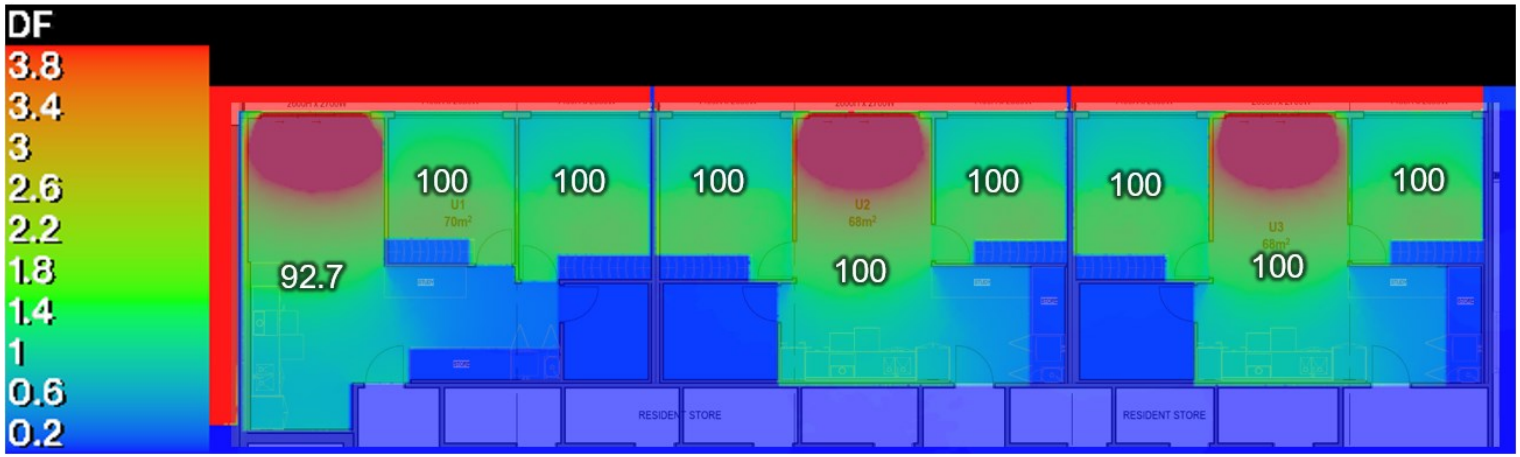


Proposed Design: Model view from North

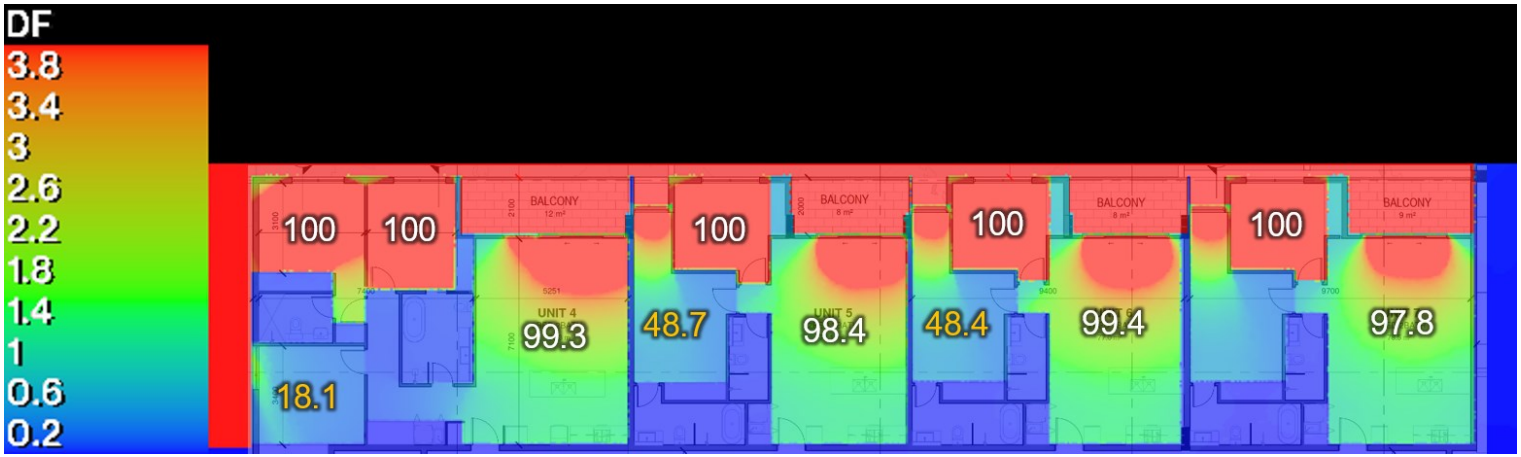
