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Ref: 23076_23083/Civil/WSUD **20/12/2023**

Stormwater Management Plan Response

For Proposed Senior School Building Extensions and New Facilities Development at Tintern Grammar College Ringwood East

Site Address:	90 Alexandra Rd, Ringwood East
Job Number:	23076 & 23083
Date:	20/12/2023
Revision:	B
Client:	Tintern Grammar
Report By:	KN
Checked By:	RMc
Appendices:	A: Proposed Site Plans B: Senior School Building Response C: Facilities Response

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Introduction

Ipsum Structures have been commissioned by Tintern Grammar to prepare a Stormwater Management Plan response to meet the objectives of the Maroondah City Council Engineering Development Design Guidelines.

The subject site is located at Tintern Grammar, 90 Alexandra Road, Ringwood East. Refer Appendix A, Site Plans prepared by McIldowie Partners for location and extent of proposed works.

The report embraces a range of measures that are designed to mitigate the increase in stormwater runoff as well as to avoid the environmental impacts of the potential pollution threat to the runoff itself.

Project Objectives

1) Minimise stormwater discharge off site from the increase in the impervious area of the proposed development.
2) Minimising potable water demand by harvesting and storing stormwater in rainwater tanks for sanitary flushing of toilets, where possible and appropriate.
3) Treating stormwater on-site to improve the water quality and reduce the flow into the council's stormwater system.

Proposed Development

Two developments have been proposed at Tintern Grammar; an extension to the Senior College, and a new Facilities development.

Senior School Building Extensions

The new Senior School Building is an extension to the existing Senior College building. The area of works associated with the extension includes a new building measuring approximately 1316 m^2 in plan and 1363 m^2 of external landscaping. The existing maintenance facilities building and archives building, as well as a number sheds and hard paving will be demolished for the new works, and relocated to the south east corner of the site.

The new building will be located at the north-east side of the existing Senior College. It consists of two storeys, with a third lower ground level / undercroft along the south-east face. It will house an auditorium stage, classrooms/studios, study areas, office / administration areas and new amenities. The external works will incorporate 326 m^2 of paving and 1037 m^2 of soft landscaping.

The proposed development will result in 61% impermeable area compared to 23% in the current state, for the immediate surrounds of the building.

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Facilities Development

The Facilities development will be located at the south east corner of the school site, approximately 250m from the Senior School Building development. It will be made up of two buildings housing a workshop, shed, stores, offices and amenities totalling 664 m^2 of roof. A driveway runs between the two buildings with paving extending east and west at the south end, measuring 911 m^2. There are permeable carparking areas at the north end measuring 368 m^2.

Currently the area is open grassland. The development will result in 81% impermeable area.

Legal Point of Discharge

The Legal Point of Discharge for the site will be confirmed with council once the planning application has been made and detailed design is underway, however initial assumptions have been made to proceed with the preliminary high-level design.

Senior School Building Extensions

The new Senior School Building will be connected to the existing internal drainage infrastructure, which may require local upgrades in some locations.

Facilities Development

It is proposed that the facilities development will connect to the existing junction pit in the Gracedale Avenue Reserve, at the west end.

Stormwater Management

The stormwater management response requires the development to achieve the following outlined in the *Urban Stormwater: Best Practice Environmental Management Guidelines, CSIRO 1999* and *WSUD Engineering procedures Stormwater CSIRO 2005*:

- 80% retention of the typical urban annual load for Total Suspended Solids (TSS)
- 45% retention of the typical urban annual load for Total Phosphorus (TP)
- 45% retention of the typical urban annual load for Total Nitrogen (TN)
- 70% retention of the typical urban annual load for Gross Pollutants (litter)

These can be achieved by adopting the following practices:

- Retention and reuse of stormwater
- Reduce impact of stormwater on the drainage system
- Prevent pollutants/toxins from entering the stormwater system

Melbourne Water's Stormwater Treatment Objective-Relative Measure (STORM) calculator has been used to assess the effectiveness of the stormwater management proposed for the

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developments. The tool, OSD4 is also used to determine detention requirements for the new works.

Drainage Strategy

- Both drainage designs will be via a gravity system
- Both drainage designs will drain to the Legal Point of Discharge via onsite detention and various WSUD methods

Senior School Building Response

STORM –

The collection of the new building roof runoff to a 30,000L rainwater tank for reuse will achieve 106% rating, and will not require the new landscaped area to be treated.

OSD4 –

The collection of all runoff from the development into a detention system(s) with 41.5 m^3 minimum detention storage will retain the same flow rate during peak storm periods. The detention system may consist of a combination of water tanks and storage pipes within the ground, and is subject to final detailed design.

Facilities Development Response

STORM –

The facilities development is tending towards industrial-type development and therefore a more detailed approach will be adopted rather than the use of the STORM calculator. Atlan Stormwater has been contacted for a treatment solution in order to treat the runoff and meet Melbourne Water requirements. The recommendations include the installation of Atlan Stormsacks to all pits collecting surface runoff to capture gross pollutants, followed by an Atlan FlowFilter system to provide secondary stormwater filtration to the entire facilities development. Alternative products may be considered if deemed to provide the same level or better treatment outcome.

OSD4 –

The collection of all runoff from the development into a detention system with 51.4 m^3 minimum detention storage will retain the same flow rate during peak storm periods. The detention system will consist of below ground storage pipes with an orifice pit for flow control.

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Site Management

Summary of the objectives is as follows:

- Protect drainage system from sedimentation and contamination
- Protect site from environmental degradation during construction

The responsible Builder is to provide a site management plan for its operation during the construction period. Measure should be put in place to prevent debris and other sediments from entering into the stormwater drainage system. Examples of measures include, but are not limited to, covering exposed surfaces with mesh, use of sand bags and socked agricultural pipes.

Asset Maintenance Program

Ongoing management of the treatment systems is necessary to maintain good operation post construction.

Gutters should be fitted with mesh and first flush diverters to catch litter and twigs, and should be checked and cleaned regularly.

The rainwater harvesting tank and associated components, including the pump, should be checked for leaks and damage every 3 months, and the water quality checked every 6 months. Refer www.smartwateradvice.org and tank/pump supplier for detail maintenance guidelines. A more onerous maintenance cycle may be adopted by the client, if a higher level of water quality for re-use is required.

All pits should also be checked and cleaned regularly to prevent debris from entering into the natural waterway. Cleaning and maintenance of the Atlan Stormsacks should follow Atlan Stormwater recommendations.

The Atlan FlowFilter system, or alternative equivalent if adopted, will need to be regularly monitored and maintained. A scheduled maintenance program should be carried out with a professional specialised in the product to ensure good working order and maximise its design life.

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Summary

Adopt a combination of rainwater tank for reuse and detention for the new Senior School Building will reduce stormwater impact on the stormwater system. The combination will reduce pollutants into the waterways and retain pre-existing flow rates during peak storm periods.

For the facilities development, the combination of Atlan Stormwater products, Stormsack and FlowFilter, with below ground on-site detention provides an industrial approach to the improvement of stormwater quality.

The incorporation of a site management plan will ensure best practices in stormwater management is achieved.

This report was prepared by,
Kerry Ng
For and on behalf of Ipsum Structures

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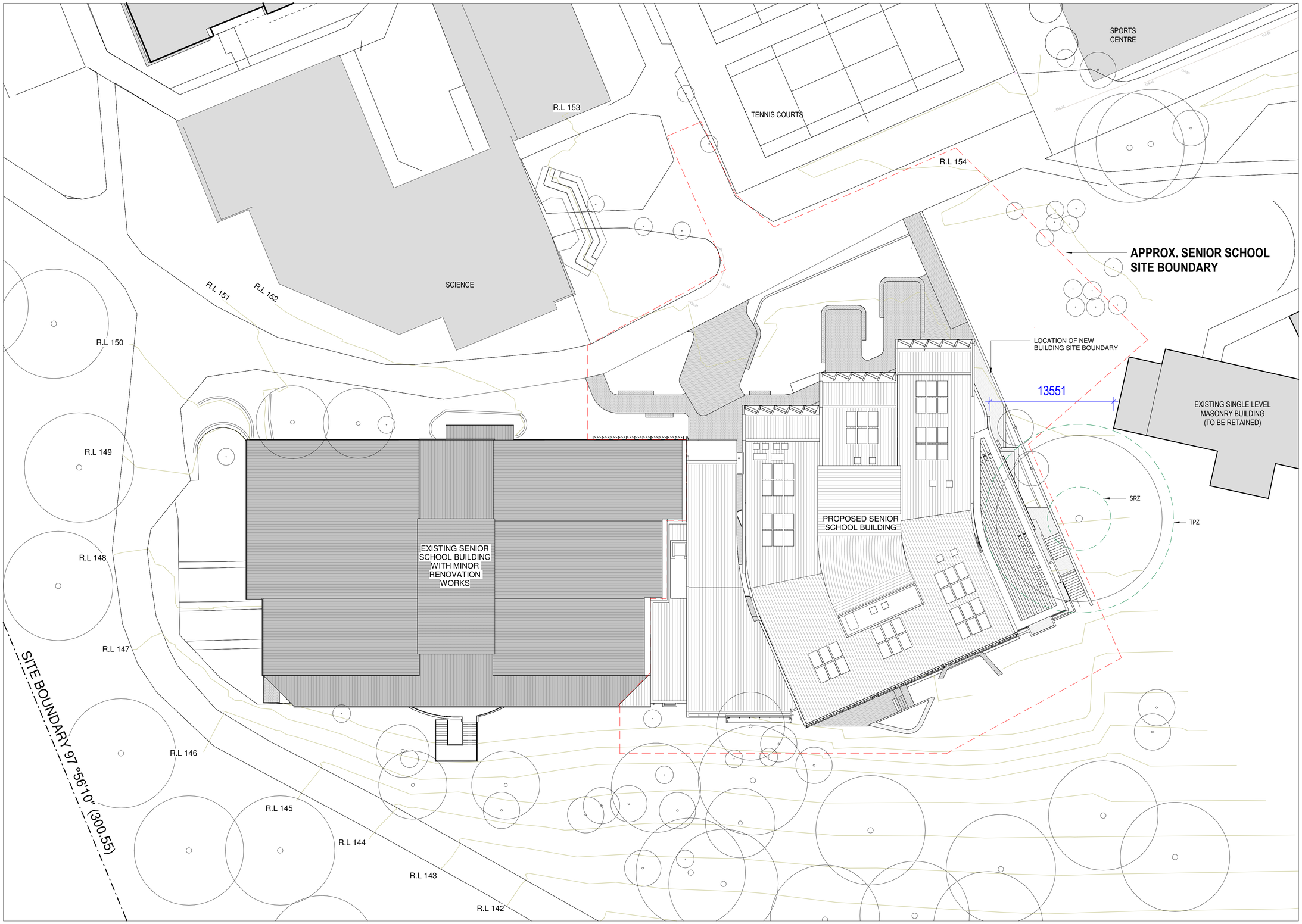
Appendix A

Proposed Site Plans

APPROX. SITE AREA OF NEW BUILDING : m2

PROPOSED NEW BUILDING FOOTPRINT AREA:m2

PROPOSED NEW BUILDING OVERALL BUILDING AREA (3 LEVELS): 2349m2



REVISION SCHEDULE:

REV	DESCRIPTION OF CHANGE	DATE

LEGEND

ADVERTISED PLAN

NORTH POINT

CLIENT

TINTERN GRAMMAR

ARCHITECTURAL CONSULTANT

McIldowie Partners

T/ +613 8643 4900
info@mcildowiepartners.com.au

LEVEL 5, 185 FLINDERS LANE
MELBOURNE VIC 3000

CLIENT

TINTERN GRAMMAR

PROJECT

SENIOR SCHOOL

PROJECT ADDRESS

90 ALEXANDRA RD RINGWOOD EAST VIC 3135

DRAWING STATUS

TOWN PLANNING

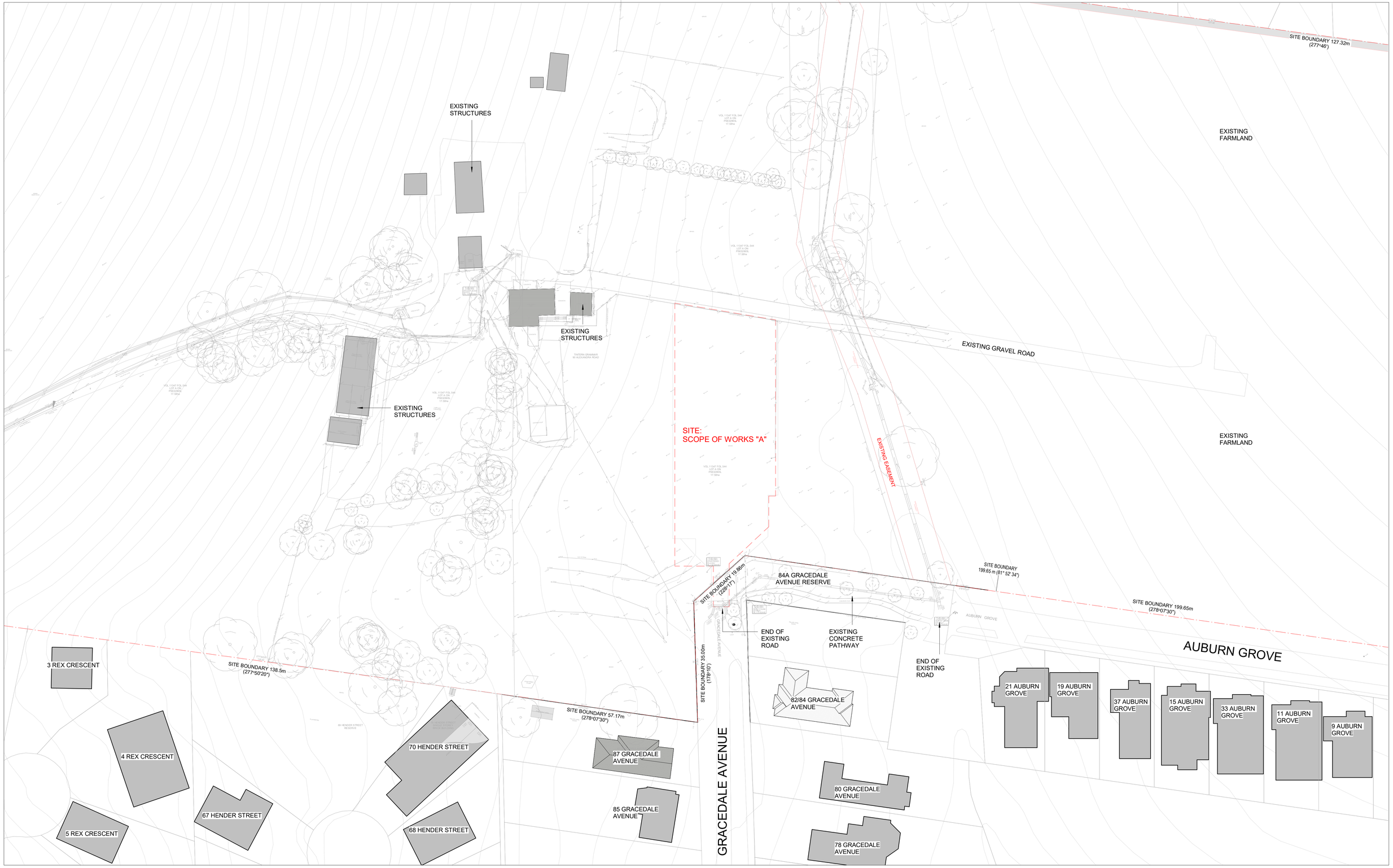
TITLE

PROPOSED SITE PLAN

DRAWING NUMBER:

TP051

JOB NO:	SCALE@A1:	REV DATE:	DRAWN:	CHECK:	REVISION:
3230	1 : 200		Author	Checker	



REV	DESCRIPTION OF CHANGE	DATE
3	Issued for information	01.12.23
2	Issued for information	27.10.23
1	Issued for information	28.09.23

DO NOT SCALE OFF DRAWINGS. USE FIGURED DIMENSIONS ONLY. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE COMMENCING WORK OR PREPARING SHOP DRAWINGS

DRAWINGS TO BE PRINTED IN COLOUR.

NORTH POINT

NORTH

CLIENT

TINTERN GRAMMAR

ARCHITECTURAL CONSULTANT

McIldowie Partners

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info@mcildowiepartners.com.au
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Melbourne VIC 3000

NOTES

ADVERTISED PLAN

PROJECT
TINTERN GRAMMAR - FACILITIES

DRAWING STATUS
TOWN PLANNING

PROJECT ADDRESS
90 ALEXANDRA ROAD, RINGWOOD EAST VIC 3135

TITLE
EXISTING - SITE PLAN

FILE
Autodesk Docs://3252 - Tintern Grammar - Facilities/3252-TTG-Facilities.rvt

JOB NO:	SCALE:	REV DATE:	DRAWN:	CHECK:
3252	1 : 500	01.12.23	GN	TC

DRAWING NUMBER:
TP003

REVISION:
3

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Appendix B

Senior School Building Response

OUTLINE OF NEW WORKS

EX. BUILD DEMOLISH
120.6 m2

EX. BUILD RETAIN
13.5 m2

EX. SLAB DEMOLISH
30.6 m2

EX. BUILD DEMOLISH
379.6 m2

EXISTING BUILDING
1356 m2

SITE
2679 m2

EX. SHED DEMOLISH
6.2 m2

EX. SLAB DEMOLISH
6 m2

EX. SHED DEMOLISH
3.9 m2

EX. SHED DEMOLISH
22.3 m2

EX. SHED DEMOLISH
44.8 m2

EX. SHED DEMOLISH
9.2 m2

153 154 151 152 150 149 148 147 146 145 144

EXISTING SENIOR SCHOOL BUILDING CONDITIONS

1:100 SCALE AT A0 SHEET

ADVERTISED
PLAN

NEW PAVE
195m2

SITE
2679 m2

BELOW GROUND DETENTION FOR
EXTERNAL AREA RUNOFF

NEW PAVE
131.1 m2

POTENTIAL NEW STORMWATER SYSTEM

EX. BUILD RETAIN
13.5 m2

NEW BUILD
1202.5 m2
FFL 156.74

300ø
IL 146.57

TOP 148.51

225ø
IL 146.66

150ø
IL 147.92

EXISTING BUILDING
1356 m2
FFL 152.74

NEW BUILD
1202.5 m2
FGL 152.76

NEW FIRST-FLOOR
TERRACE
113.3m2

TOP 150.14

2 X 30,000 L RAINWATER TANK TO
COLLECT NEW ROOF RUNOFF FOR
COMBINED RE-USE AND DETENTION

BELOW GROUND DETENTION FOR
TERRACE RUNOFF

NEW BUILD
1202.5 m2
LGL 148.74

150ø
IL 147.81

TOP 149.54

225ø
IL 146.77

TOP 147.30

150ø
IL 146.78

150ø
IL 147.64

TOP 148.63

EXISTING BALCONY
FFL 152.69

EXISTING STORMWATER SYSTEM TO
BE REMOVED FOR NEW WORKS

POTENTIAL NEW STORMWATER SYSTEM

151 152 153 154 153 152 151 150 149 148 147 146 145 144

PROPOSED SENIOR SCHOOL BUILDING EXTENSIONS

1:100 SCALE AT A0 SHEET

STORM Rating Report

TransactionID:	0
Municipality:	MAROONDAH
Rainfall Station:	MAROONDAH
Address:	Tintern Grammar Yr 12
	RINGWOOD EAST
	VIC
Assessor:	Ipsum Structures
Development Type:	Commercial/Retail
Allotment Site (m2):	2,679.00
STORM Rating %:	106

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
ROOF	1,203.00	Rainwater Tank	30,000.00	100	145.20	80.00
TERRACE	113.00	None	0.00	0	0.00	0.00
PAVING	326.00	None	0.00	0	0.00	0.00

Date Generated: 30-Nov-2023 Program Version: 1.0.0

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Appendix C

Facilities Development Response

PIPE CONNECTION FOR DOWNPIPES

KERB / RETAINING WALL

PAVED = 117m²

RL 114.25

ROOF AREA = 313m²

PROPOSED FACILITIES

PERMEABLE CARPARK
PERMEABLE = 241m²

SPEL/ATLAN STORMSACK TO ALL SURFACE RUNOFF PITS (TYPICAL)

TOTAL SITE = 1942m²

PAVED = 764m²

3/600 DIA STORAGE PIPES x 60m LONG O/ALL AT 1:300 MIN. GRADE.