F.6 Daylight Contour Plots



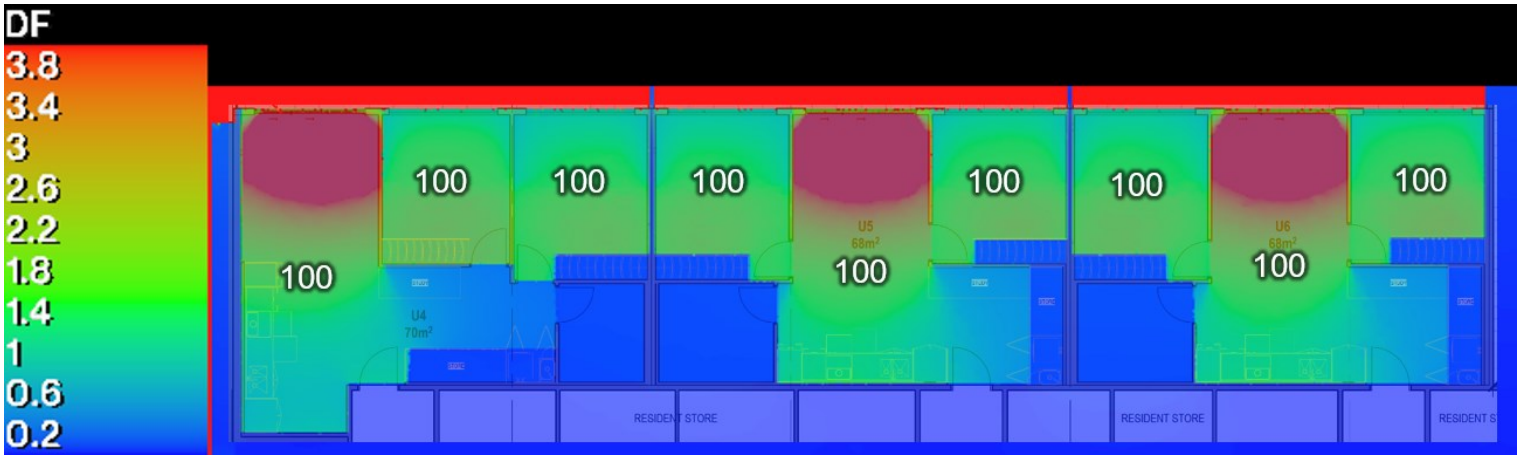
Basement 2 Daylight Contour Plot – Approved Scheme



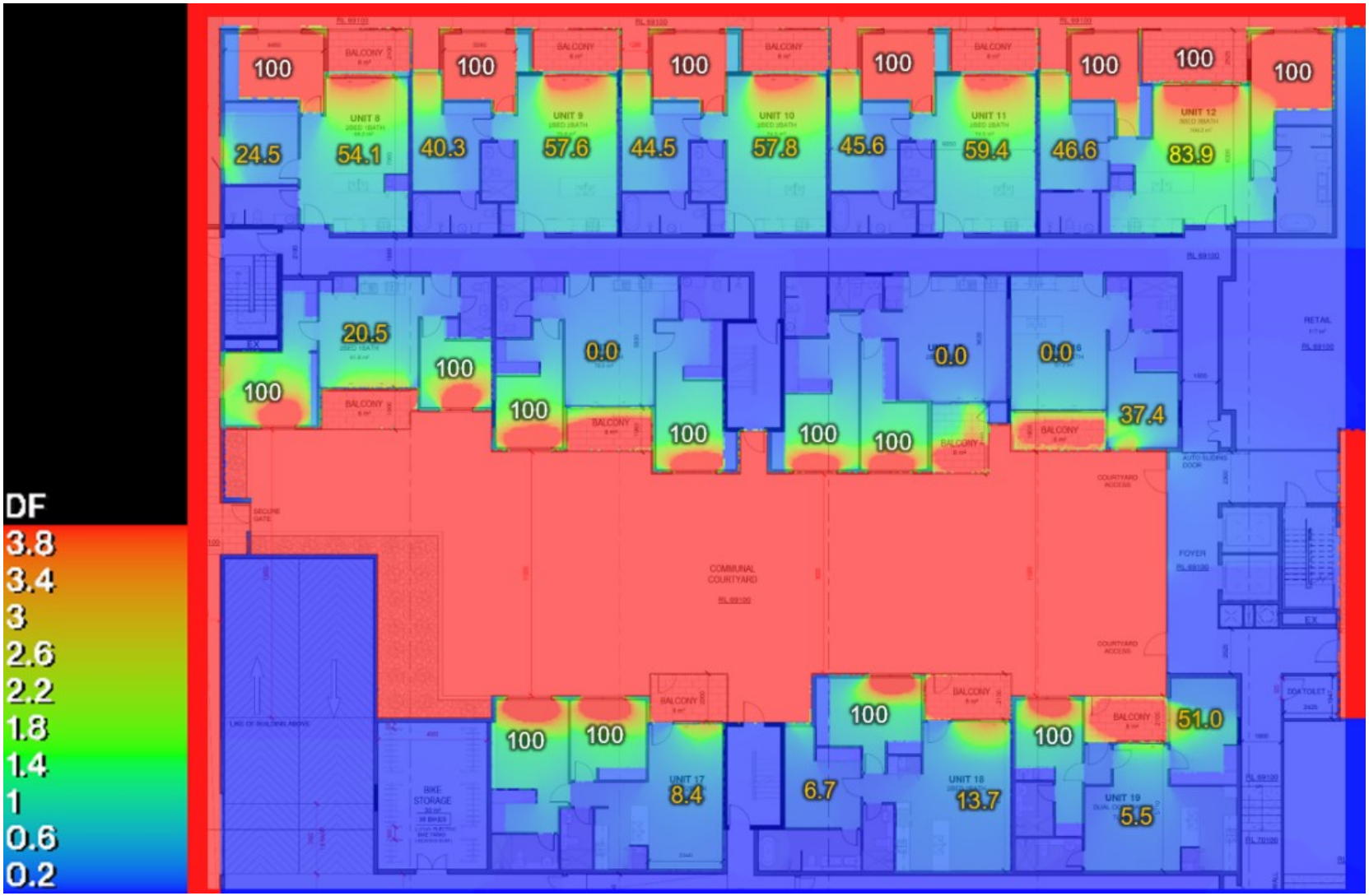
Basement 2 Daylight Contour Plot – Proposed Design