ORIFICE PIT

SPEL/ATLAN HYDROSYSTEM

300 DIA PIPE AT 1:300 MIN. GRADE.

GRATED TRENCH W. SPOON DRAIN

PAVED = 30m²

RL 114.25

ROOF AREA = 351m²

PERMEABLE CARPARK
PERMEABLE = 127m²

KERB AND CHANNEL

SPEL/ATLAN STORMSACK TO ALL SURFACE RUNOFF PITS (TYPICAL)

PIPE CONNECTION FOR DOWNPIPES

PROPOSED FACILITIES DEVELOPMENT

1:100 SCALE AT A0 SHEET

Atlan
STORMWATER

Atlan WSUD/MUSIC Report

Tintern Grammar - 90 Alexandra Road, Ringwood

PROJECT NUMBER:	CLIENT:	DATE:
23-5994	Sustainable Built Environments	29th of November, 2023

Victoria Office
Atlan Stormwater(Formerly SPEL)
897 Wellington Road
Rowville VIC 3178

Telephone: 1300 773 500
sales@atlan.com.au

www.atlan.com.au

PHONE: 1300 773 500
EMAIL: atlan@spel.com.au
OFFICE: 897 Wellington Road, Rowville VIC 3178
www.atlan.com.au

Project Site

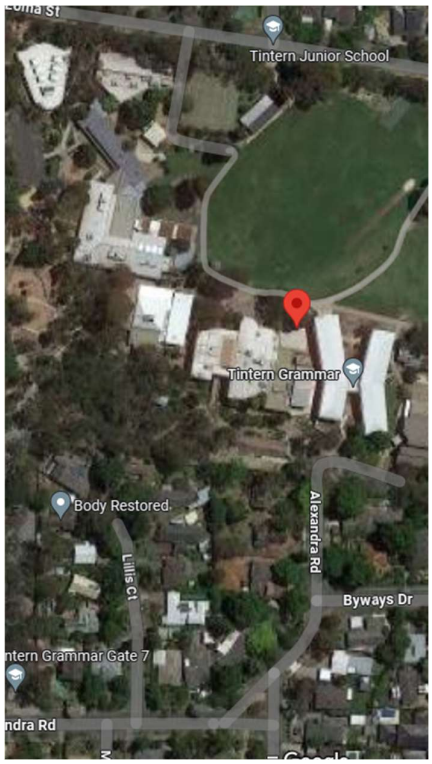

Figure 1: Existing Site Conditions

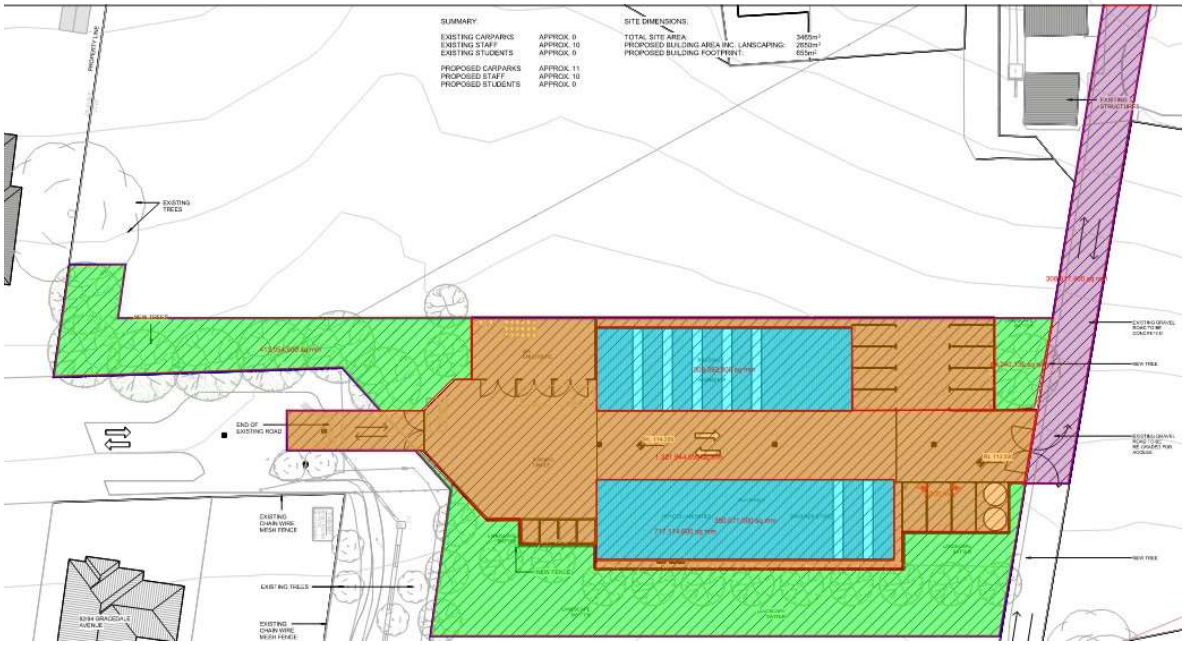

Figure 2: Proposed Development

PHONE: 1300 773 500
EMAIL: sales@atlan.com.au
OFFICE: 897 Wellington Road, Rowville VIC 3178
www.atlan.com.au

MUSIC Inputs

10 Year rainfall template: 850-1100mm_NarreWarrenNorth 1984-1993_6min

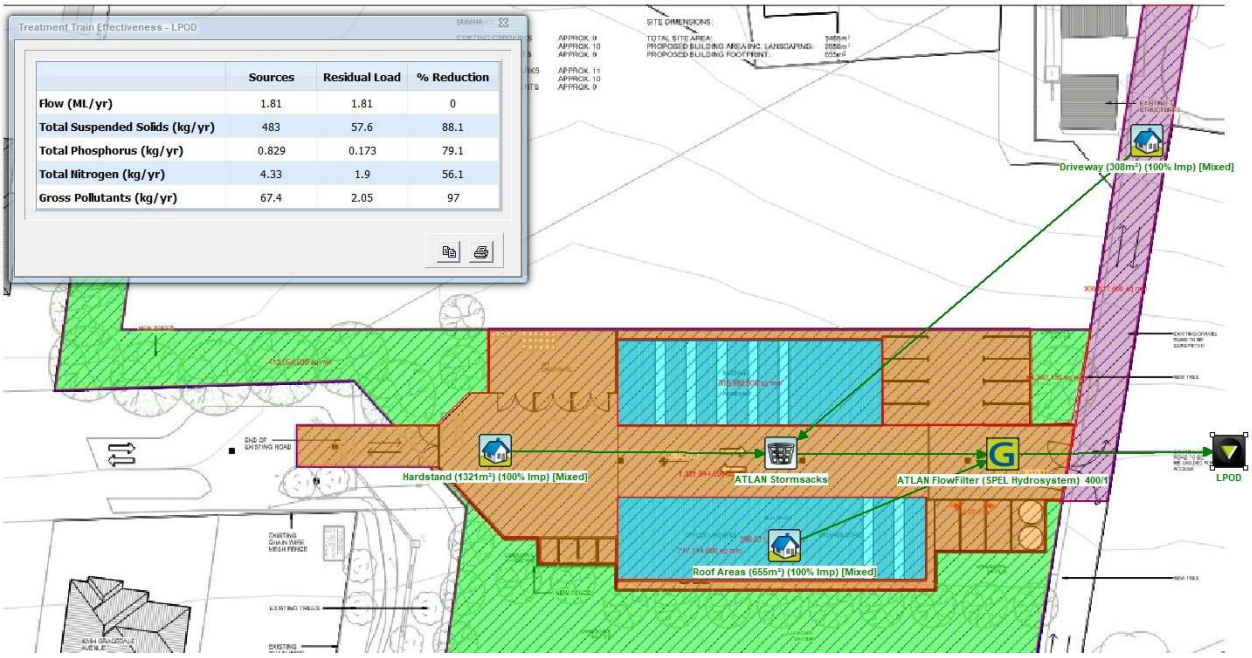

Figure 3: MUSIC Model Configuration

Catchment Details

Catchment	Size (m²)	Imperviousness (%)
Hardstand	1321	100
Roof Areas	655	100
Driveway	308	100

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Treatment Details

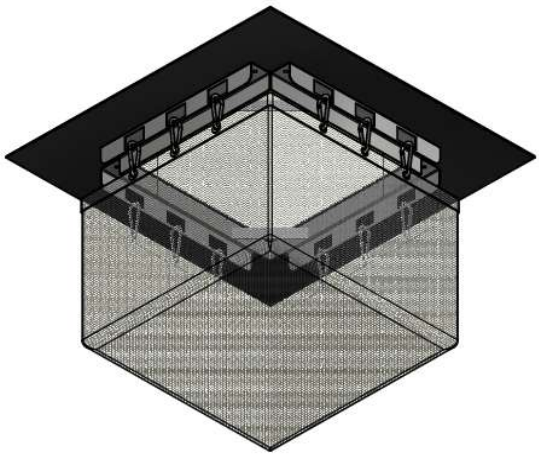
SPEL Stormsack

System Type: GPT (Gross Pollutant Trap)

Treatment Type: Primary

Model: SSS.6060.C1

Treatment Flow Rate: 55 L/s



Pollutant Removal Rates

Pollutant	TSS	TP	TN	GP
Input (mg/L)	1000	5	50	15
Output (mg/L)	390	3.6	27.5	0

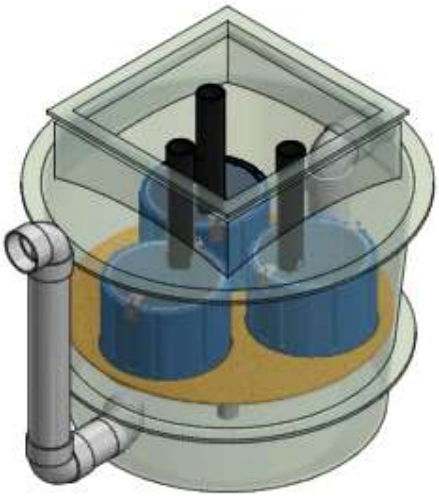
SPEL Hydrosystem

System Type: Dynamic Separator and Filter

Treatment Type: Secondary and Tertiary

Model: HS.400/1

Treatment Flow Rate: 2.5L/s



Pollutant Removal Rates

Pollutant	TSS	TP	TN	GP
Input (mg/L)	1000	5	50	15.0
Output (mg/L)	100	0.5	28	0.0

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MUSIC Results

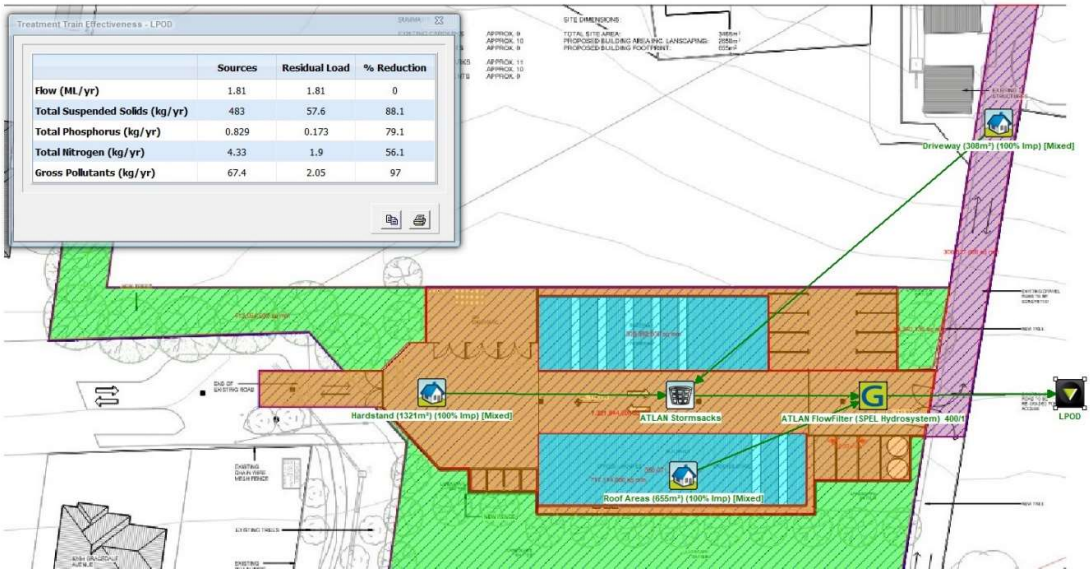

Figure 4: MUSIC Model Results

Pollutant	Sources (kg/yr)	Residual Load (kg/yr)	Reduction (%)	Reduction Target (%)
Flow (ML/yr)	1.81	1.81	**1**	0
Total Suspended Solids	483	57.6	**88.1**	80
Total Phosphorus	0.829	0.173	**79.1**	45
Total Nitrogen	4.33	1.9	**56.1**	45
Gross Pollutants	67.4	2.05	**97**	70

Author: Lee Parker
Position: Engineering Coordinator

Approved: Kurt Jensen
Position: VIC/TAS General Manager

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Sustainable Built Environments Pty Ltd

ESD Town Planning Report

for the

Facilities Buildings

at

Tintern Grammar

For

McIldowie Architects

CONTENTS

Quality Assurance
Document: ESD Report
Date: 05th December 2023
Prepared by SMc

Revision	Revision Date	Details	Authorised
V1	30th November 2023	For Town Planning	SM
V2	05th December 2023	Add 5kW PV array	SM

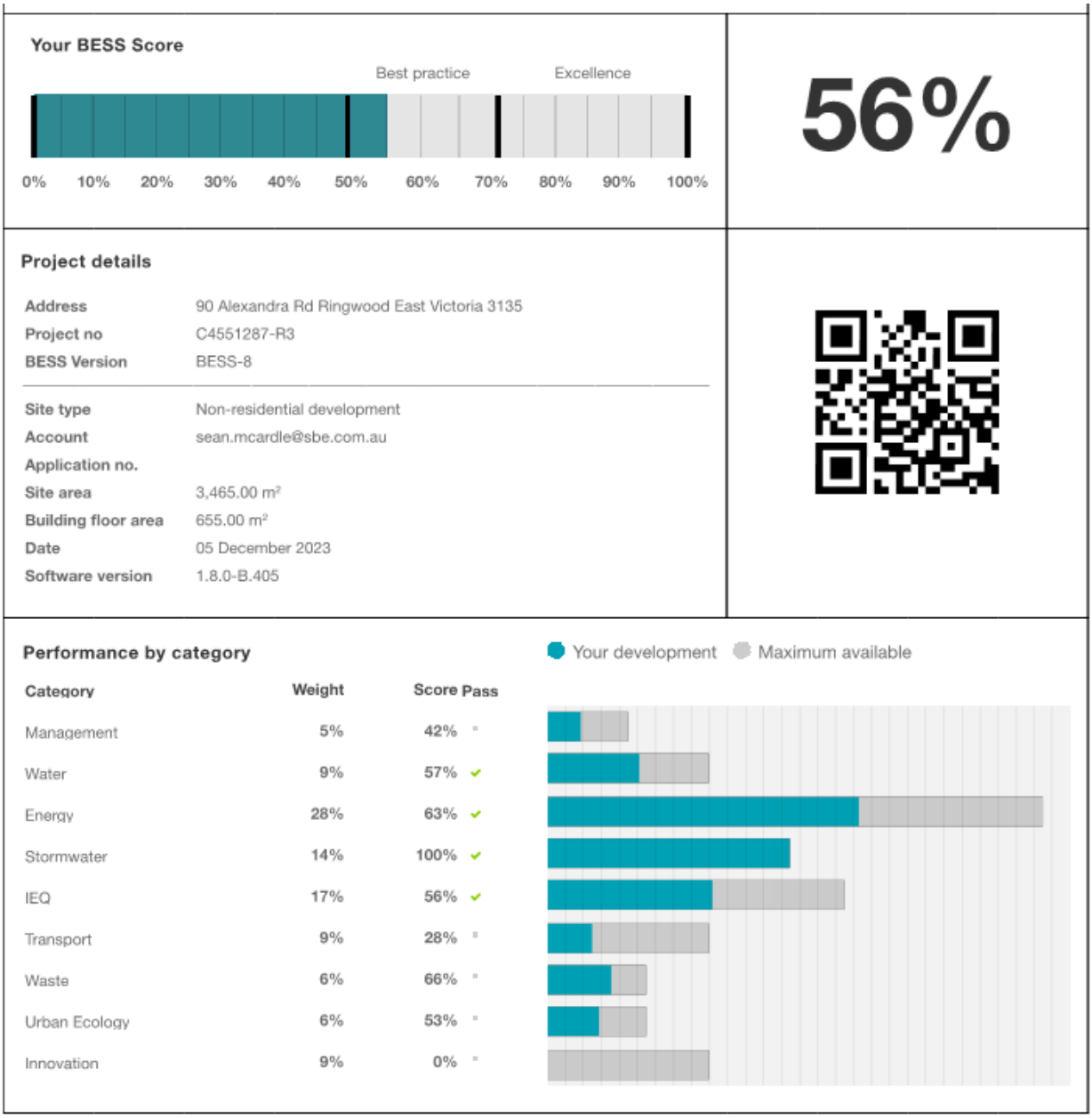
1. EXECUTIVE SUMMARY

Sustainable Built Environments (SBE) has been commissioned to provide Environmentally Sustainable Design (ESD) advice for the proposed new Facilities buildings.

The project delivers an office building with an attached but unconditioned Grounds equipment store and a second free standing unconditioned workshop/storage building.

SBE has used the Built Environment Sustainability Scorecard (BESS) to benchmark the design's potential ESD performance under each key ESD criteria including: management, water and energy efficiency, stormwater, indoor environment quality (IEQ), sustainable transport, waste, urban ecology, and innovation. Green Star benchmarking credits have been used to assess ESD criteria not covered by BESS (e.g. Building Materials) but encouraged to be addressed by Council.

The proposed development currently targets 56 points from 100 in the BESS tool (see extract below), which equates to Best Practice.



2. INTRODUCTION

Sustainable Built Environments (SBE) has been commissioned to provide Environmentally Sustainable Design (ESD) advice for the proposed new Facilities buildings.

2.1 The Project

Sustainable Built Environments (SBE) has been commissioned to provide Environmentally Sustainable Design (ESD) advice for the proposed new Facilities buildings.

2.2 Documents

This report has been informed by Town Planning drawings Rev 4 produced by McIldowie Architects.

2.3 ESD Expectations

The Maroondah City Council will expect the project to incorporate sensible ESD and stormwater management initiatives. Their Planning Scheme calls for "…A Sustainability Management Plan (including an assessment using BESS/Green star, STORM/MUSIC or other methods). This ESD report is a response to Council's Planning Scheme requirements and uses the BESS tool.

3. MANAGEMENT

It is important to encourage an environmental focus in the management of design, construction and operational phases of the development. The Management category aims to highlight the importance of a holistic and thoroughly integrated approach to constructing and operating a building with good environmental performance.

Management			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
3.1	*BESS 2.3 Thermal Performance Modelling - Non-Residential*	To encourage and recognise developments that have used modelling to inform passive design at the early design stage	A Section J facade assessment has been carried out using the NCC 2019 DTS facade calculator. – DTS compliance is confirmed. Having identified this minimum requirement, we confirm the exposed roof and floor insulation will be at least 10% higher in performance than these minimum requirements. Refer to Appendix A.
3.2	*BESS 3.3 Metering*	To provide building users with information that allows monitoring of energy and water consumption	All major building services (i.e. lighting, HVAC equipment, lift, etc.) shall be individually sub-metered.

4. WATER

In Australia, water has long been considered a precious and high-demand resource. Fresh water supplies are increasingly affected by a range of factors including catchment locations, contaminated sources, drought and rising demand. In addition to reducing the demand for water, efficient use of water in buildings can reduce building owners' operational costs. This category aims to minimise the impacts on the environment from extensive water use in the built environment.

Water			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
4.1	*BESS 1.1 Potable Water Use Reduction*	To encourage building design that minimises potable water consumption in operations.	All sanitary fixtures and water appliances shall have the WELS rating stated below (where applicable): • Kitchen Taps – 5 Stars • Bathroom Taps – 5 Stars • Toilets – 4 Stars • 5-star dishwasher in kitchen • On demand underbench electric domestic hot water units that will eliminate hot water losses through long pipe runs for kitchen. • For showers a dedicated heat pump storage system is proposed – see energy section) • 4 star WELS (>6.0 but <= 7.5l/min) shower heads.
4.2	*BESS 3.1 Water Efficient Landscaping*		Low water use indigenous plants shall be specified for the landscaped areas and irrigation shall be supplied by rainwater.
4.3	*BESS Water 4.1 Building Systems Water Use Reduction*		No water-based cooling systems shall be adopted and fire test water (from hydrants or sprinkler discharge) where applicable shall be captured for reuse in irrigation.

5. ENERGY

Production of Australia's energy is largely from the incineration of non-renewable fossil fuels and is the country's greatest contributor to greenhouse gas emissions. The credits within the Energy Category target an overall reduction of energy consumption. Such reduction has an impact upon greenhouse gas emissions and energy production capacity as well as other emissions associated with energy generation.

Energy			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
5.1	*BESS 1.1 Thermal Performance Rating – Non-Residential*	To reduce reliance on mechanical systems to achieve thermal comfort in summer and winter, as well as to reduce greenhouse gas emissions, energy demand, and maintenance and operational costs.	A preliminary Section J1-J3 assessment has been conducted. DTS compliance is confirmed – with a min 10% increase in floor and roof insulation. For more information on the preliminary assessment refer to Appendix A.
5.2	*BESS 2.1 Greenhouse Gas Emissions* *BESS 2.2 Peak Demand* *BESS 2.3 Electricity Consumption*		The air-conditioning system for the office shall have a COP and EER 85% or better than the most efficient equivalent capacity unit available. 50% of the office spaces have openable windows to the perimeter for fresh air and the grounds equipment and workshop storage spaces are all 100% naturally ventilated.
5.3	*BESS 3.2 Hot Water*		The domestic hot water systems provided for the kitchen shall be underbench electric units that will eliminate energy losses through long pipe runs. The showers will be served by small electric heat pump storage systems located on the adjacent external wall.
5.4	*BESS Energy 4.2 Renewable Energy Systems - Solar*		A PV array of at least 5kW will be installed – with optimal size to be determined in design development

6. STORMWATER

Continued urbanisation and expansion has resulted in a dramatic increase in areas of hard and impervious surfaces, such as buildings, roads and car parks. This has various negative impacts on waterways and their water quality, as well as on people, fauna and flora.

Best practice stormwater management means incorporating water sensitive urban design strategies such as rainwater tanks, raingardens, porous paving and landscaping to reduce the volume of run-off and the pollutant load on local waterways.

Stormwater			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
6.1	*BESS 1.1 Stormwater Treatment*	To minimise negative environmental impacts of stormwater runoff and maximise onsite re-use of stormwater	The WSUD solution consists of some filter treatment pits to collect runoff from hard surfaces which will connect to a common hydrosystem treatment device which will filter stormwater prior to it discharging to the LPOD. Rainwater from the roofs will also be directed through the Hydrosystem. SPEL/Atlan have provided a design and MUSIC model for a compliant WSUD solution using their proprietary products.