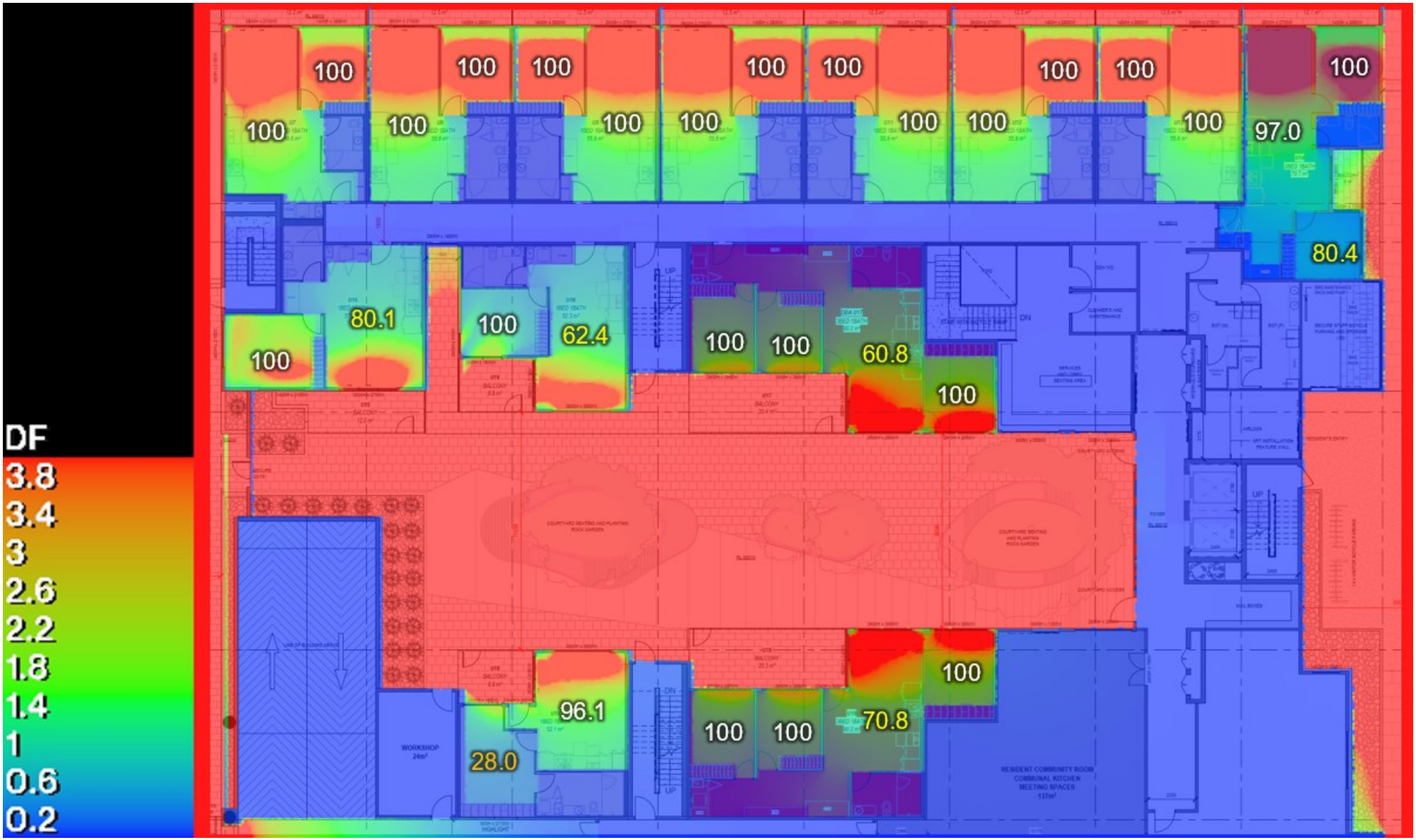
Basement 1 Daylight Contour Plot – Approved Scheme



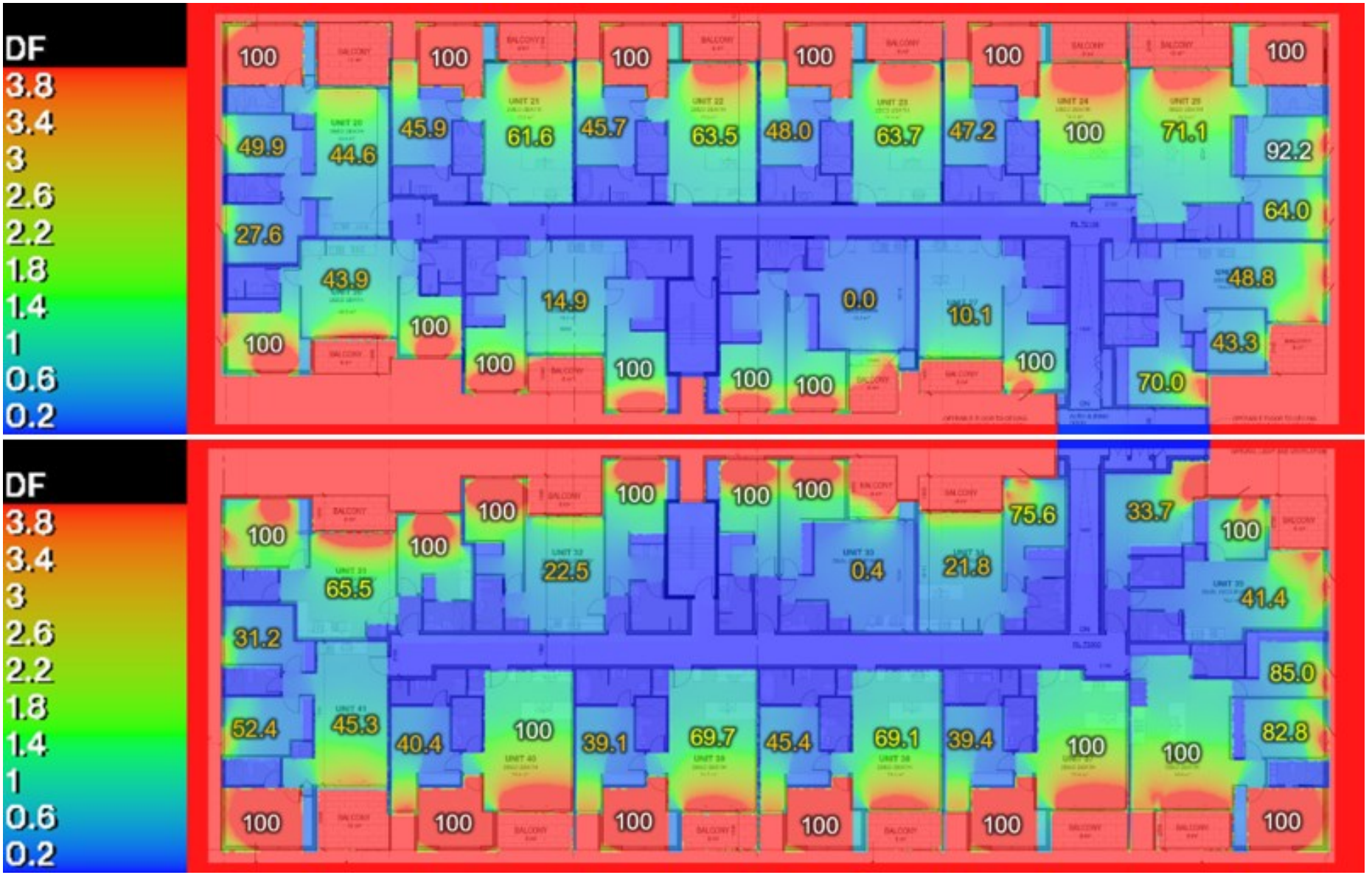
Basement 1 Daylight Contour Plot – Proposed Design