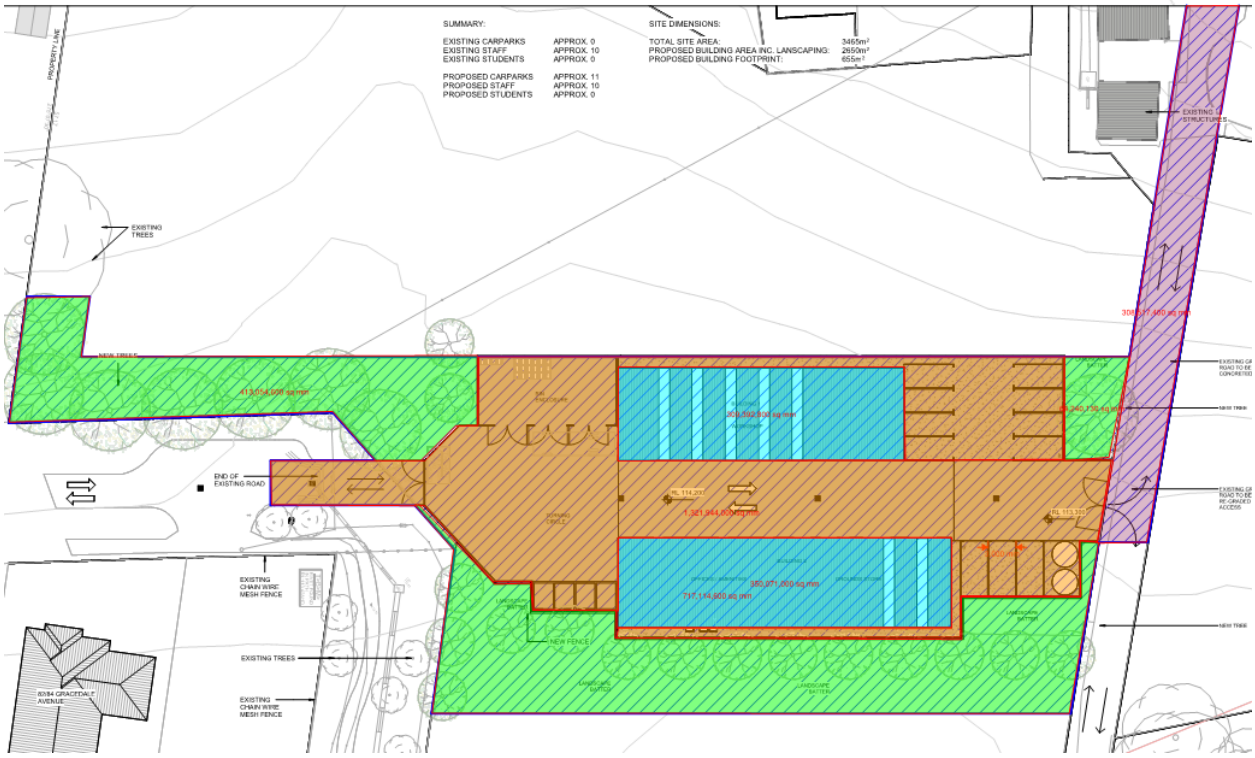


Figure 1 Proposed Site Area = 3.465m2, 655m2 roof area, 308m2 of driveway, 1,321m2 of carpark/hardstand

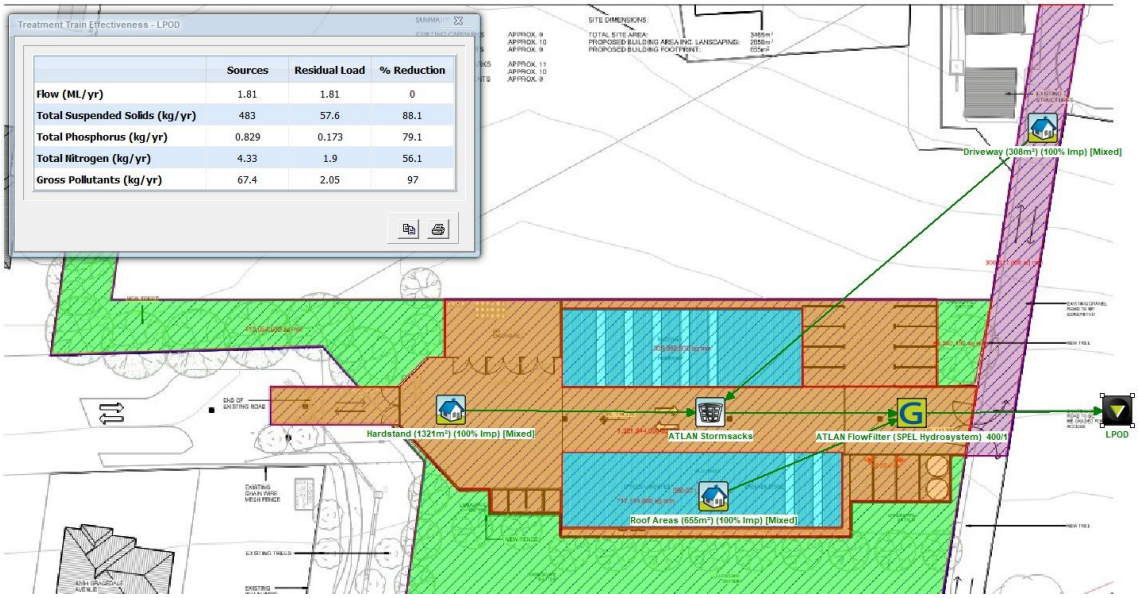


Figure 2 Proposed WSUD solution - filter treatment pits to collect runoff from hard surfaces which will connect to a common hydrosystem treatment device which will filter stormwater prior to it discharging to the LPOD. Rainwater from the roofs will also be directed through the Hydrosystem.

7. INDOOR ENVIRONMENT QUALITY

Indoor Environment Quality (IEQ) is a key ESD objective in the provision of a healthy and safe internal building environment for residents. The IEQ category aims to balance other categories, in the sense that reductions in energy consumption could easily be achieved at the expense of occupants' comfort. Yet, occupant comfort is vital and as such the IEQ category encourages healthy and good indoor environmental quality.

There are numerous published studies that highlight the relationships between learning outcomes and air quality in classrooms. Improved comfort and reduced pollutant and CO2 levels will help to optimise the potential for better learning outcomes.

Indoor Environment Quality			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
7.1	*BESS 1.4 Daylight Access – Non-Residential and Green star IEQ Daylighting*	To provide a high level of amenity and energy efficiency through design for natural light.	47% of the nominated office areas and 76% of the grounds and workshop spaces achieve a daylight factor greater than 2%. Refer to Appendix B for more information on the daylight assessment.
7.2	*BESS 2.3 Effective Natural Ventilation and BESS 3.5 Ceiling fans*	To provide fresh air and passive cooling opportunities.	50% of the office spaces have openable windows to the perimeter for fresh air and the grounds equipment and workshop storage spaces are all 100% naturally ventilated.
7.3	*BESS IEQ 3.4 Thermal comfort - Shading - Non-Residential*	To provide comfortable indoor spaces and reduce energy needed for heating and cooling	100% Effective shading to the north for office and no shading to east or west = 30% claim for effective shading Workshop/storage spaces have no northern, western or eastern glazing = 100% claim for effective shading.
7.4	*BESS 4.1 Air Quality - Non-Residential*	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	Where relevant: Paints, adhesives, sealants and carpets applied on-site shall meet the maximum Total Volatile Organic Compound (TVOC) limits outlined in Appendix C. Engineered wood products including particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels shall meet the Formaldehyde emission limits outlined in Appendix D.

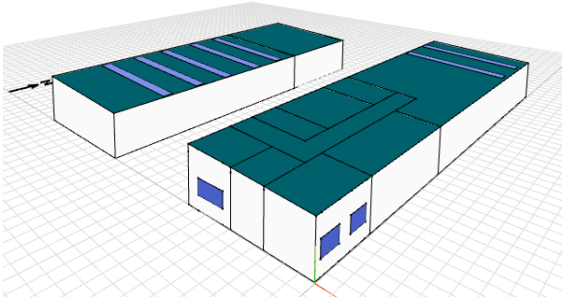


Figure 3 The buildings have been modelled for daylight. See Appendix.

8. TRANSPORT

The automobile accounts for 54% of Australia's total domestic transport emissions and approximately 80% of adults use a private car to commute to and from work. There is a need to maximise alternative transport options if the environmental impact of car commuting is to be reduced. Options available may include trains, buses and, light rail trams. Walking and cycling are the most environmentally friendly alternatives, with no associated fuel use or pollutants. All credits within the Transport category have the same underlying principle; to reward the reduction in automotive movement by simultaneously discouraging it and encouraging use of alternative transportation.

No particular Transport ESD initiatives.

9. WASTE

Up to 40% of the waste going to Australia's landfills is related to the construction and demolition of buildings. Simple design decisions can influence the amount of construction waste being produced and operational waste streams being separated.

Even more waste is produced during the occupancy phase of buildings. Poor waste practices and treatment of the environment in the past have not only lead to a degradation of our water, air and land resources but also represent a big financial burden to current and future generations.

Waste			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
9.1	*BESS 2.1 - Operational Waste - Food & Garden Waste*	To minimise organic waste going to landfill	Green waste collection and on-site composting of green and kitchen waste is handled on a campus wide basis. Refer to Campus Waste Management Plan.
9.2	*BESS 2.2 Operational Waste – Convenience of Recycling*	To minimise recyclable material going to landfill	Wherever a general waste bin is provided, a clearly labelled recycling bin shall also be provided. Refer to Campus Waste Management Plan.

10. URBAN ECOLOGY

The credits within the Land Use and Ecology category promote initiatives to improve or reduce impacts on ecological systems and biodiversity. The term 'Biodiversity' is used to describe the variation of life forms in a particular ecosystem and is often used as a measure of the health status of the environment.

Many credits in other categories have an indirect impact on the land use and ecology of the Australian environment, for example, the 'Stormwater' category addresses the rainwater run-off from buildings and hard surfaces in an attempt to prevent pollution from reaching nearby natural watercourses. This category, however, addresses the direct impact of a project on the ecological value of the site.

Urban Ecology			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
10.1	*BESS 1.1 Communal Spaces*	Communal spaces are places where people gather for social exchange. They can be outdoors or indoors, and can include rooftop gardens, communal courtyards with seating and bbq facilities, gyms, community rooms for use and hire within the building and other spaces where people can gather.	The project has a 26m2 lunchroom available for all staff.
10.2	*BESS 2.1 Vegetation*	To encourage and recognise the use of vegetation and landscaping within and around developments.	The site is significantly landscaped. 1194m2 of 3465m2 = 34%

11. MATERIALS

The 'Innovation' criteria aims to recognise the implementation of innovative practices, processes and strategies that

The production and use of building materials can have serious impacts on the environment. Energy is used to extract, produce and transport building materials; natural resources are exploited to be used in building materials; the industrial production of the materials causes pollution, and if poorly selected and used the material ends up as waste, to become landfill or incinerated.

Within the Materials category the credits target the consumption of resources through selection and re-use of materials, and efficient management practices. The basic concepts of the category are to reduce the amount of natural resources used, re-use whatever materials can be re-used, and recycle whenever possible.

Materials			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
11.1	*IMAP Building Materials*	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	All timber used in the building and construction works shall either be: • Certified by a forest certification scheme and be accompanied by a relevant Chain of Custody (CoC) certificate; or • Be from a reused source.
11.2	*IMAP Building Materials*		All permanent formwork, pipes, flooring, blinds and cables in a project shall either: • Not contain PVC and have an Environmental Product Declaration (EPD); or • Meet Best Practice Guidelines for PVC.
11.3	*Green Star 21 Product Transparency and Sustainability*	To encourage sustainability and transparency in product specification.	Products and manufacturers complying with the following standards and certifications shall be chosen in preference to non-compliance choices, where they are equally suitable for use and selection does not impact the project budget: • Products with a product-specific, third-party verified EPD; • Products with a industry-wide, third-party verified EPD; • Carpet Institute of Australia Environmental Certification Scheme (ECS); • Ecospecifier Green Tag GreenRate; • Australasian Furnishing Research and Development Institute Green Tick; • Good Environmental Choice Australia; • The institute for Market Transformation to Sustainability Sustainable Materials Rating Technology; • Manufacturer Environmental Management System (ISO14001); • Manufacturer certified to SA8000 social accountability standard or GeSI management standards; and • Products certified to Fairtrade Mark.
11.4	*IMAP Construction and Building Management*	To reward projects that reduce construction waste going to landfill by reusing or recycling building materials.	Target at least 70% construction waste recycling (diversion from landfill)

12. CONCLUSION

This report outlines the range of ESD initiatives that have been included in the design of the proposed development.

The development proposal demonstrates a holistic approach to sustainable urban development that addresses the ESD objectives of the Maroondah City Council.

A copy of the BESS scorecard used to complete this assessment in accordance to the Planning Scheme is attached in Appendix F.

APPENDIX A – PRELIMINARY ENERGY EFFICIENCY ASSESSMENT

A Preliminary NCC 2019/22 DTS assessment has been conducted to establish basic compliance requirements and to confirm the project will satisfy the Building Code J1-3.

NCC 2019/2022 Section J1-3 Deemed to Satisfy Assessment.

General Building Parameters	
Address	90 Alexandra Road, Ringwood
Climate Zone	6
Building Class	5 (office). (store/workshop spaces are unconditioned class 7 and not subject to section J1-3)
Total Floor Area	162m2

Building Fabric Parameters			
Element	**DTS Description**	**DTS Compliance**	**Comments**
J1.3 Roof and ceiling	External roof and ceiling part of the thermal envelope. R3.2 required.	R_T 3.8. (3.2+10%)	Skylights are to non-conditioned spaces and so not subject to section J.
J1.4 Roof lights	Roof lights part of the conditioned envelope	N/A	
J1.5 Walls	External walls part of the envelope must achieve at least R1.4	R_T 1.4	
	Internal walls part of the envelope must achieve at least R1.4	R_T 1.4	
J1.5 Facade	Method 2 Glazing – Combined façade (glazing and wall) must achieve U<2.0 and AC NA due to low window to wall ratio of 0.06	Combined façade (glazing and wall) U=0.88 and AC energy=NA due to low window to wall ratio of 0.06 so any SHGC may be nominated. Proposed U3.5 SHGC 0.35 glazing.	Construction details yet to be finalised.
J1.6 Floors	Slab on Ground NA	New slab for conditioned space on ground should achieve R2.2 (2.0+10%)	Construction details yet to be finalised.

Table 1: Preliminary DTS assessment proposed constructions.

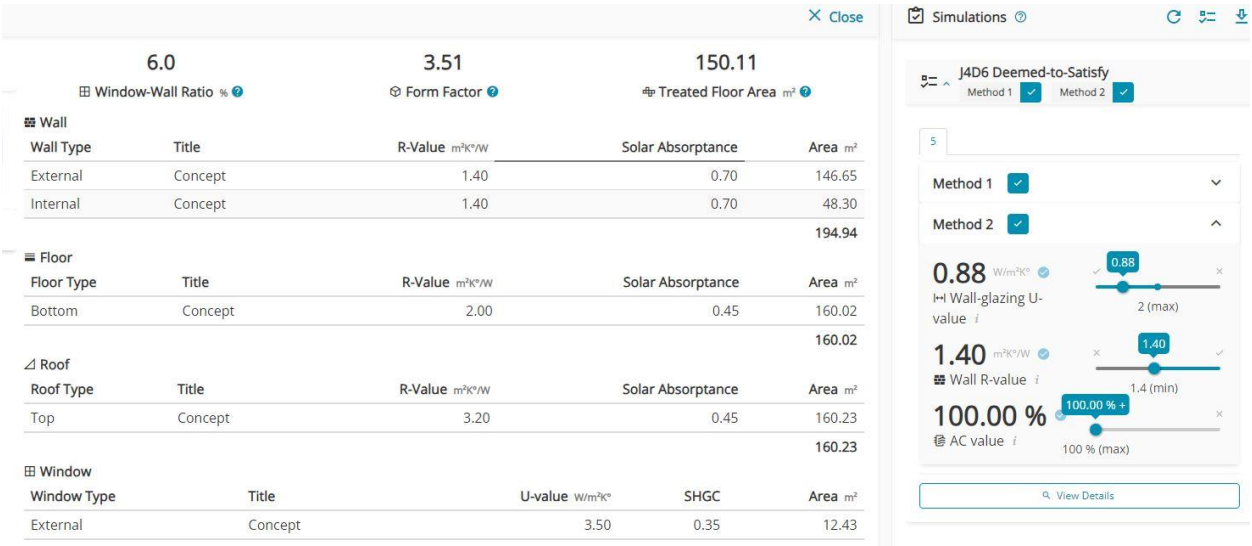


Figure 4 DTS Assessment showing compliance with DTS method 2.

APPENDIX B – DAYLIGHT ASSESSMENT

Table 3 and 4 outline the assumptions that have been included in the daylight assessment and the results obtained.

General Building Simulation Parameters	
Address	90 Alexandra Road, Ringwood
Terrain Type	Campus
Climate Zone	6
Building Class	5 and 7
Sky	10,000 Lux CIE overcast sky
Working Plane	Desk level
Software	Speckel
Application	Radiance
Assessed Areas	• Offices and breakout spaces and workshop/grounds equipment store • Amenities, circulation and back of house excluded.
Total Assessed Floor Area	165m2 office, 212m2 workshop and 179m2 ground equipment store.

Building Element Parameters	
Element	**Reflectance**
Floor	0.30
Wall	0.70
Ceiling	0.80
Roof	0.30
Ground	0.30
Glazing (VLT)	0.60
Skylight (VLT)	NA

Shading Elements	
Element	**Description**
Overshadowing	Neighbouring buildings are included in the model.
Local shading	NA

Table 2: Daylight simulation parameters

The following overlays show the extent of nominated floor area across which the desired daylight factor (2%) is achieved.

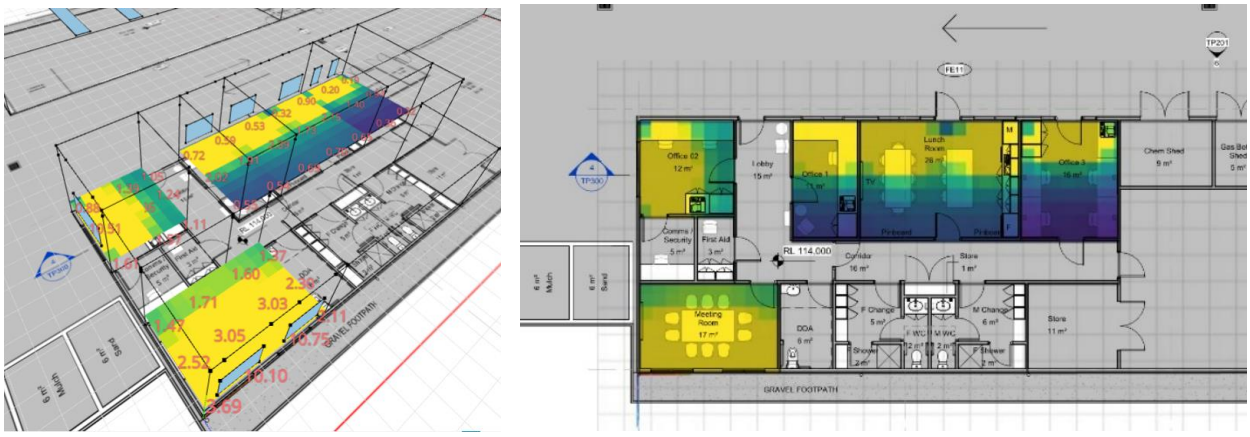


Figure 5: Daylight plots of the office. Areas in yellow have a DF>2%. Note circulation, back of house and amenities areas are excluded.

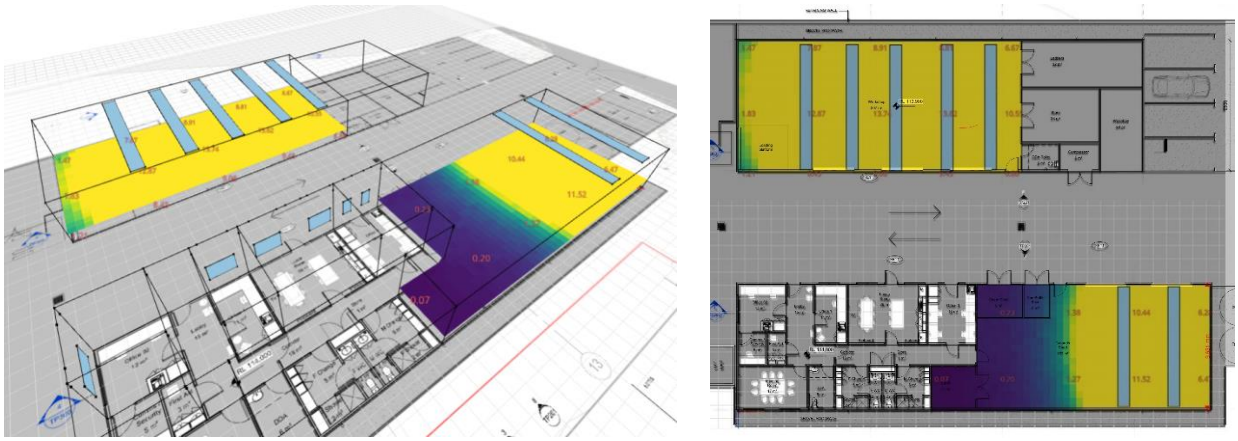


Figure 6: Daylight Plots of Workshop and Grounds Equipment store. Areas in yellow have a DF>2%. Note circulation, BOH and amenities areas are excluded.