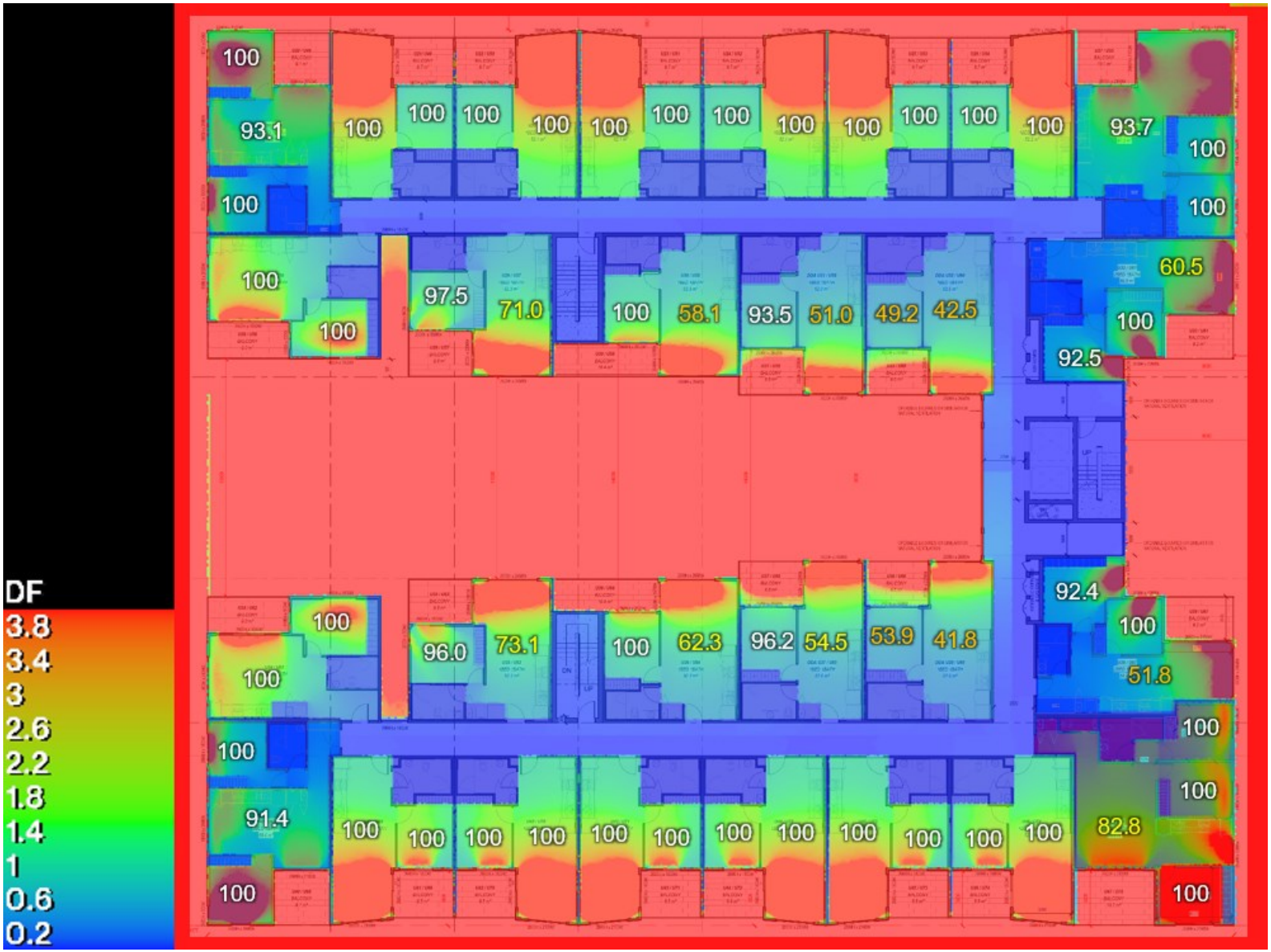
Ground floor Daylight Contour Plot - Approved Scheme



Ground floor Daylight Contour Plot - Proposed Design



Ground floor Daylight Contour Plot – Approved Scheme



Level 1 Daylight Contour Plot – Proposed Design

F.7 Assumptions (Approved Scheme)

Assumed Glazing Visual Light Transmittance

Glazing Type	Visible Light Transmittance (VLT)
	%
Clear, double glazing (GL1)	70
Light Bronze glazing (GL2)	40
Privacy screening (GL4)	40
Glass balustrade (BL2)	60
Steel balustrade (BL1)	50
Perforated aluminium panel (MC3)	20