Table 3: Daylight assessment results. The 'Pass Area' identifies the area of the floor plate (at desk height) that achieves a Daylight Factor (DF) of 2% or more.

Office Areas

Level	Zone	Area m²	Pass Area m²	%
1	4. Lunch room	27.53	9.07	33%
1	5. Meeting	17.75	12.1	68%
1	6. Office 3	16.83	4	24%
1	7. office 2	13.24	6.34	48%
1	8. Office 1	11.6	4.55	39%
	TOTAL	86.95	36.06	**41%**

Workshop and Grounds Equipment Store

Level	Zone	Area m²	Pass Area m²	%
1	1. workshop	212.85	202.5	95%
1	2. shed	179.18	95.05	53%
		392.03	297.55	**76%**

APPENDIX C – PAINTS, ADHESIVE, SEALANTS AND CARPETS

The following TVOC limits are applicable to all internal applications of all types of paints, adhesives or sealants applied on-site, including both exposed and concealed applications. If exterior grade products are used in an internal application, then these must also meet the requirements.

The following items are excluded from this credit:

- Glazing film, tapes, and plumbing pipe cements;
- Products used in car park;
- Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing site and later installed in the fitout; and
- Adhesives and mastics used for temporary formwork and other temporary installations.

Product Type	Maximum TVOC Content (g/litre of ready to use product)
General purpose adhesive and sealants	50
Interior wall and ceiling paints, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealants, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

Table 4: Maximum TVOC Limits for Paints, Adhesives and Sealants

Further, carpets used in the project must either be:

- Certified under a recognised Product Certification Scheme (listed on the GBCA website) or other recognised standards; or
- Compliant with the Total VOC (TVOC) limits specified in the table below.

Product Type	Maximum TVOC Content (g/litre of ready to use product)
ASTM D5116 – Total VOC limit	0.5mg/m2 per hour
ASTM D5116 – 4-PC (4 – Phenylcyclohexene)	0.05mg/m2 per hour
ISO 16000 / EN 13419 – TVOC at three days	0.5mg/m2 per hour
ISO 10580 / ISO/TC 219 (Document N238) – TVOC at 24 hours	0.5mg/m2 per hour

Table 5: Carpet Test Standards and TVOC Emissions Limits

APPENDIX D – ENGINEERED WOOD PRODUCTS

The term "engineered wood products" includes composite wood products and includes raw/ unfinished as well as finished products. Items not covered by these limits include products used in exterior applications, formwork, internal car park applications, re-used products, and raw timber. All emission levels must be established by a NATA or ISO/IEC 17025 registered laboratory as per the testing methodologies in the table above.

Test Protocol	Emission Limit / Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1.0 mg/L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.0 mg/L
AS/NZS 4357.4 – Laminated Veneer Lumber (LVL)	≤1.0 mg/L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1.0 mg/L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1.0 mg/L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1.0 mg/L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/ m²hr
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1mg/m²hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m²hr (at 3 days)
ASTM D6007	≤0.12mg/m³**
ASTM E1333	≤0.12mg/m³***
EN 717-1 (also known as DIN EN 717-1)	≤0.12 mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5 mg/m²hr
**The test report must confirm that the conditions of this table comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.	
*** The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.	

Table 6: Formaldehyde emission limit values for engineered wood products

APPENDIX E – WSUD REPORT

Final SPEL WSUD proposal and MUSIC modelling follows.

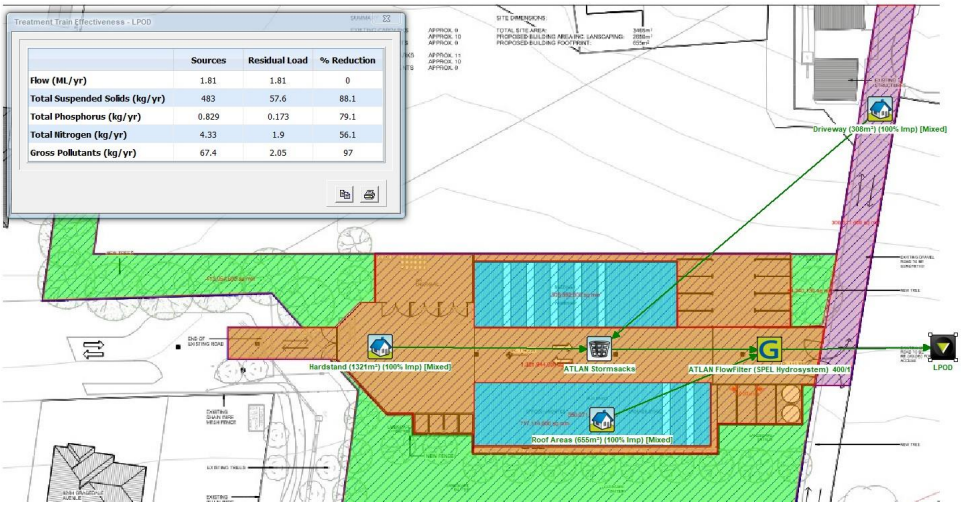


Figure 7 Proposed WSUD solution - filter treatment pits to collect runoff from hard surfaces which will connect to a common hydrosystem treatment device which will filter stormwater prior to it discharging to the LPOD. Rainwater from the roofs will also be directed through the Hydrosystem.

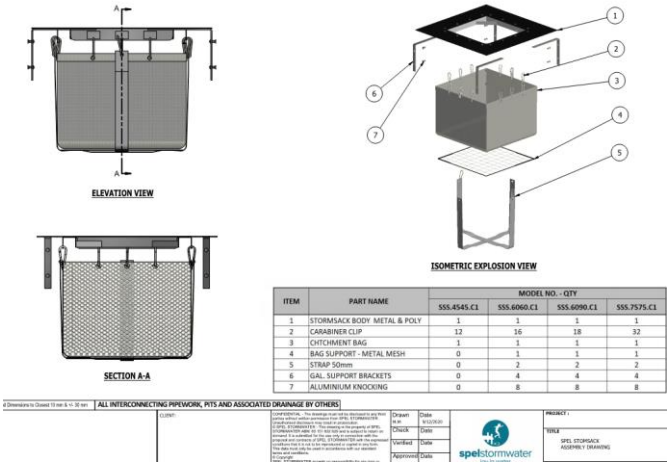


Figure 8 Atlan Stormsacks – filter bags located in pits.

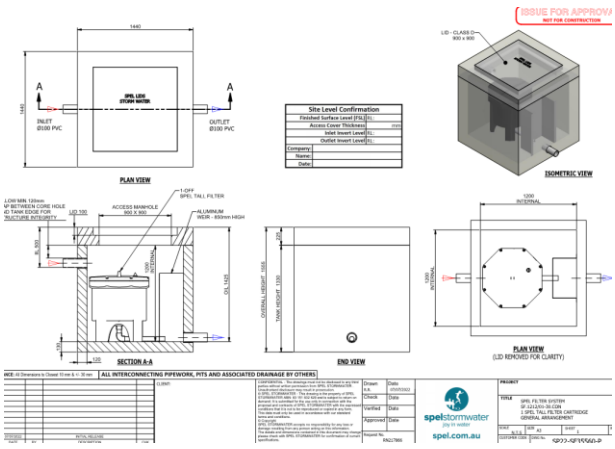


Figure 9 Atlan flow filter (Hydrosystem) 'Vault'

Atlan
STORMWATER

Atlan WSUD/MUSIC Report

Tintern Grammar - 90 Alexandra Road, Ringwood

PROJECT NUMBER:	CLIENT:	DATE:
23-5994	Sustainable Built Environments	29th of November, 2023

Victoria Office
Atlan Stormwater(Formerly SPEL)
897 Wellington Road
Rowville VIC 3178

Telephone: 1300 773 500
sales@atlan.com.au

www.atlan.com.au

PHONE: 1300 773 500
EMAIL: atlan@spel.com.au
OFFICE: 897 Wellington Road, Rowville VIC 3178
www.atlan.com.au

Project Site

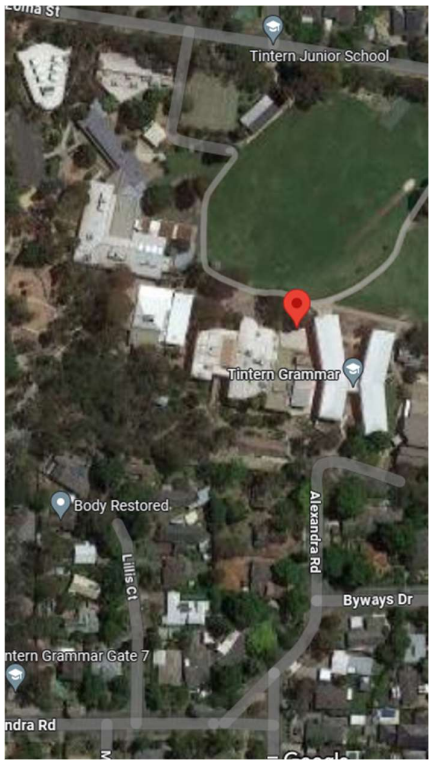


Figure 1: Existing Site Conditions

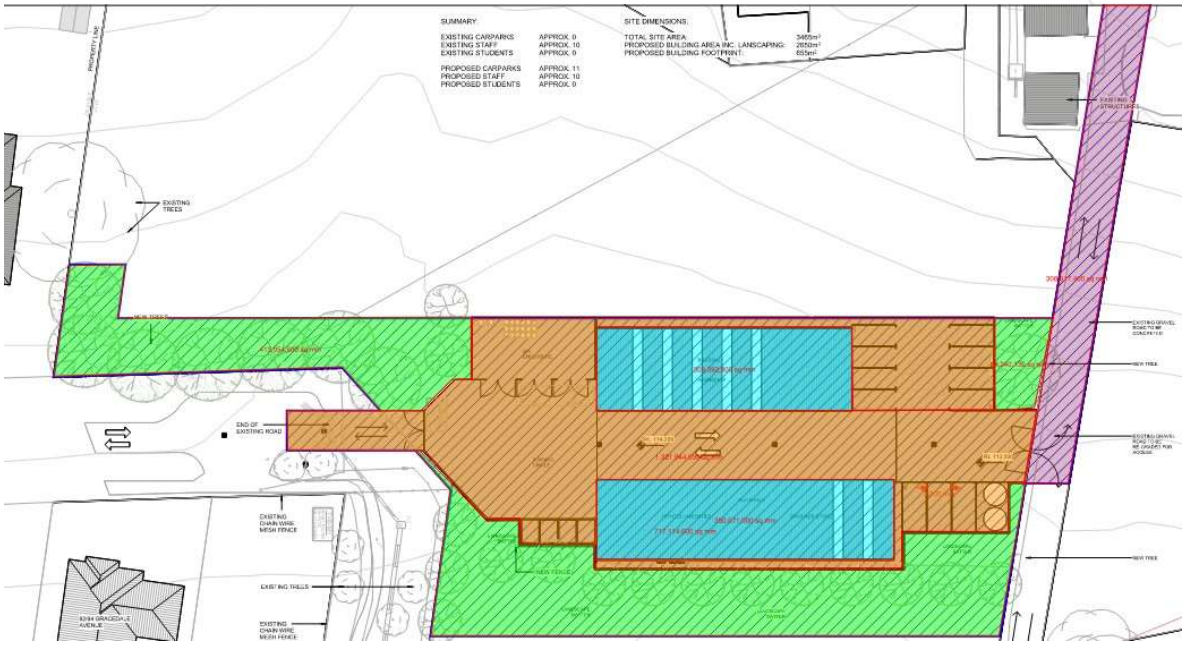


Figure 2: Proposed Development

PHONE: 1300 773 500
EMAIL: sales@atlan.com.au
OFFICE: 897 Wellington Road, Rowville VIC 3178
www.atlan.com.au

MUSIC Inputs

10 Year rainfall template: 850-1100mm_NarreWarrenNorth 1984-1993_6min

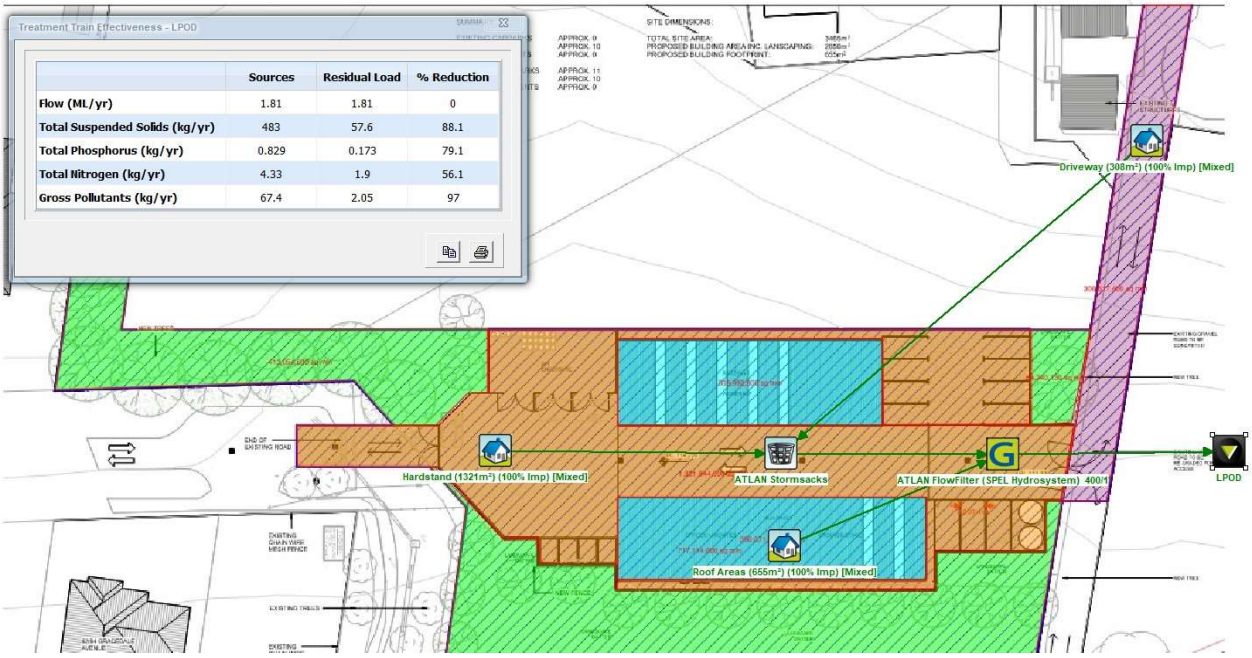


Figure 3: MUSIC Model Configuration

Catchment Details

Catchment	Size (m²)	Imperviousness (%)
Hardstand	1321	100
Roof Areas	655	100
Driveway	308	100

PHONE: 1300 773 500
EMAIL: sales@atlan.com.au
OFFICE: 897 Wellington Road, Rowville VIC 3178
www.atlan.com.au

Treatment Details

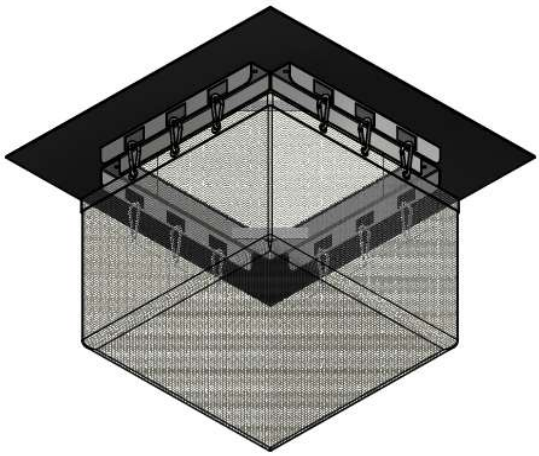
SPEL Stormsack

System Type: GPT (Gross Pollutant Trap)

Treatment Type: Primary

Model: SSS.6060.C1

Treatment Flow Rate: 55 L/s



Pollutant Removal Rates

Pollutant	TSS	TP	TN	GP
Input (mg/L)	1000	5	50	15
Output (mg/L)	390	3.6	27.5	0

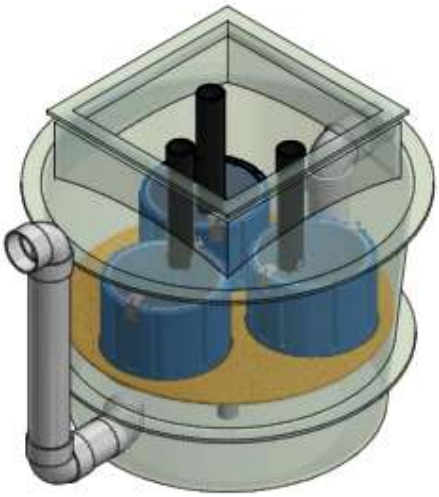
SPEL Hydrosystem

System Type: Dynamic Separator and Filter

Treatment Type: Secondary and Tertiary

Model: HS.400/1

Treatment Flow Rate: 2.5L/s



Pollutant Removal Rates

Pollutant	TSS	TP	TN	GP
Input (mg/L)	1000	5	50	15.0
Output (mg/L)	100	0.5	28	0.0

PHONE: 1300 773 500
EMAIL: sales@atlan.com.au
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www.atlan.com.au

MUSIC Results

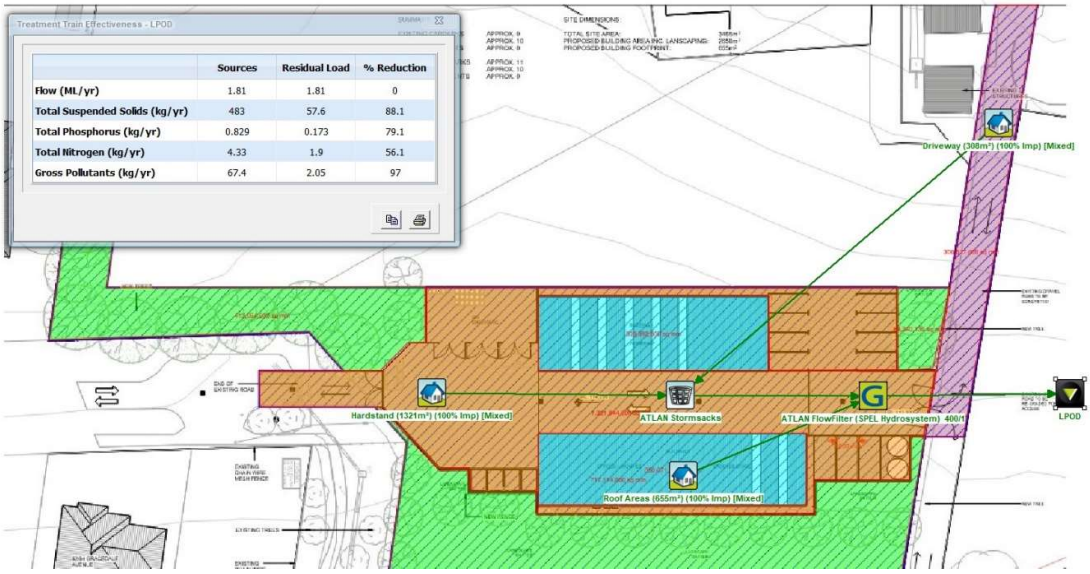


Figure 4: MUSIC Model Results

Pollutant	Sources (kg/yr)	Residual Load (kg/yr)	Reduction (%)	Reduction Target (%)
Flow (ML/yr)	1.81	1.81	**1**	0
Total Suspended Solids	483	57.6	**88.1**	80
Total Phosphorus	0.829	0.173	**79.1**	45
Total Nitrogen	4.33	1.9	**56.1**	45
Gross Pollutants	67.4	2.05	**97**	70

Author: Lee Parker
Position: Engineering Coordinator

Approved: Kurt Jensen
Position: VIC/TAS General Manager

APPENDIX F – BESS REPORT

A preliminary assessment of the Design's potential BESS score, based on the ESD initiatives proposed within report, is provided below.

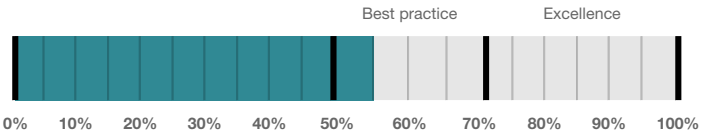
BESS Report

Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 90 Alexandra Rd Ringwood East Victoria 3135. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Maroondah City Council.

Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

Your BESS Score

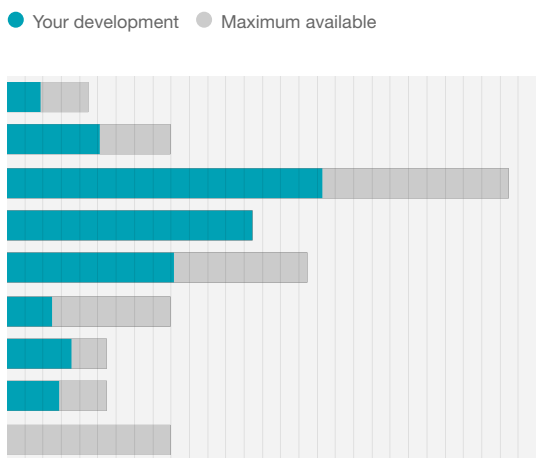


56%

Project details

Address	90 Alexandra Rd Ringwood East Victoria 3135
Project no	C4551287-R3
BESS Version	BESS-8
Site type	Non-residential development
Account	sean.mcardle@sbe.com.au
Application no.	
Site area	3,465.00 m²
Building floor area	655.00 m²
Date	05 December 2023
Software version	1.8.0-B.405

Performance by category



Category	Weight	Score	Pass
Management	5%	42%	
Water	9%	57%	✓
Energy	28%	63%	✓
Stormwater	14%	100%	✓
IEQ	17%	56%	✓
Transport	9%	28%	
Waste	6%	66%	
Urban Ecology	6%	53%	
Innovation	9%	0%	

Buildings

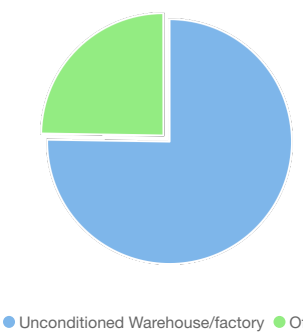
Name	Height	Footprint	% of total footprint
offce and grounds equipment store	1	350 m²	53%
workshop store	1	310 m²	46%

Dwellings & Non Res Spaces

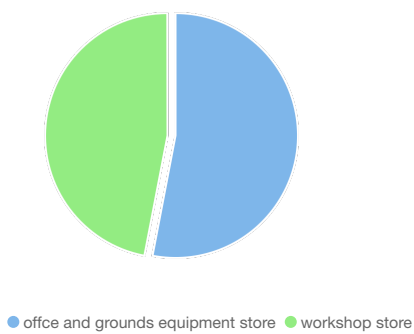
Non-Res Spaces

Name	Quantity	Area	Building	% of total area
Office				
office	1	162 m²	offce and grounds equipment store	24%
Total	**1**	**162 m²**	**24%**	
Unconditioned Warehouse/factory				
workshop store	1	310 m²	workshop store	47%
grounds equip store	1	183 m²	offce and grounds equipment store	27%
Total	**2**	**493 m²**	**75%**	

Building Type composition



Building composition



Credit summary

Management Overall contribution 4.5%

	42%
1.1 Pre-Application Meeting	0%
2.3 Thermal Performance Modelling - Non-Residential	50%
3.2 Metering - Non-Residential	N/A Scoped Out
	NA - no commervila tenan
3.3 Metering - Common Areas	100%
4.1 Building Users Guide	100%

Water Overall contribution 9.0%

	Minimum required 50%	**57%** ✔ **Pass**
1.1 Potable Water Use Reduction	40%	
3.1 Water Efficient Landscaping	100%	
4.1 Building Systems Water Use Reduction	100%	

Energy Overall contribution 27.5%

	Minimum required 50%	63%	Pass
1.1 Thermal Performance Rating - Non-Residential		37%	
2.1 Greenhouse Gas Emissions		100%	
2.2 Peak Demand		100%	
2.6 Electrification		0%	Disabled
	Credit is available when project is declared to have no gas connection.		
2.7 Energy consumption		100%	
3.1 Carpark Ventilation		N/A	Scoped Out
	no enlcosed carparking		
3.2 Hot Water		100%	
3.7 Internal Lighting - Non-Residential		0%	
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A	Scoped Out
	No cogeneration or trigeneration system in use.		
4.2 Renewable Energy Systems - Solar		94%	
4.4 Renewable Energy Systems - Other		N/A	Scoped Out
	No other (non-solar PV) renewable energy is in use.		

Stormwater Overall contribution 13.5%

	Minimum required 100%	100%	Pass
1.1 Stormwater Treatment		100%	

IEQ Overall contribution 16.5%

	Minimum required 50%	56%	Pass
1.4 Daylight Access - Non-Residential		68%	Achieved
2.3 Ventilation - Non-Residential		37%	Achieved
3.4 Thermal comfort - Shading - Non-Residential		75%	
3.5 Thermal Comfort - Ceiling Fans - Non-Residential		0%	
4.1 Air Quality - Non-Residential		100%	

Transport Overall contribution 9.0%

28%

1.4 Bicycle Parking - Non-Residential	0%	
1.5 Bicycle Parking - Non-Residential Visitor	0%	
1.6 End of Trip Facilities - Non-Residential	0%	⊘ Disabled
	Credit 1.4 must be complete first.	
2.1 Electric Vehicle Infrastructure	100%	
2.2 Car Share Scheme	N/A	⌖ Scoped Out
	NA - campus wide issue	
2.3 Motorbikes / Mopeds	0%	

Waste Overall contribution 5.5%

66%

1.1 - Construction Waste - Building Re-Use	0%	
2.1 - Operational Waste - Food & Garden Waste	100%	
2.2 - Operational Waste - Convenience of Recycling	100%	

Urban Ecology Overall contribution 5.5%

53%

1.1 Communal Spaces	24%	
2.1 Vegetation	100%	
2.2 Green Roofs	0%	
2.3 Green Walls and Facades	0%	
3.2 Food Production - Non-Residential	0%	

Innovation Overall contribution 9.0%

0%

1.1 Innovation	0%	

Credit breakdown

Management Overall contribution 2%

1.1 Pre-Application Meeting		0%
Score Contribution	This credit contributes 44.2% towards the category score.	
Criteria	Has an ESD professional been engaged to provide sustainability advice from schematic design to construction? AND Has the ESD professional been involved in a pre-application meeting with Council?	
Question	Criteria Achieved ?	
Project	No	
2.3 Thermal Performance Modelling - Non-Residential		50%
Score Contribution	This credit contributes 26.3% towards the category score.	
Criteria	Has a preliminary facade assessment been undertaken in accordance with NCC2022 Section J4D6?	
Question	Criteria Achieved ?	
Office	Yes	
Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?	
Question	Criteria Achieved ?	
Office	No	
3.2 Metering - Non-Residential		N/A ⌖ Scoped Out
This credit was scoped out	NA - no commervila tenan	
3.3 Metering - Common Areas		100%
Score Contribution	This credit contributes 14.7% towards the category score.	
Criteria	Have all major common area services been separately submetered?	
Question	Criteria Achieved ?	
Office	Yes	
Unconditioned Warehouse/factory	Yes	
4.1 Building Users Guide		100%
Score Contribution	This credit contributes 14.7% towards the category score.	
Criteria	Will a building users guide be produced and issued to occupants?	
Question	Criteria Achieved ?	
Project	Yes	

Water Overall contribution 5% Minimum required 50%

Water Approach	
What approach do you want to use for Water?:	Use the built in calculation tools
Project Water Profile Question	
Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No
Are you installing a rainwater tank?:	No
Water fixtures, fittings and connections	
Showerhead:	
office	4 Star WELS (>= 6.0 but <= 7.5)
grounds equip store workshop store	Scope out
Bath: All	Scope out
Kitchen Taps: All	>= 5 Star WELS rating
Bathroom Taps: All	>= 5 Star WELS rating
Dishwashers:	
office	>= 5 Star WELS rating
grounds equip store workshop store	Scope out
WC: All	>= 4 Star WELS rating
Urinals: All	Scope out
Washing Machine Water Efficiency: All	Scope out

1.1 Potable Water Use Reduction		40%
Score Contribution	This credit contributes 71.4% towards the category score.	
Criteria	What is the reduction in total potable water use due to efficient fixtures, appliances, rainwater use and recycled water use? To achieve points in this credit there must be >25% potable water reduction.	
Output	Reference	
Project	456 kL	
Output	Proposed (excluding rainwater and recycled water use)	
Project	339 kL	
Output	Proposed (including rainwater and recycled water use)	
Project	339 kL	
Output	% Reduction in Potable Water Consumption	
Project	25 %	

3.1 Water Efficient Landscaping		100%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Will water efficient landscaping be installed?	
Question	Criteria Achieved ?	
Project	Yes	

4.1 Building Systems Water Use Reduction	100%
Score Contribution	This credit contributes 14.3% towards the category score.
Criteria	Where applicable, have measures been taken to reduce potable water consumption by >80% in the buildings air-conditioning chillers and when testing fire safety systems?
Question	Criteria Achieved ?
Project	Yes

Energy Overall contribution 18% Minimum required 50%

Use the BESS Deem to Satisfy (DtS) method for Energy?:	Yes
Do all exposed floors and ceilings (forming part of the envelope) demonstrate meeting the required NCC2022 insulation levels (total R-value upwards and downwards)?:	Yes
Does all wall and glazing demonstrate meeting the required NCC2022 facade calculator (or better than the total allowance)?:	Yes
Are heating and cooling systems within one Star of the most efficient equivalent capacity unit available, or Coefficient of Performance (CoP) & Energy Efficiency Ratios (EER) not less than 85% of the CoP & EER of the most efficient equivalent capacity unit available?:	Yes
Are water heating systems within one star of the best available, or 85% or better than the most efficient equivalent capacity unit?:	Yes
Use the BESS Deem to Satisfy (DtS) method for Energy Unconditioned Spaces?:	-
Are you installing a cogeneration or trigeneration system?:	No
Non-Residential Building Energy Profile	
Heating, Cooling & Comfort Ventilation - Electricity Reference fabric & services:	-
Heating, Cooling & Comfort Ventilation - Electricity - proposed fabric and reference services:	-
Heating, Cooling & Comfort Ventilation - Electricity Proposed fabric & services:	-
Heating - Gas - Reference fabric and services:	-
Heating - Gas - Proposed fabric and Reference services:	-
Heating - Gas - Proposed fabric and services:	-
Heating - Wood - reference fabric and services:	-
Heating - Wood - proposed fabric and reference services:	-
Heating - Wood - proposed fabric and services:	-
Hot Water - Electricity - Reference:	-
Hot Water - Electricity - Proposed:	-
Hot Water - Gas - Baseline:	-
Hot Water - Gas - Proposed:	-
Lighting - Reference:	-
Lighting - Proposed:	-
Peak Thermal Cooling Load - Reference:	-
Peak Thermal Cooling Load - Proposed:	-
Solar Photovoltaic system	
System Size (lesser of inverter and panel capacity): 5kW array	5.0 kW peak
Orientation (which way is the system facing)?: 5kW array	North
Inclination (angle from horizontal): 5kW array	15.0 Angle (degrees)
Which Building Class does this apply to?: 5kW array	Office

1.1 Thermal Performance Rating - Non-Residential		37%	
Score Contribution	This credit contributes 39.6% towards the category score.		
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC2022 Section J)?		
2.1 Greenhouse Gas Emissions		100%	
Score Contribution	This credit contributes 11.1% towards the category score.		
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?		
2.2 Peak Demand		100%	
Score Contribution	This credit contributes 4.9% towards the category score.		
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?		
2.6 Electrification		0%	⊘ Disabled
This credit is disabled	Credit is available when project is declared to have no gas connection.		
2.7 Energy consumption		100%	
Score Contribution	This credit contributes 22.2% towards the category score.		
Criteria	What is the % reduction in annual energy consumption against the benchmark?		
3.1 Carpark Ventilation		N/A	⌖ Scoped Out
This credit was scoped out	no enlcosed carparking		
3.2 Hot Water		100%	
Score Contribution	This credit contributes 5.5% towards the category score.		
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?		
3.7 Internal Lighting - Non-Residential		0%	
Score Contribution	This credit contributes 11.1% towards the category score.		
Criteria	Does the maximum illumination power density (W/m2) in at least 90% of the area of the relevant building class meet the requirements in Table J7D3a of the NCC 2022 Vol 1?		
Question	Criteria Achieved ?		
Office	No		
Unconditioned Warehouse/factory	No		
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A	⌖ Scoped Out
This credit was scoped out	No cogeneration or trigeneration system in use.		

4.2 Renewable Energy Systems - Solar		94%	
Score Contribution	This credit contributes 5.5% towards the category score.		
Criteria	What % of the estimated energy consumption of the building class it supplies does the solar power system provide?		
Output	Solar Power - Energy Generation per year		
Office	6,222 kWh		
Output	% of Building's Energy		
Office	123 %		
4.4 Renewable Energy Systems - Other		N/A	Scoped Out
This credit was scoped out	No other (non-solar PV) renewable energy is in use.		

Stormwater

Overall contribution 14% Minimum required 100%

Which stormwater modelling are you using?:	MUSIC or other modelling software
1.1 Stormwater Treatment	100%
Score Contribution	This credit contributes 100.0% towards the category score.
Criteria	Has best practice stormwater management been demonstrated?
Question	Flow (ML/year)
Project	0.0 % Reduction
Question	Total Suspended Solids (kg/year)
Project	88.1 % Reduction
Question	Total Phosphorus (kg/year)
Project	79.1 % Reduction
Question	Total Nitrogen (kg/year)
Project	56.1 % Reduction

IEQ Overall contribution 9% Minimum required 50%

1.4 Daylight Access - Non-Residential		68%	✔ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the nominated floor area has at least 2% daylight factor?		
Question	Percentage Achieved?		
Office	47 %		
Unconditioned Warehouse/factory	76 %		
2.3 Ventilation - Non-Residential		37%	✔ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the regular use areas are effectively naturally ventilated?		
Question	Percentage Achieved?		
Office	50 %		
Unconditioned Warehouse/factory	100 %		
Criteria	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668.2:2012?		
Question	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668:2012?		
Office	-		
Unconditioned Warehouse/factory	-		
Criteria	What CO_2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain?		
Question	Value		
Office	-		
Unconditioned Warehouse/factory	-		
3.4 Thermal comfort - Shading - Non-Residential		75%	
Score Contribution	This credit contributes 17.6% towards the category score.		
Criteria	What percentage of east, north and west glazing to regular use areas is effectively shaded?		
Question	Percentage Achieved?		
Office	30 %		
Unconditioned Warehouse/factory	100 %		
3.5 Thermal Comfort - Ceiling Fans - Non-Residential		0%	
Score Contribution	This credit contributes 5.9% towards the category score.		
Criteria	What percentage of regular use areas in tenancies have ceiling fans?		
Question	Percentage Achieved?		
Office	0 %		
Unconditioned Warehouse/factory	0 %		
4.1 Air Quality - Non-Residential		100%	
Score Contribution	This credit contributes 5.9% towards the category score.		

Criteria	Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes
Unconditioned Warehouse/factory	Yes

Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes
Unconditioned Warehouse/factory	No carpet

Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes
Unconditioned Warehouse/factory	No engineered wood

Transport Overall contribution 3%

1.4 Bicycle Parking - Non-Residential		0%	
Score Contribution	This credit contributes 28.6% towards the category score.		
Criteria	Have the planning scheme requirements for employee bicycle parking been exceeded by at least 50% (or a minimum of 2 where there is no planning scheme requirement)?		
Question	Criteria Achieved ?		
Office	No		
Unconditioned Warehouse/factory	No		
Question	Bicycle Spaces Provided ?		
Office	-		
Unconditioned Warehouse/factory	-		
1.5 Bicycle Parking - Non-Residential Visitor		0%	
Score Contribution	This credit contributes 14.3% towards the category score.		
Criteria	Have the planning scheme requirements for visitor bicycle parking been exceeded by at least 50% (or a minimum of 1 where there is no planning scheme requirement)?		
Question	Criteria Achieved ?		
Office	No		
Unconditioned Warehouse/factory	No		
Question	Bicycle Spaces Provided ?		
Office	-		
Unconditioned Warehouse/factory	-		
1.6 End of Trip Facilities - Non-Residential		0%	⊘ Disabled
This credit is disabled	Credit 1.4 must be complete first.		
2.1 Electric Vehicle Infrastructure		100%	
Score Contribution	This credit contributes 28.6% towards the category score.		
Criteria	Are facilities provided for the charging of electric vehicles?		
Annotation	Gator electric grounds maintenace vehicle		
Question	Criteria Achieved ?		
Project	Yes		
2.2 Car Share Scheme		N/A	⌖ Scoped Out
This credit was scoped out	NA - campus wide issue		
2.3 Motorbikes / Mopeds		0%	
Score Contribution	This credit contributes 14.3% towards the category score.		
Criteria	Are a minimum of 5% of vehicle parking spaces designed and labelled for motorbikes (must be at least 5 motorbike spaces)?		
Question	Criteria Achieved ?		
Project	-		

Waste Overall contribution 4%

1.1 - Construction Waste - Building Re-Use	0%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used?
Question	Criteria Achieved ?
Project	No

2.1 - Operational Waste - Food & Garden Waste	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are facilities provided for on-site management of food and garden waste?
Question	Criteria Achieved ?
Project	Yes

2.2 - Operational Waste - Convenience of Recycling	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are the recycling facilities at least as convenient for occupants as facilities for general waste?
Question	Criteria Achieved ?
Project	Yes

Urban Ecology Overall contribution 3%

1.1 Communal Spaces		24%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Is there at least the following amount of common space measured in square meters : * 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?	
Annotation	26m2 lunch room	
Question	Common space provided	
Office	26.0 m²	
Unconditioned Warehouse/factory	0.0 m²	
Output	Minimum Common Space Required	
Office	12 m²	
Unconditioned Warehouse/factory	9 m²	
2.1 Vegetation		100%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area?	
Annotation	1194m2 of 3465m2 = 34%	
Question	Percentage Achieved ?	
Project	34%	
2.2 Green Roofs		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green roof?	
Question	Criteria Achieved ?	
Project	No	
2.3 Green Walls and Facades		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green wall or green façade?	
Question	Criteria Achieved ?	
Project	No	
3.2 Food Production - Non-Residential		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	What area of space per occupant is dedicated to food production?	
Question	Food Production Area	
Office	0.0 m²	
Unconditioned Warehouse/factory	0.0 m²	
Output	Min Food Production Area	
Office	4 m²	
Unconditioned Warehouse/factory	3 m²	

Innovation Overall contribution 0%

1.1 Innovation		0%
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	What percentage of the Innovation points have been claimed (10 points maximum)?	

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Sustainable Built Environments Pty Ltd

ESD Town Planning Report

for the

Senior School

at

Tintern Grammar

For

McIldowie Architects

CONTENTS

Quality Assurance
Document: ESD Report
Date: 24th November 2023
Prepared by SMc

Revision	Revision Date	Details	Authorised
V1	17th November 2023	For review	SM
V2	24th November 2023	For Town Planning	SM

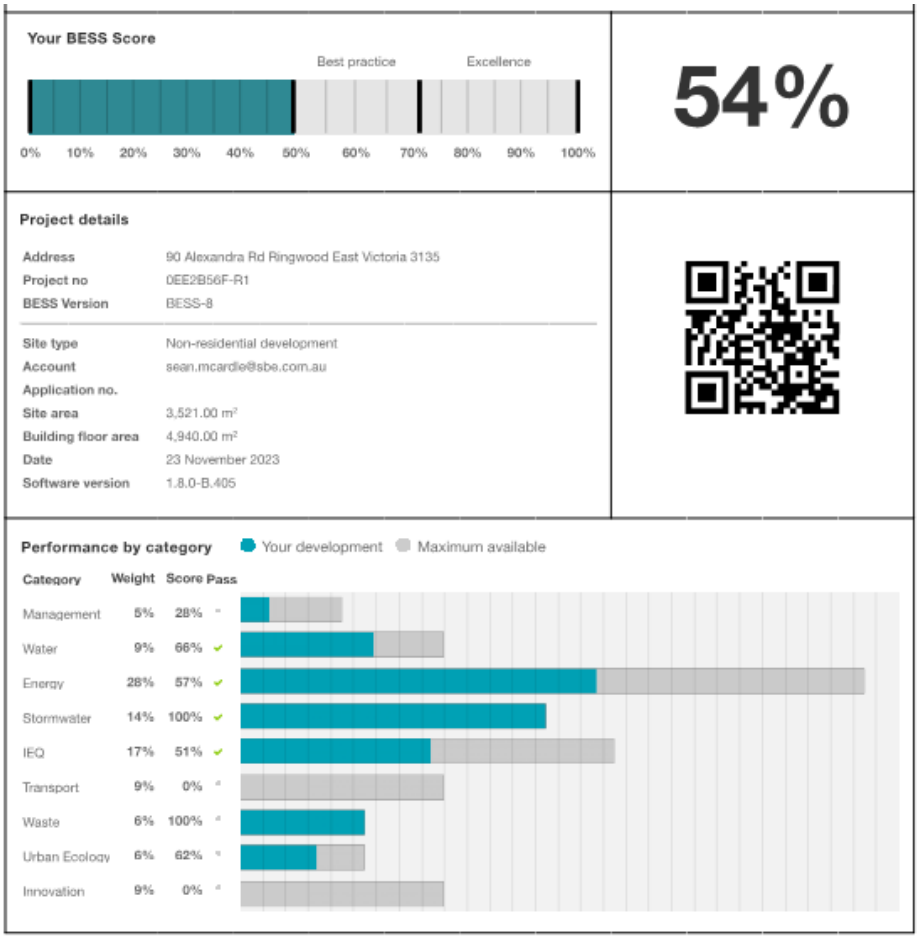
1. EXECUTIVE SUMMARY

Sustainable Built Environments (SBE) has been commissioned to provide Environmentally Sustainable Design (ESD) advice for the proposed new Senior School building.

The project delivers classroom/studios as well an Auditorium, break out spaces and study office/admin areas in a new extension and renovation to an existing building.

SBE has used the Built Environment Sustainability Scorecard (BESS) to benchmark the design's potential ESD performance under each key ESD criteria including: management, water and energy efficiency, stormwater, indoor environment quality (IEQ), sustainable transport, waste, urban ecology, and innovation. Green Star benchmarking credits have been used to assess ESD criteria not covered by BESS (e.g. Building Materials) but encouraged to be addressed by Council.

The proposed development currently targets 54 points from 100 in the BESS tool (see extract below), which equates to Best Practice.



2. INTRODUCTION

Sustainable Built Environments (SBE) has been commissioned to provide Environmentally Sustainable Design (ESD) advice for the proposed new Senior School building.

2.1 The Project

The project delivers classroom/studios as well an Auditorium, break out spaces and study office/admin areas in a new extension and renovation to an existing building.

2.2 Documents

This report has been informed by Draft sketch design drawings produced by McIldowie Architects.

2.3 ESD Expectations

The Maroondah City Council will expect the project to incorporate sensible ESD and stormwater management initiatives. Their Planning Scheme calls for "…A Sustainability Management Plan (including an assessment using BESS/Green star, STORM/MUSIC or other methods). This ESD report is a response to Council's Planning Scheme requirements and uses the BESS tool.