Assumed Surface Reflectances

Construction Element	Reflectance (%)	Description
Internal floors	30	Medium-coloured flooring
Balcony pavers	40	Medium-light-coloured pavers
Concrete textured render (PC1)	40	Light grey finish
Concrete smooth render (PC2)	40	Light grey finish
Concrete smooth render (PC3)	10	Dark charcoal finish
Metal cladding (MC1)	10	Dark bronze finish
Metal cladding (MC2)	40	Light grey finish
External wall tiles (TL1)	30	Dull colour finish
Blockwork (BLW)	40	Medium colour finish
Red brick	30	Red brick finish
Equitable developments	40	Medium colour finish
Greenery	20	Greenery
Internal walls	85	White paint
Ceilings	85	White paint
External ground	10	Asphalt
External soffit	40	Concrete finish

F.8 Assumptions (Proposed Design)

Assumed Glazing Visual Light Transmittance

Glazing Type	Visible Light Transmittance (VLT)
	%
Clear, double glazing	70
Light bronze glass balustrade (BL1)	40
Opaque glass balustrade (BL2)	60
Rail balustrades (BL3)	60

Assumed Surface Reflectances

Construction Element	Reflectance (%)	Description
Internal floors	30	Medium-coloured flooring
Balcony pavers	40	Medium-light-coloured pavers
FC Sheet (PC1)	50	Taubman's Paints Quill finish
FC Sheet (PC2)	50	Taubman's Paints Quill finish
FC Sheet (PC3)	20	Taubman's Paints Cookie Jar finish
FC Sheet (MC1)	10	Taubman's Paints Jasper finish
FC Sheet (MC2)	10	Taubman's Paints Jasper finish
FC Sheet (MC3)	60	Taubman's Paints Suntan Yellow finish
Blockwork (BLW)	10	Dark grey finish
Red brick	30	Red brick finish
Equitable developments	40	Medium colour finish
Greenery	20	Greenery
Internal walls	85	White paint
Ceilings	85	White paint
External ground	10	Asphalt
External soffit	40	Concrete finish

Appendix G. Site Management Plan

During the construction phase, the key pollutants at risk of entering the stormwater system include:

- Sediments (soil, sand, gravel and concrete washings); and
- Litter, debris etc.

These pollutants arise from factors such as dirt from construction vehicles, stockpiles located close to surface runoff flow paths, and surface runoff from disturbed areas during earthmoving and construction works. It is therefore important to have measures that either prevent or minimise the pollutant loads entering stormwater system during construction.

In order to mitigate the impacts of the above pollutants on the stormwater system, the following stormwater management strategies will be implemented during the construction phase as appropriate:

- Installation of onsite erosion and sediment control measures. All installed control measures shall be regularly inspected & maintained to ensure their effectiveness. Such measures may include (but not limited to):
  - Silt fences
  - sediment traps
  - hay bales
  - geotextile fabrics
- Where possible, litter bins with a lid will be used to prevent litter from getting blown away and potentially entering stormwater drains.

Additionally, the following work practices shall be adopted to reduce stormwater pollution:

- Site induction by the head contractor/ builder to make personnel aware of stormwater management measures in place
- Employ suitable measures to reduce mud being carried off-site into the roadways such as installing a rumble grid/ gravel/ crushed-rock driveway (or equivalent measure) to provide clean access for delivery vehicles, removing mud from vehicle tyres with a shovel etc.
- Safe handling and storage of chemicals, paints, oils and other elements that could wash off site to prevent them from entering stormwater drains.
- Where practicable, stockpiles will be covered, located within the site's fence and away from the lowest point of the site where surface runoff will drain to. This initiative will minimise erosion.

Accordingly, the measures presented above are considered appropriate for the proposed development at this stage of the project. The measures will reduce the pollutants entering stormwater system from the site during construction works thereby protecting waterways.

Suite 8/10 Northumberland Street
South Melbourne VIC 3205 Australia

+61 3 9636 0280
info@arkresources.com.au

arkresources.com.au

Ark Resources