2.4 Note regarding the existing building

The existing building is to be retained and extended. Some minor refurbishment work will be carried out in the existing building and where opportunities arise during the course of the works to upgrade any existing elements to match what is proposed for the extension they will be considered. This extends to building fabric, glazing, HVAC, lighting, materials and finishes. However, upgrading the building fabric of the existing building is not considered a mandatory building code requirement at this point in time.

2.4.1. Practice Note guidance on existing building work upgrades.

With reference to Practice Note EE-02[1] table 2 this is an addition to an existing building where the "Extension [is] greater than 25% of the existing building" which requires "new building work only must comply with the Regulations - reg 233(3) & (6)" but also as some window replacements works are proposed to the existing (less than 50% of existing building, including work done in the past 3 years) the work proposed to the existing must also "comply with the Regulations - reg 233(1) & (2)"

Both [DTS] Method 1 and 2 require existing wall-glazing construction to be considered. In some cases, it may be unreasonable for new wall-glazing construction in an extension to compensate for the poor performance of the existing wall-glazing construction. In such instances it may be reasonable to determine compliance by applying the performance of the new wall-glazing construction uniformly to a single façade for Method 1, or to the whole storey for Method 2, but only require the complying glazing to be installed in the extension.

It follows that any glazing (or other components) to be replaced in the existing building will need to adhere to the same performance requirements established for the extension.

Building fabric

Where a building is being extended, the fabric of the extension should fully comply with the BCA fabric provisions. Partial compliance may be considered where the extension is relatively small. Where the new work includes replacement of existing elements such as roof cladding, wall cladding or wall lining, compliance with the BCA fabric provisions should be achieved. However, if the roof cladding, wall cladding or wall lining is only being repaired, then it may be unreasonable to require this to be removed, solely to install new insulation.

Example – an existing office building between a main street and a lane is being extended to the adjoining allotment and for aesthetic reasons, the existing facade is being replaced. The fabric of the extension must comply with the BCA fabric provisions. As the facade is being replaced, it is reasonable to expect insulation to be added to the external wall of the existing building. However, as work is not being carried out on the rear wall of the existing building (other than painting), requiring that wall to be insulated is not considered "reasonable".

Figure 1 Further guidance by example extracted from the above-mentioned practice note.

[1] Building Practice Note EE-02: Applying BCA energy efficiency measures to existing Class 2 to 9 buildings

3. MANAGEMENT

It is important to encourage an environmental focus in the management of design, construction and operational phases of the development. The Management category aims to highlight the importance of a holistic and thoroughly integrated approach to constructing and operating a building with good environmental performance.

Management			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
3.1	*BESS 2.3 Thermal Performance Modelling - Non-Residential*	To encourage and recognise developments that have used modelling to inform passive design at the early design stage	A Section J facade assessment has been carried out using the NCC 2019 DTS facade calculator. – DTS compliance is confirmed. Having identified this minimum requirement, we confirm the exposed roof and floor insulation will be at least 10% higher in performance than these minimum requirements. Refer to Appendix A.
3.2	*BESS 3.3 Metering*	To provide building users with information that allows monitoring of energy and water consumption	All major building services (i.e. lighting, HVAC equipment, lift, etc.) shall be individually sub-metered.

4. WATER

In Australia, water has long been considered a precious and high-demand resource. Fresh water supplies are increasingly affected by a range of factors including catchment locations, contaminated sources, drought and rising demand. In addition to reducing the demand for water, efficient use of water in buildings can reduce building owners' operational costs. This category aims to minimise the impacts on the environment from extensive water use in the built environment.

Water			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
4.1	*BESS 1.1 Potable Water Use Reduction*	To encourage building design that minimises potable water consumption in operations.	All sanitary fixtures and water appliances shall have the WELS rating stated below: • Kitchen Taps – 5 Stars • Bathroom Taps – 5 Stars • Toilets – 3 Stars connected to rainwater tank for flushing • 5-star dishwasher in kitchen • On demand underbench electric domestic hot water units that will eliminate hot water losses through long pipe runs. (note if a shower is installed a dedicated heat pump storage system is proposed – see energy section) • 4 star WELS (>6.0 but <= 7.5l/min) shower heads (if installed) A 33,000L rainwater tank is proposed to be installed and connected to the entire roof area for capture and rainwater and reuse in WC flushing and irrigation.
4.2	*BESS 3.1 Water Efficient Landscaping*		Low water use indigenous plants shall be specified for the landscaped areas and irrigation shall be supplied by rainwater.
4.3	*BESS Water 4.1 Building Systems Water Use Reduction*		No water-based cooling systems shall be adopted and fire test water (from hydrants or sprinkler discharge) where applicable shall be captured for reuse in irrigation.

5. ENERGY

Production of Australia's energy is largely from the incineration of non-renewable fossil fuels and is the country's greatest contributor to greenhouse gas emissions. The credits within the Energy Category target an overall reduction of energy consumption. Such reduction has an impact upon greenhouse gas emissions and energy production capacity as well as other emissions associated with energy generation.

Energy			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
5.1	*BESS 1.1 Thermal Performance Rating – Non-Residential*	To reduce reliance on mechanical systems to achieve thermal comfort in summer and winter, as well as to reduce greenhouse gas emissions, energy demand, and maintenance and operational costs.	A preliminary Section J1-J3 assessment has been conducted. DTS compliance is confirmed – with a min 10% increase in floor and roof insulation. For more information on the preliminary assessment refer to Appendix A.
5.2	*BESS 2.1 Greenhouse Gas Emissions* *BESS 2.2 Peak Demand* *BESS 2.3 Electricity Consumption* *BESS 2.4 Gas Consumption* *BESS 2.6 Electrification*		All air-conditioning systems provided for the development shall have a COP and EER 85% or better than the most efficient equivalent capacity unit available. Most externally located rooms (60% of the total) have openable windows to the perimeter for fresh air and an HVAC system that will be, in part, controlled with CO2 sensors and modulated to ensure CO2 levels are maintained below 500ppm. The extension will be 'all electric'
5.3	*BESS 3.2 Hot Water*		The domestic hot water systems provided for the kitchen/s shall be underbench electric units that will eliminate energy losses through long pipe runs. If a shower is to be installed consider a dedicated small electric heat pump storage system located on an adjacent external wall.

6. STORMWATER

Continued urbanisation and expansion has resulted in a dramatic increase in areas of hard and impervious surfaces, such as buildings, roads and car parks. This has various negative impacts on waterways and their water quality, as well as on people, fauna and flora.

Best practice stormwater management means incorporating water sensitive urban design strategies such as rainwater tanks, raingardens, porous paving and landscaping to reduce the volume of run-off and the pollutant load on local waterways.

Stormwater			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
6.1	*BESS 1.1 Stormwater Treatment*	To minimise negative environmental impacts of stormwater runoff and maximise onsite re-use of stormwater	The roof area shall be connected to a min 33,000L rainwater tank for collection, 'retention' and reuse of rainwater for toilet flushing and irrigation. Note we have initially proposed a 50,000L rainwater tank of which 17,000L would be allocated for 'detention' needs. This strategy may need to be reviewed by the civil engineer after taking into account other site wide factors and features. Should detention not be required, or catered for elsewhere on campus then the rainwater tank may be reduced to 33,000L capacity. The raised deck area on the north of the building will be drained to stormwater without treatment. The rest of the designated site is considered permeable and/or hard paved areas that will drain to adjacent permeable. See Stormwater Appendix for more information.

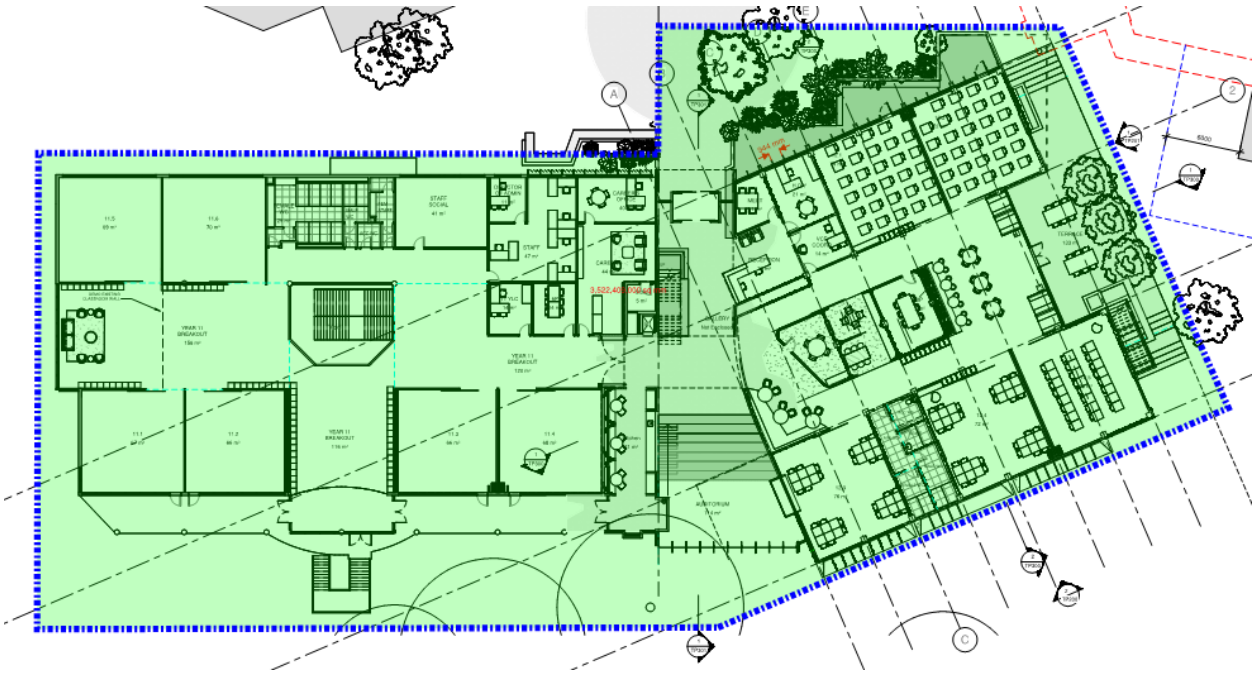


Figure 2 Proposed Site Area 3,522m2

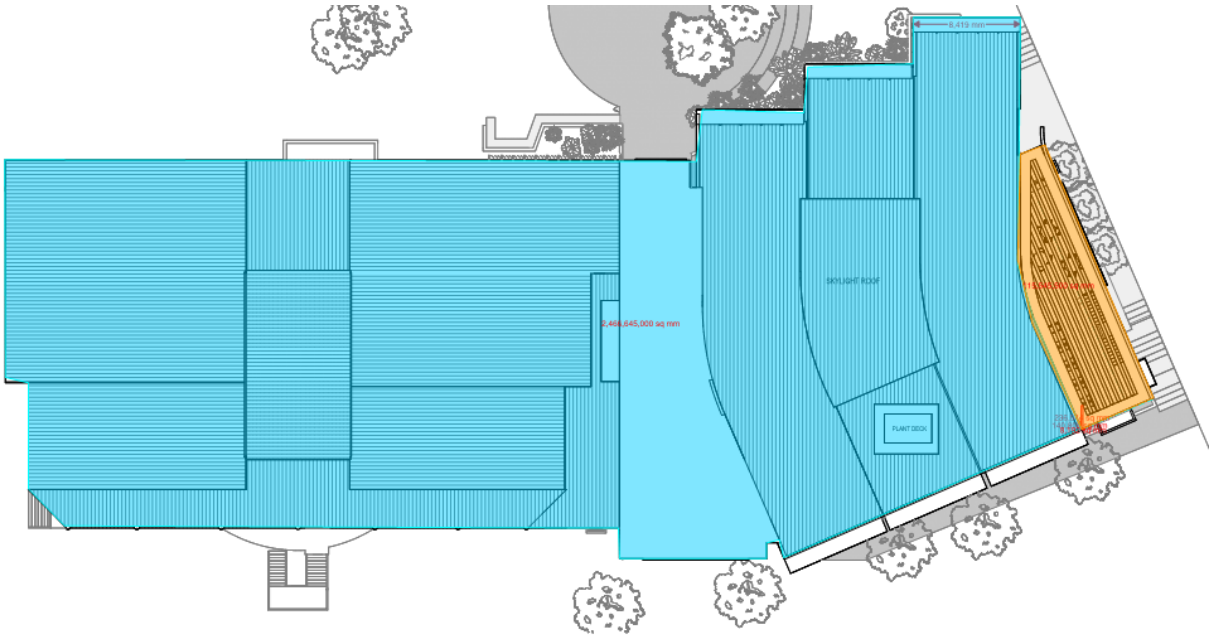


Figure 3 Roof area (blue connected to rainwater tank) =2,466m2. Deck area (orange = 115m2) connected to LPOD without treatment. Remainder of site considered permeable.

Results

VOLUME	FLOW	QUALITY	EFFICIENCY
Objective: Reduce annual average runoff volume by harvesting or infiltrating stormwater	**Objective**: Control peak discharge flow (litres per second) with adequate on site detention	**Objective**: Improve stormwater runoff water quality (Equivalent to STORM score)	**Objective**: Increase drought resilience
Target: No increase in pre-development annual average runoff volume (Up to a 10% increase is allowed to account for uncertainties)	**Target:** less than or equal to zero. If greater than zero this is the additional Site Storage Requirement (SSR) volume required	**Target**: Achieve a score of 100 or more This corresponds to a 45% reduction in nitrogen runoff	**Target**: Achieve greater than 25% potable water use reduction
VOLUME RESULT	**FLOW RESULT**	**QUALITY RESULT**	**EFFICIENCY RESULT**
5.4	-0.6	106	35.2
% change in annual average volume	m^3 of additional site storage required	Pollution reduction score (out of 100)	% water saving
VOLUME PASSES	FLOW PASSES	QUALITY PASSES	EFFICIENCY PASSES

Figure 4 Preliminary Insite WSUD Assessment for the project.

Building Occupancy Calculations

Building Spaces

•4940m^2 of School or childcare - BCA Class 9b with an average occupancy of 172.7 people

Figure 5 In order to establish an occupancy, we have referenced the InSite stormwater tool, It calculates an equivalent occupancy number of 172 people in terms of 'WC flushing demand'. www.insitewater.com.au

7. INDOOR ENVIRONMENT QUALITY

Indoor Environment Quality (IEQ) is a key ESD objective in the provision of a healthy and safe internal building environment for residents. The IEQ category aims to balance other categories, in the sense that reductions in energy consumption could easily be achieved at the expense of occupants' comfort. Yet, occupant comfort is vital and as such the IEQ category encourages healthy and good indoor environmental quality.

There are numerous published studies that highlight the relationships between learning outcomes and air quality in classrooms. Improved comfort and reduced pollutant and CO2 levels will help to optimise the potential for better learning outcomes.

Indoor Environment Quality			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
7.1	*BESS 1.4 Daylight Access – Non-Residential and Green star IEQ Daylighting*	To provide a high level of amenity and energy efficiency through design for natural light.	37% of the nominated floor area achieves daylight factor greater than 2%. Refer to Appendix B for more information on the daylight assessment.
7.2	*BESS 2.3 Effective Natural Ventilation and BESS 3.5 Ceiling fans*	To provide fresh air and passive cooling opportunities.	Most externally located rooms (60% of the total) have openable windows to the perimeter for fresh air and an HVAC system that will be, in part, controlled with CO2 sensors and modulated to ensure CO2 levels are maintained below 500ppm. In addition, 50% of the regularly occupied spaces will have sweep fans to enhance air movement for comfort.
7.3	*BESS IEQ 3.4 Thermal comfort - Shading - Non-Residential*	To provide comfortable indoor spaces and reduce energy needed for heating and cooling	100% Effective shading is proposed to the north and the east and west elevations have reasonably well articulated external fenestration both horizontal and vertical. A conservative 30% claim for effective shading 'overall' is made.
7.4	*BESS 4.1 Air Quality - Non-Residential*	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	All paints, adhesives, sealants and carpets applied on-site shall meet the maximum Total Volatile Organic Compound (TVOC) limits outlined in Appendix C. All engineered wood products including particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels shall meet the Formaldehyde emission limits outlined in Appendix D.

8. TRANSPORT

The automobile accounts for 54% of Australia's total domestic transport emissions and approximately 80% of adults use a private car to commute to and from work. There is a need to maximise alternative transport options if the environmental impact of car commuting is to be reduced. Options available may include trains, buses and, light rail trams. Walking and cycling are the most environmentally friendly alternatives, with no associated fuel use or pollutants. All credits within the Transport category have the same underlying principle; to reward the reduction in automotive movement by simultaneously discouraging it and encouraging use of alternative transportation.

No particular Transport ESD initiatives.

9. WASTE

Up to 40% of the waste going to Australia's landfills is related to the construction and demolition of buildings. Simple design decisions can influence the amount of construction waste being produced and operational waste streams being separated.

Even more waste is produced during the occupancy phase of buildings. Poor waste practices and treatment of the environment in the past have not only lead to a degradation of our water, air and land resources but also represent a big financial burden to current and future generations.

Waste			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
9.1	*BESS Waste 1.1 - Construction Waste - Building Re-Use*	To recognise developments that re-use materials on-site	The existing building is to be retained and extended.
9.2	*BESS 2.1 - Operational Waste - Food & Garden Waste*	To minimise organic waste going to landfill	Green waste collection and on-site composting of green and kitchen waste is handled on a campus wide basis. Refer to Campus Waste Management Plan.
9.3	*BESS 2.2 Operational Waste – Convenience of Recycling*	To minimise recyclable material going to landfill	Wherever a general waste bin is provided, a clearly labelled recycling bin shall also be provided. Refer to Campus Waste Management Plan.

10. URBAN ECOLOGY

The credits within the Land Use and Ecology category promote initiatives to improve or reduce impacts on ecological systems and biodiversity. The term 'Biodiversity' is used to describe the variation of life forms in a particular ecosystem and is often used as a measure of the health status of the environment.

Many credits in other categories have an indirect impact on the land use and ecology of the Australian environment, for example, the 'Stormwater' category addresses the rainwater run-off from buildings and hard surfaces in an attempt to prevent pollution from reaching nearby natural watercourses. This category, however, addresses the direct impact of a project on the ecological value of the site.

Urban Ecology			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
10.1	*BESS 1.1 Communal Spaces*	Communal spaces are places where people gather for social exchange. They can be outdoors or indoors, and can include rooftop gardens, communal courtyards with seating and bbq facilities, gyms, community rooms for use and hire within the building and other spaces where people can gather.	The project has significant common areas when break out spaces, circulation, indoor and outdoor spaces are considered.
10.2	*BESS 2.1 Vegetation*	To encourage and recognise the use of vegetation and landscaping within and around developments.	The site is significantly landscaped.

11. MATERIALS

The 'Innovation' criteria aims to recognise the implementation of innovative practices, processes and strategies that

The production and use of building materials can have serious impacts on the environment. Energy is used to extract, produce and transport building materials; natural resources are exploited to be used in building materials; the industrial production of the materials causes pollution, and if poorly selected and used the material ends up as waste, to become landfill or incinerated.

Within the Materials category the credits target the consumption of resources through selection and re-use of materials, and efficient management practices. The basic concepts of the category are to reduce the amount of natural resources used, re-use whatever materials can be re-used, and recycle whenever possible.

Materials			
Section Number	**Reference**	**Aim**	**Design Response/ Project Compliance**
11.1	*IMAP Building Materials*	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	All timber used in the building and construction works shall either be: • Certified by a forest certification scheme and be accompanied by a relevant Chain of Custody (CoC) certificate; or • Be from a reused source.
11.2	*IMAP Building Materials*		All permanent formwork, pipes, flooring, blinds and cables in a project shall either: • Not contain PVC and have an Environmental Product Declaration (EPD); or • Meet Best Practice Guidelines for PVC.
11.3	*Green Star 21 Product Transparency and Sustainability*	To encourage sustainability and transparency in product specification.	Products and manufacturers complying with the following standards and certifications shall be chosen in preference to non-compliance choices, where they are equally suitable for use and selection does not impact the project budget: • Products with a product-specific, third-party verified EPD; • Products with a industry-wide, third-party verified EPD; • Carpet Institute of Australia Environmental Certification Scheme (ECS); • Ecospecifier Green Tag GreenRate; • Australasian Furnishing Research and Development Institute Green Tick; • Good Environmental Choice Australia; • The institute for Market Transformation to Sustainability Sustainable Materials Rating Technology; • Manufacturer Environmental Management System (ISO14001); • Manufacturer certified to SA8000 social accountability standard or GeSI management standards; and • Products certified to Fairtrade Mark.
11.4	*IMAP Construction and Building Management*	To reward projects that reduce construction waste going to landfill by reusing or recycling building materials.	Target at least 70% construction waste recycling (diversion from landfill)

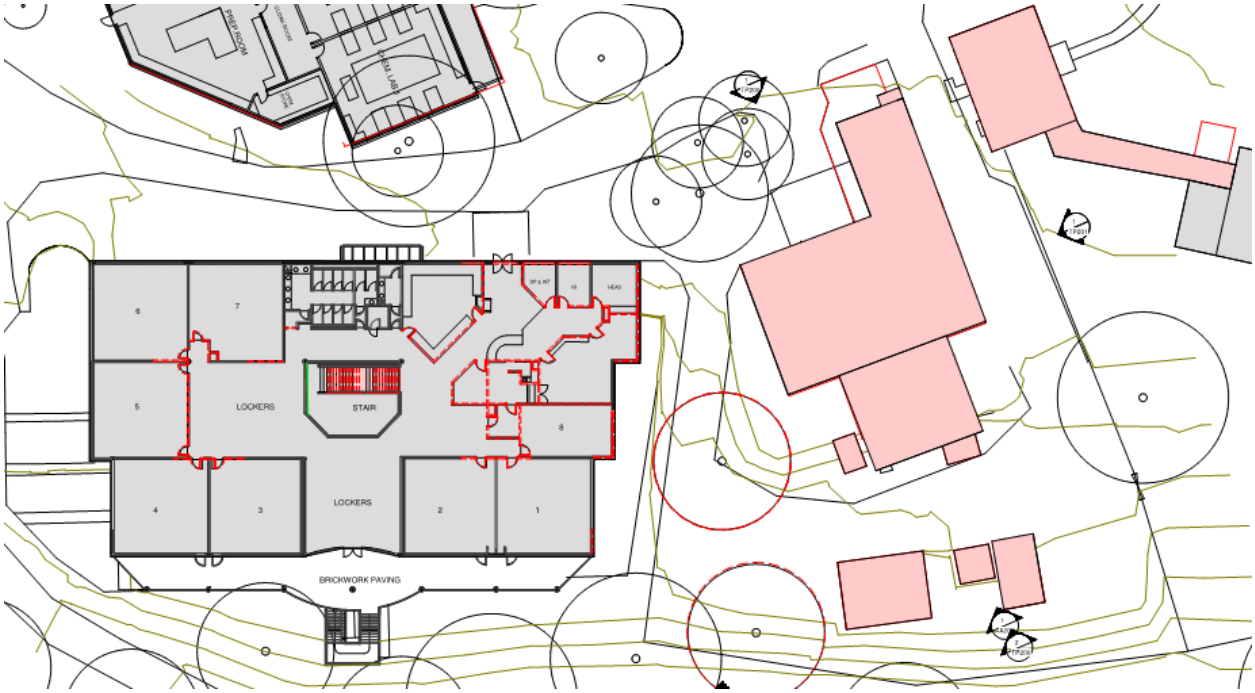


Figure 6 Areas in red are to be 'deconstructed' and, wherever possible, useful materials and components saved for reuse.

12. CONCLUSION

This report outlines the range of ESD initiatives that have been included in the design of the proposed development.

The development proposal demonstrates a holistic approach to sustainable urban development that addresses the ESD objectives of the Maroondah City Council.

A copy of the BESS scorecard used to complete this assessment in accordance to the Planning Scheme is attached in Appendix F.

APPENDIX A – PRELIMINARY ENERGY EFFICIENCY ASSESSMENT

A Preliminary NCC 2019/22 DTS assessment has been conducted to establish basic compliance requirements and to confirm the project will satisfy the Building Code J1-3.

Note – In the study below the existing building is included; in alignment with Building Practice Note EE-02: Applying BCA energy efficiency measures to existing Class 2 to 9 buildings. Any new/replacement of building fabric in the existing building will have to adhere to the performance requirements of the new 'extension' outlined below.

NCC 2019/2022 Section J1-3 Deemed to Satisfy Assessment.

General Building Parameters	
Address	90 Alexandra Road, Ringwood
Climate Zone	6
Building Class	9b
Total Floor Area	4,940m2

Building Fabric Parameters			
Element	**DTS Description**	**DTS Compliance**	**Comments**
J1.3 Roof and ceiling	External roof and ceiling part of the thermal envelope. R3.2 required.	R_T 3.8.	Construction details yet to be finalised.
J1.4 Roof lights	Roof lights part of the envelope	N/A	
J1.5 Walls	External walls part of the envelope must achieve at least R1.0	R_T 1.4	
	Internal walls part of the envelope must achieve at least R1.0	R_T 1.4	
J1.5 Facade	Method 2 Glazing – Combined façade (glazing and wall) must achieve U<2.0 and AC energy<394.82 (method 2).	Combined façade (glazing and wall) U=1.71 and AC energy=252.82 (method 2). Achieved using proposed U3.5 SHGC 0.35 glazing.	
J1.6 Floors	Slab on Ground NA	None – all new slabs are suspended. If any new slab for conditioned space on ground is incorporated it should be insulated to R2.2	Construction details yet to be finalised.
	Suspended Slab (between a conditioned and an unconditioned space) R2.2	R2.2	Construction details yet to be finalised.

Table 1: Preliminary DTS assessment proposed constructions.

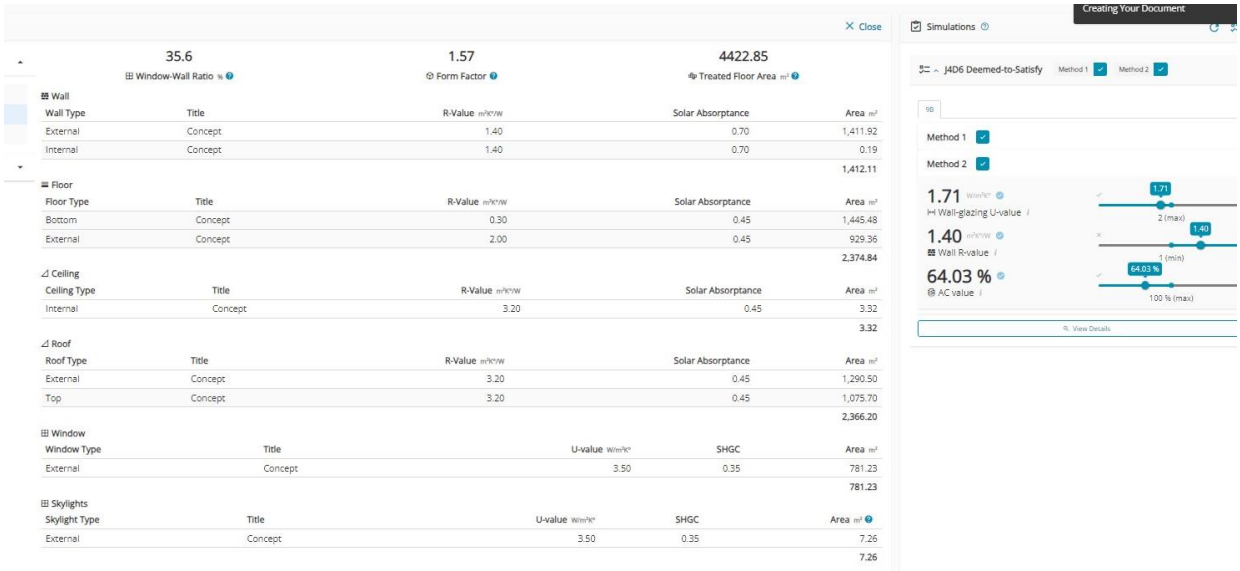


Figure 7 DTS Assessment showing compliance with DTS method 2.

APPENDIX B – DAYLIGHT ASSESSMENT

Table 3 and 4 outline the assumptions that have been included in the daylight assessment and the results obtained.

General Building Simulation Parameters	
Address	90 Alexandra Road, Ringwood
Terrain Type	Campus
Climate Zone	6
Building Class	9b
Sky	10,000 Lux CIE overcast sky
Working Plane	Desk level
Software	Speckel
Application	Radiance
Assessed Areas	• Classrooms, offices, breakout spaces • Amenities, circulation and back of house excluded.
Total Assessed Floor Area	3,010m2

Building Element Parameters	
Element	**Reflectance**
Floor	0.30
Wall	0.70
Ceiling	0.70
Roof	0.30
Ground	0.30
Glazing (VLT)	0.60
Skylight (VLT)	NA

Shading Elements	
Element	**Description**
Overshadowing	Neighbouring buildings are included in the model.
Local shading	All balconies, canopies, overhangs and reveals have been modelled as per the architectural drawings.

Table 2: Daylight simulation parameters

The following overlays show the extent of nominated floor area across which the desired daylight factor (2%) is achieved.

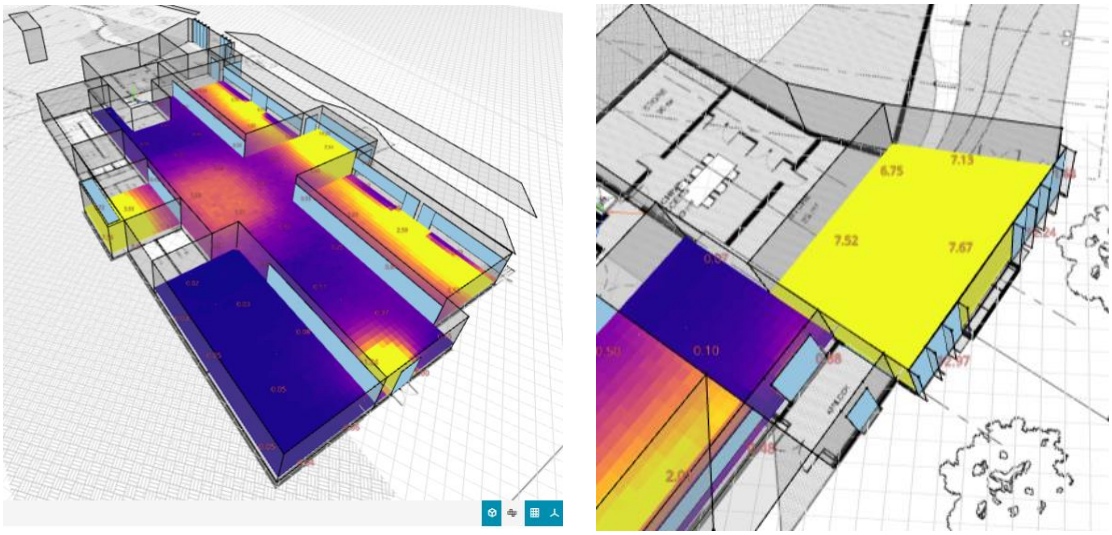


Figure 8: Lower Ground Floor including Auditorium. Areas in yellow have a DF>2%. Note circulation and amenities areas are excluded.

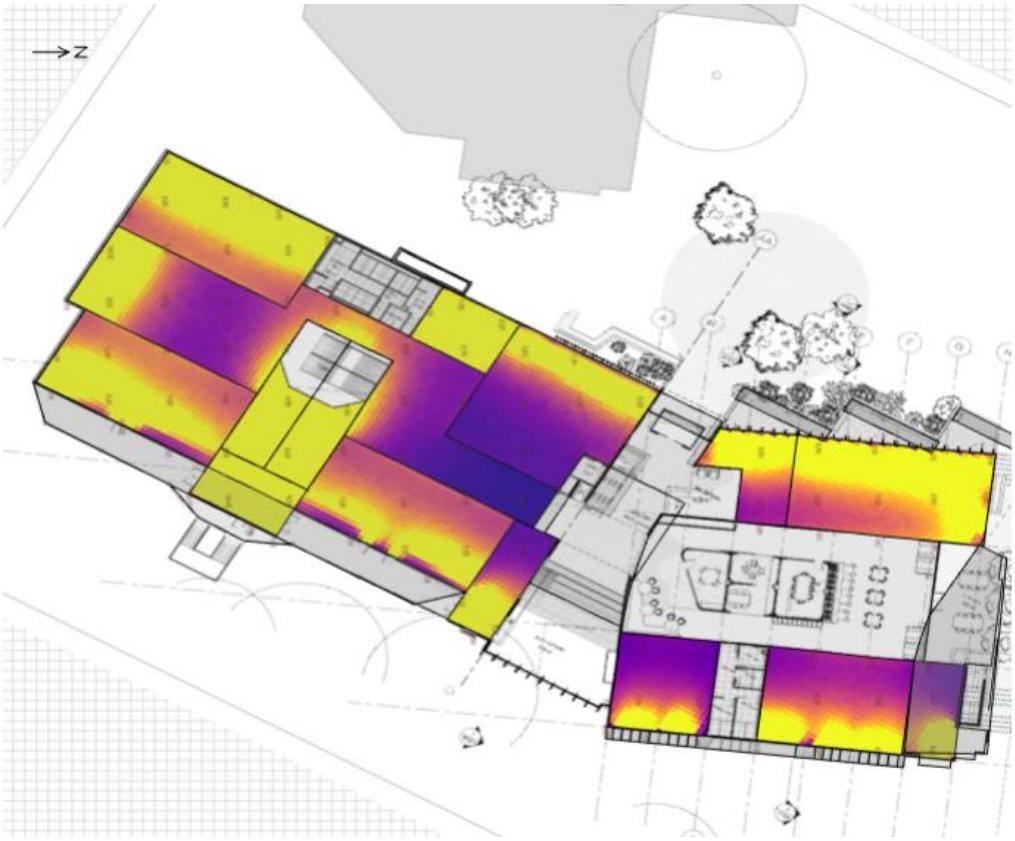


Figure 9: Ground Floor. Areas in yellow have a DF>2%. Note circulation and amenities areas are excluded.

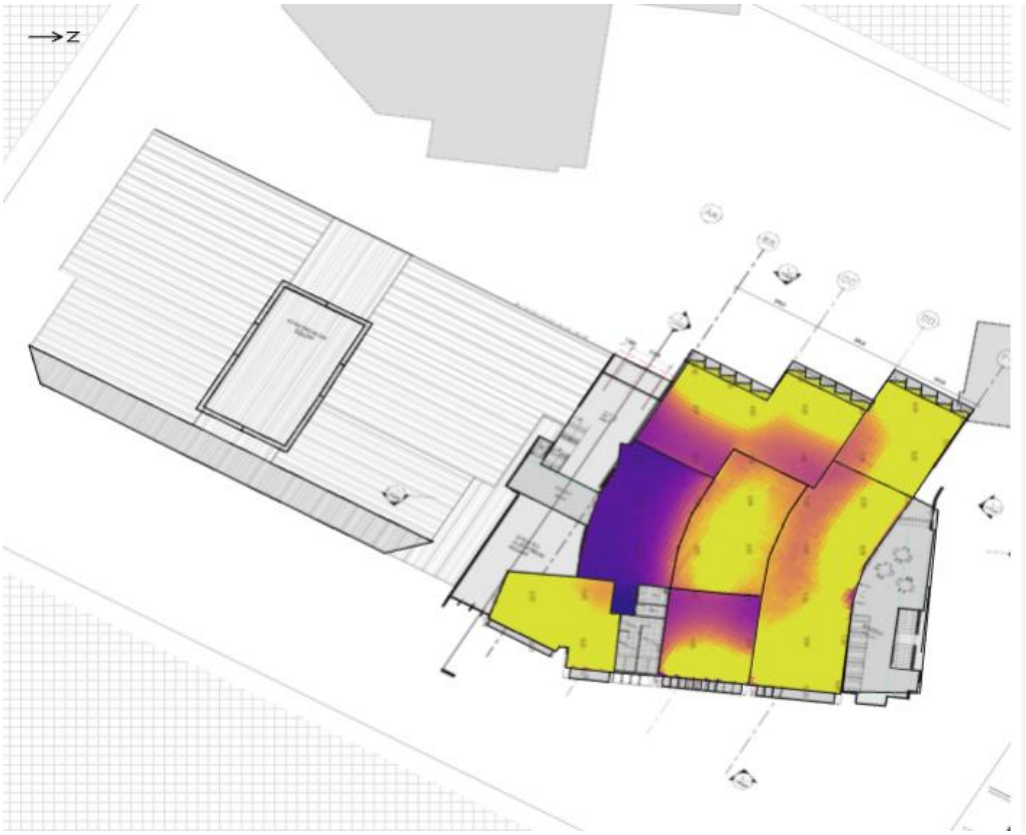


Figure 10: First Floor. Areas in yellow have a DF>2%. Note circulation and amenities areas are excluded.

Table 3: Daylight assessment results. The 'Pass Area' identifies the area of the floor plate (at desk height) that achieves a Daylight Factor (DF) of 2% or more. Classrooms 10.1-2, 10.3-4 and 10.5-6 in the existing building have relatively poor daylight access as does 12.3 in the new building, which has extensive external fenestration.

Level	Zone	Area m²	Pass Area m²	%
1	11. Staff work	34.96	0	0%
1	2. 10.1 and 2	141.12	34.25	24%
1	3. 10.3 and 4	140.87	17.08	12%
1	4. 10.5 and 6	139.4	0	0%
1	6. Auditorium stage	83.04	83.03	100%
1	9. Staff	51.29	32.81	64%
2	1. Yr 11 breakout 2	320.75	45.19	14%
2	10. Yr 11 breakout	117.15	117.15	100%
2	12. 12.3	79.84	11.72	15%
2	15. VCE Co-ord	51.25	22.6	44%
2	16. kitchen	47.79	17.27	36%
2	17. staff social	43.11	39.59	92%
2	4. Admin offices	164.3	35.82	22%
2	5. 12.4 and 5	158.73	35.32	22%
2	6. 12.1 and 2	154.03	80.88	53%
2	7. 11.1 and 2	141.12	53.25	38%
2	8. 11.3 and 4	140.88	31.4	22%
2	9. 11.5 and 6	139.39	79.37	57%
3	1. breakout and social	445.17	157.71	35%
3	2. 12.6 and 7	168.15	70.4	42%
3	3. Yr 12 quiet	86.5	73.79	85%
3	4. boardroom and staff	83.69	60.25	72%
3	5. 12.8	78.36	23.29	30%
	TOTALS	**3010.89**	**1122.17**	**37%**

APPENDIX C – PAINTS, ADHESIVE, SEALANTS AND CARPETS

The following TVOC limits are applicable to all internal applications of all types of paints, adhesives or sealants applied on-site, including both exposed and concealed applications. If exterior grade products are used in an internal application, then these must also meet the requirements.

The following items are excluded from this credit:

- Glazing film, tapes, and plumbing pipe cements;
- Products used in car park;
- Paints, adhesives and sealants used off-site, for example applied to furniture items in a manufacturing site and later installed in the fitout; and
- Adhesives and mastics used for temporary formwork and other temporary installations.

Product Type	Maximum TVOC Content (g/litre of ready to use product)
General purpose adhesive and sealants	50
Interior wall and ceiling paints, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealants, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

Table 4: Maximum TVOC Limits for Paints, Adhesives and Sealants

Further, carpets used in the project must either be:

- Certified under a recognised Product Certification Scheme (listed on the GBCA website) or other recognised standards; or
- Compliant with the Total VOC (TVOC) limits specified in the table below.

Product Type	Maximum TVOC Content (g/litre of ready to use product)
ASTM D5116 – Total VOC limit	0.5mg/m2 per hour
ASTM D5116 – 4-PC (4 – Phenylcyclohexene)	0.05mg/m2 per hour
ISO 16000 / EN 13419 – TVOC at three days	0.5mg/m2 per hour
ISO 10580 / ISO/TC 219 (Document N238) – TVOC at 24 hours	0.5mg/m2 per hour

Table 5: Carpet Test Standards and TVOC Emissions Limits

APPENDIX D – ENGINEERED WOOD PRODUCTS

The term "engineered wood products" includes composite wood products and includes raw/ unfinished as well as finished products. Items not covered by these limits include products used in exterior applications, formwork, internal car park applications, re-used products, and raw timber. All emission levels must be established by a NATA or ISO/IEC 17025 registered laboratory as per the testing methodologies in the table above.

Test Protocol	Emission Limit / Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1.0 mg/L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.0 mg/L
AS/NZS 4357.4 – Laminated Veneer Lumber (LVL)	≤1.0 mg/L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1.0 mg/L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1.0 mg/L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1.0 mg/L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/ m²hr
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1mg/m²hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m²hr (at 3 days)
ASTM D6007	≤0.12mg/m³**
ASTM E1333	≤0.12mg/m³***
EN 717-1 (also known as DIN EN 717-1)	≤0.12 mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5 mg/m²hr
**The test report must confirm that the conditions of this table comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.	
*** The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.	

Table 6: Formaldehyde emission limit values for engineered wood products

APPENDIX E – WSUD REPORT

Insite WSUD Assessment follows.

Stormwater Calculations

Report for **Maroondah**

Date report printed: 23/11/2023

Project Details

Project Name	Tintern Grammar SS		
InSite User Email	sean.mcardle@sbe.com.au		
Web files link			
Site Area (m2)	3522	Project ID	3992
Planning number			
Development type	Non-residential development		
Existing site details	Residential >750m2 per dwelling		
Street address	90 Alexandra Road, Ringwood East VIC, Australia		

Results

VOLUME	FLOW	QUALITY	EFFICIENCY
Objective: Reduce annual average runoff volume by harvesting or infiltrating stormwater	**Objective**: Control peak discharge flow (litres per second) with adequate on site detention	**Objective**: Improve stormwater runoff water quality (Equivalent to STORM score)	**Objective**: Increase drought resilience
Target: No increase in pre-development annual average runoff volume (Up to a 10% increase is allowed to account for uncertainties)	**Target:** less than or equal to zero. If greater than zero this is the additional Site Storage Requirement (SSR) volume required	**Target**: Achieve a score of 100 or more This corresponds to a 45% reduction in nitrogen runoff	**Target**: Achieve greater than 25% potable water use reduction
VOLUME RESULT	**FLOW RESULT**	**QUALITY RESULT**	**EFFICIENCY RESULT**
5.4	-0.6	106	35.2
% change in annual average volume	m^3 of additional site storage required	Pollution reduction score (out of 100)	% water saving
VOLUME PASSES	FLOW PASSES	QUALITY PASSES	EFFICIENCY PASSES

Design Criteria

The items on this page must be reflected on other project plans, specifications and engineering drawings.
The development must be designed and constructed in accordance with the following:

Rainwater Tank Specifications

Total rainwater tank volume (L)	50000	*This is the rainwater tank volume retention + detention	
Total rainwater retention* tank volume (L)	33000	*This is the rainwater tank volume that is available for reuse	
Total rainwater detention* tank volume (L)	17000	*This is the rainwater tank volume that is reserved for slow release to stormwater	
Roof connected to rainwater tank (m^2)	2466.0		
Rainwater tanks connected to	Toilet , Irrigation		
Other rainwater tank end uses (L/day)		Irrigated Garden Area (m^2)	
% building rainwater end uses connected (to rainwater tanks)	100	First Flush Device?	0
Additional* Site Storage (L)		*Site storage added adjacent to the legal point of discharge for peak flow detention or volume infiltration	
Recycled water source (Yes/No)			
Water tank reliability %	84.2		
Rainwater tank overflow %	50.0	*Note if this number is under 25%, then 30% of the tank's *retention* volume will be counted toward the *detention* volume	

Water Efficiency Specifications

Basin WELS star rating	> 5 Star WELS rating
Toilet WELS rating	> 3 Star WELS rating
Bath WELS star rating	Not Applicable
Washing Machine WELS star rating	Not Applicable
Kitchen Taps WELS rating	> 5 Star WELS rating
Urinal WELS rating	Not Applicable
Shower WELS star rating	4 Star WELS (> 6.0 but <= 7.5)
Dishwasher WELS star rating	> 5 Star WELS rating

Stormwater management measures selected are

This includes all impervious areas in the site connected to Council or Stormwater Authority drains. This excludes pervious areas like garden, gravel, and lawn areas)

- For the 2466m^2 roof area roof, Raintank Volume = 50000 litres connected to 2466m^2 of roof, additional water tank based detention volume = 17000 litres. Total tank volume (retention + detention volumes) = 50000.0 litres
- 115m^2 of Courtyard deck

Building Occupancy Calculations

Building Spaces

•4940m^2 of School or childcare - BCA Class 9b with an average occupancy of 172.7 people

Estimated Total Building Occupancy	172.7

Stormwater VOLUME Calculations

Site Area (m^2)	3522
Post development total impervious area (m2)	2581.0
Rainwater Tank Overflow (kL/annum)	1060.9
Pre-development Volume (kL/annum)	1091.3
Post-development Volume (kL/annum)	1150.0
Change in volume %	5.4

Stormwater QUALITY Calculations

Rainwater Tank Runoff reduction (%)	50.0
Rainwater Tank(s) Total Nitrogen (TN) reduction	2740.0
Total Nitrogen (TN) % reduction	47.8
Equivalent STORM Score	106

Water EFFICIENCY Calculations

Benchmark water use (kL/year)	9257.1		
Predicted potable water use (kL/year)	6000.0		
Predicted potable water use (L/person/day)	112.0		
Water savings from tank (kL/year)	1061.6		
Water saving from efficiency (kL/year)	2195.50		
Total water saving % (efficiency + tank + recycled water)	35.2	Water saving (kL/year)	3257.1

Stormwater FLOW Calculations - **Swinburne Method**

This section outlines rational method calculations for On Site Detention (OSD) and Site Storage Requirements (SSR)

Permissible Site Discharge (PSD) Calculations

Calculated PSD	28.0
PSD Override Value Used	

Site Storage Calculations

Preliminary On Site Detention (OSD) tank size required estimate (m^3)	27.38	Swinburne Method Tank formula
OSD and storages* provided (m^3)	28.0	Includes storages: rainwater tank retention allowance, rainwater tank detention, and additional added storage volumes
Additional detention / retention volume required (m^3)	-0.6	
Base case (pre-development) fraction impervious (ratio)	0.40	
Base case runoff coefficient	0.45	
Post development total impervious area (in hectares)	0.2581	
Post development fraction impervious (ratio)	0.73	
Post development runoff coefficient	0.698	
Pre-development design storm	20% AEP (~1 in 5 year ARI storm) - default residential	
Post development detention required	10% AEP (~1 in 10 ARI) - default residential	
Critical Storm Duration - the Catchment time of concentration – Tc(catchment) in minutes	20	
Rainfall Depth (mm) for Critical Storm Duration - Tc(catchment)	15.75	
Rainfall intensity - i at Tc(catchment) (mm/h)	47.250	
Travel time from discharge point to catchment outlet (min) - Tcs	20.0	
Rainfall Depth (mm) for Tcs - (IFD at Tcs)	18.71	
Rainfall intensity - i at tc(site) (mm/h)	56.13	

OSD tank flow restrictor orifice diameter = 116 mm

Detention Calculator - Site Storage Requirement (SSR)

Storm Duration (mins)	Rainfall Depth (mm)	Stored Volume (m^3)
5		
7.5		
10		
12.5		
15		
20		
30		
40		
60		

About In-Site Water

This report is generated by user inputs from the toolkit at InSite Water. In-Site water is an online Integrated Water Management tool designed for use on smaller sites (less than 2 hectares) in Australia that need quick and accurate stormwater engineering answers. InSite water is simple to use but provides robust stormwater design and engineering answers.

This report includes outputs from the InSite tool that has investigated:

– water tank sizing
– detention tank sizing
– water savings through efficiency
– water WSUD treatments such as raingardens

For enquiries, contact us through www.insitewater.com.au

Disclaimer

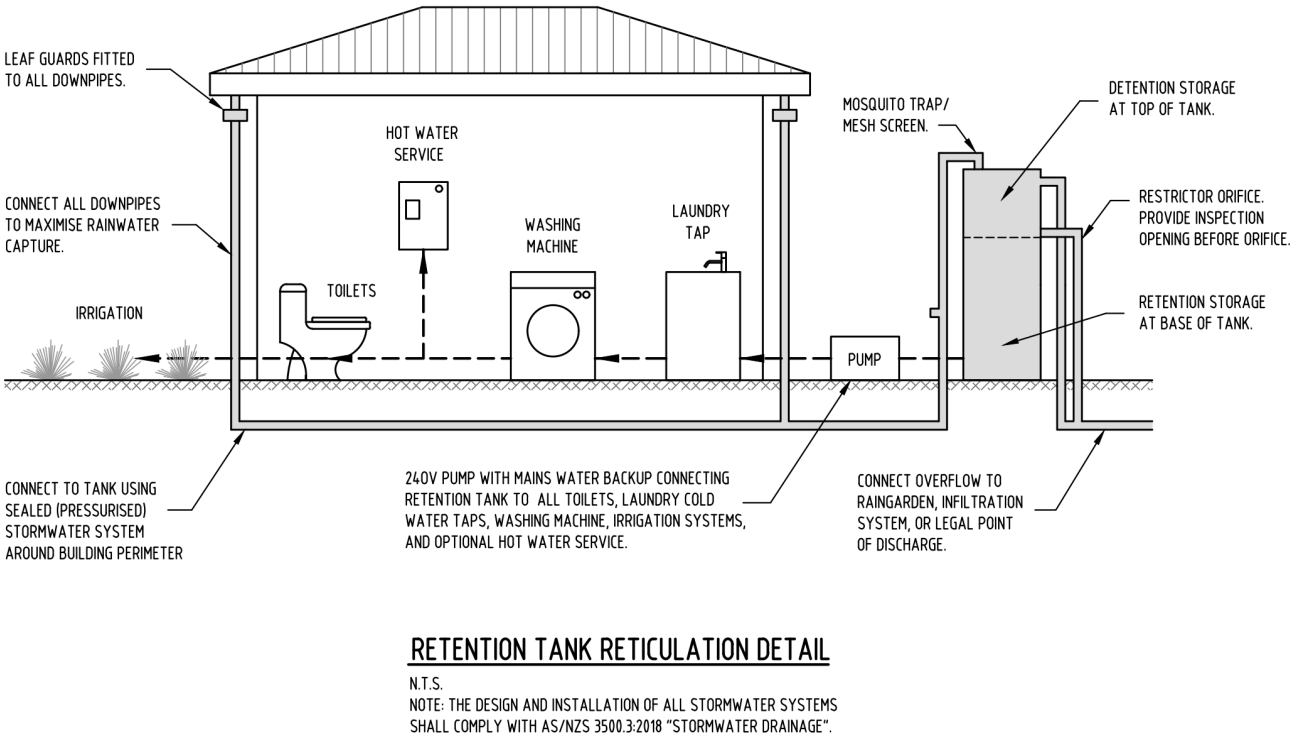
This guide is of a general nature only. Advice from a suitably qualified professional should be sought for your particular circumstances. Depending on each unique situation, there may be occasions where compliance is not achieved.

This report does not provide a detailed design and layout for the piping and general drainage system in your development, which should be prepared by a suitably qualified professional. In addition, InSite Water does not consider compliance for slope stability or foundation / slab / footing protection, which needs to come from a qualified geotechnical or structural engineer.

The following is outside the scope of InSite Water, however it is critical that all designers consider the following in drainage design and in using Water Sensitive Urban Design (WSUD) devices and approaches:

- *Manage expectations and risks around occasional surface water and ponding.*
- *Ensure that uncontrolled stormwater does not flow over property boundaries or otherwise cause a nuisance.*
- *Plan for major flood pathways – locate buildings away from, adapt (raise floors above predicted flood levels) and defend buildings against potential major flooding.*
- *Seek professional advice to reduce damage and safety risks.*
- *Design for local conditions such as vegetation, topography and soils (soil type, reactivity, permeability, water table level, salinity, dispersiveness, acid sulphate soils, contaminated land etc).*
- *Ensure that soil moisture and building clearance is considered in areas of reactive clays or where varying soil moisture levels could damage buildings or other infrastructure.*
- *For steeper sites, ensure the design includes geotechnical considerations such as slope stability with varying soil saturation levels.*
- *Ensure that a Stormwater Risk Assessment and Environmental Management Plan is undertaken for sites that pose a pollution risk.*
- *Ensure that a Construction Environmental Management Plan (CEMP) is implemented to control sediments and reduce stormwater pollution during construction.*
- *Compliance with ARR 2019, Australian Rainfall and Runoff: A Guide to Flood Estimation* http://arr.ga.gov.au/
- *Compliance with NCC plumbing and building standards.*
- *Compliance with AS/NZS 3500.*
- *Compliance with EPA and other environmental regulations.*
- *Compliance with other relevant Australian Standards, regulations and Council requirements.*

Appendix A: attach further details for this project (if applicable):



Above: roof treatment drawing (draft for planning approvals only: not for construction, not to scale)

APPENDIX F – BESS REPORT

A preliminary assessment of the Design's potential BESS score, based on the ESD initiatives proposed within report, is provided below.

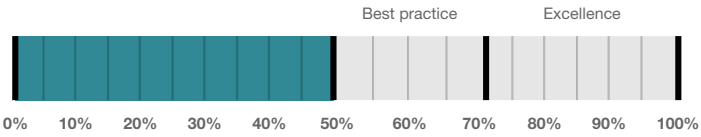
BESS Report

Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 90 Alexandra Rd Ringwood East Victoria 3135. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Maroondah City Council.

Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

Your BESS Score

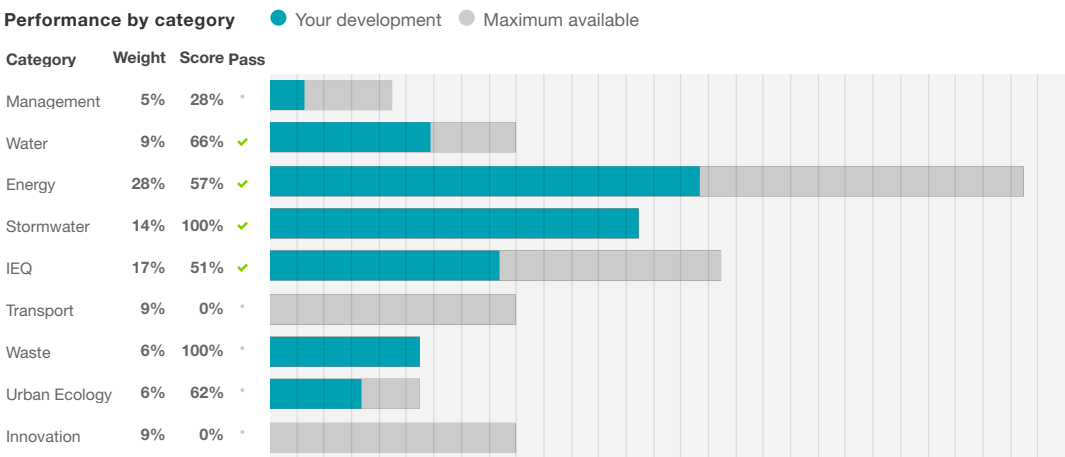


54%

Project details

Address	90 Alexandra Rd Ringwood East Victoria 3135
Project no	0EE2B56F-R1
BESS Version	BESS-8
Site type	Non-residential development
Account	sean.mcardle@sbe.com.au
Application no.	
Site area	3,521.00 m²
Building floor area	4,940.00 m²
Date	23 November 2023
Software version	1.8.0-B.405

Performance by category



Buildings

Name	Height	Footprint	% of total footprint
Yr 12 Centre	3	2,466 m²	100%

Dwellings & Non Res Spaces

Non-Res Spaces

Name	Quantity	Area	Building	% of total area
Public building				
9b school building	1	4,940 m²	Yr 12 Centre	100%
Total	**1**	**4,940 m²**	**100%**	

Credit summary

Management Overall contribution 4.5%

28%

1.1 Pre-Application Meeting	0%	
2.3 Thermal Performance Modelling - Non-Residential	50%	
3.2 Metering - Non-Residential	N/A	Scoped Out
	no individual commercial tenants NA - all one occupant/operator	
3.3 Metering - Common Areas	100%	
4.1 Building Users Guide	0%	

Water Overall contribution 9.0%

Minimum required 50% — 66% — ✔ Pass

1.1 Potable Water Use Reduction	53%	
3.1 Water Efficient Landscaping	100%	
4.1 Building Systems Water Use Reduction	100%	

Energy Overall contribution 27.5%

Minimum required 50% — 57% — ✔ Pass

1.1 Thermal Performance Rating - Non-Residential	37%	
2.1 Greenhouse Gas Emissions	100%	
2.2 Peak Demand	100%	
2.6 Electrification	0%	
2.7 Energy consumption	100%	
3.1 Carpark Ventilation	N/A	Scoped Out
	no parking	
3.2 Hot Water	100%	
3.7 Internal Lighting - Non-Residential	0%	
4.1 Combined Heat and Power (cogeneration / trigeneration)	N/A	Scoped Out
	No cogeneration or trigeneration system in use.	
4.2 Renewable Energy Systems - Solar	0%	Disabled
	No solar PV renewable energy is in use.	
4.4 Renewable Energy Systems - Other	N/A	Scoped Out
	No other (non-solar PV) renewable energy is in use.	

Stormwater Overall contribution 13.5%

	Minimum required 100%	100%	✔ Pass
1.1 Stormwater Treatment		100%	

IEQ Overall contribution 16.5%

	Minimum required 50%	51%	✔ Pass
1.4 Daylight Access - Non-Residential		37%	✔ Achieved
2.3 Ventilation - Non-Residential		83%	✔ Achieved
3.4 Thermal comfort - Shading - Non-Residential		0%	
3.5 Thermal Comfort - Ceiling Fans - Non-Residential		50%	
4.1 Air Quality - Non-Residential		100%	

Transport Overall contribution 9.0%

	0%	
1.4 Bicycle Parking - Non-Residential	0%	
1.5 Bicycle Parking - Non-Residential Visitor	0%	
1.6 End of Trip Facilities - Non-Residential	0%	⊘ Disabled
	Credit 1.4 must be complete first.	
2.1 Electric Vehicle Infrastructure	N/A	⊹ Scoped Out
	NA This is a campus wide issue.	
2.2 Car Share Scheme	N/A	⊹ Scoped Out
	NA This is a campus wide issue.	
2.3 Motorbikes / Mopeds	N/A	⊹ Scoped Out
	NA This is a campus wide issue.	

Waste Overall contribution 5.5%

	100%	
1.1 - Construction Waste - Building Re-Use	100%	
2.1 - Operational Waste - Food & Garden Waste	100%	
2.2 - Operational Waste - Convenience of Recycling	100%	

Urban Ecology Overall contribution 5.5%

62%

1.1 Communal Spaces	100%	
2.1 Vegetation	100%	
2.2 Green Roofs	0%	
2.3 Green Walls and Facades	0%	
3.2 Food Production - Non-Residential	0%	

Innovation Overall contribution 9.0%

0%

1.1 Innovation	0%	⊘ Disabled

A minimum project score of 50% is required before an Innovation Credit can be used.

Credit breakdown

Management Overall contribution 1%

1.1 Pre-Application Meeting		0%
Score Contribution	This credit contributes 42.9% towards the category score.	
Criteria	Has an ESD professional been engaged to provide sustainability advice from schematic design to construction? AND Has the ESD professional been involved in a pre-application meeting with Council?	
Question	Criteria Achieved ?	
Project	No	
2.3 Thermal Performance Modelling - Non-Residential		50%
Score Contribution	This credit contributes 28.6% towards the category score.	
Criteria	Has a preliminary facade assessment been undertaken in accordance with NCC2022 Section J4D6?	
Question	Criteria Achieved ?	
Public building	Yes	
Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?	
Question	Criteria Achieved ?	
Public building	No	
3.2 Metering - Non-Residential		N/A ⌖ Scoped Out
This credit was scoped out	no individual commercial tenants NA - all one occupant/operator	
3.3 Metering - Common Areas		100%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Have all major common area services been separately submetered?	
Question	Criteria Achieved ?	
Public building	Yes	
4.1 Building Users Guide		0%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	Will a building users guide be produced and issued to occupants?	
Question	Criteria Achieved ?	
Project	No	

Water Overall contribution 6% Minimum required 50%

Water Approach	
What approach do you want to use for Water?:	Provide our own calculations

1.1 Potable Water Use Reduction	53%
Score Contribution	This credit contributes 71.4% towards the category score.
Criteria	What is the reduction in total potable water use due to efficient fixtures, appliances, rainwater use and recycled water use? To achieve points in this credit there must be >25% potable water reduction.
Question	Percentage Achieved ?
Project	35 %

3.1 Water Efficient Landscaping	100%
Score Contribution	This credit contributes 14.3% towards the category score.
Criteria	Will water efficient landscaping be installed?
Question	Criteria Achieved ?
Project	Yes

4.1 Building Systems Water Use Reduction	100%
Score Contribution	This credit contributes 14.3% towards the category score.
Criteria	Where applicable, have measures been taken to reduce potable water consumption by >80% in the buildings air-conditioning chillers and when testing fire safety systems?
Question	Criteria Achieved ?
Project	Yes

Energy

Overall contribution 16% Minimum required 50%

Use the BESS Deem to Satisfy (DtS) method for Energy?:	Yes
Do all exposed floors and ceilings (forming part of the envelope) demonstrate meeting the required NCC2022 insulation levels (total R-value upwards and downwards)?:	Yes
Does all wall and glazing demonstrate meeting the required NCC2022 facade calculator (or better than the total allowance)?:	Yes
Are heating and cooling systems within one Star of the most efficient equivalent capacity unit available, or Coefficient of Performance (CoP) & Energy Efficiency Ratios (EER) not less than 85% of the CoP & EER of the most efficient equivalent capacity unit available?:	Yes
Are water heating systems within one star of the best available, or 85% or better than the most efficient equivalent capacity unit?:	Yes

Non-Residential Building Energy Profile

Heating, Cooling & Comfort Ventilation - Electricity Reference fabric & services:	-
Heating, Cooling & Comfort Ventilation - Electricity - proposed fabric and reference services:	-
Heating, Cooling & Comfort Ventilation - Electricity Proposed fabric & services:	-
Heating - Wood - reference fabric and services:	-
Heating - Wood - proposed fabric and reference services:	-
Heating - Wood - proposed fabric and services:	-
Hot Water - Electricity - Reference:	-
Hot Water - Electricity - Proposed:	-
Lighting - Reference:	-
Lighting - Proposed:	-
Peak Thermal Cooling Load - Reference:	-
Peak Thermal Cooling Load - Proposed:	-

1.1 Thermal Performance Rating - Non-Residential 37%

Score Contribution	This credit contributes 42.1% towards the category score.
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC2022 Section J)?

2.1 Greenhouse Gas Emissions 100%

Score Contribution	This credit contributes 10.5% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?

2.2 Peak Demand 100%

Score Contribution	This credit contributes 5.3% towards the category score.
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?

2.6 Electrification		0%	
Score Contribution	This credit contributes 0% towards the category score.		
Criteria	Is the development all-electric?		
Question	Criteria Achieved?		
Project	Yes		
2.7 Energy consumption		100%	
Score Contribution	This credit contributes 21.1% towards the category score.		
Criteria	What is the % reduction in annual energy consumption against the benchmark?		
3.1 Carpark Ventilation		N/A	Scoped Out
This credit was scoped out	no parking		
3.2 Hot Water		100%	
Score Contribution	This credit contributes 5.3% towards the category score.		
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?		
3.7 Internal Lighting - Non-Residential		0%	
Score Contribution	This credit contributes 10.5% towards the category score.		
Criteria	Does the maximum illumination power density (W/m2) in at least 90% of the area of the relevant building class meet the requirements in Table J7D3a of the NCC 2022 Vol 1?		
Question	Criteria Achieved ?		
Public building	No		
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A	Scoped Out
This credit was scoped out	No cogeneration or trigeneration system in use.		
4.2 Renewable Energy Systems - Solar		0%	Disabled
This credit is disabled	No solar PV renewable energy is in use.		
4.4 Renewable Energy Systems - Other		N/A	Scoped Out
This credit was scoped out	No other (non-solar PV) renewable energy is in use.		

Stormwater

Overall contribution 14% Minimum required 100%

Which stormwater modelling are you using?:	Melbourne Water STORM tool	
1.1 Stormwater Treatment		100%
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	Has best practice stormwater management been demonstrated?	
Annotation	100+ see Insite report	
Question	STORM score achieved	
Project	100	
Output	Min STORM Score	
Project	100	

IEQ Overall contribution 8% Minimum required 50%

1.4 Daylight Access - Non-Residential		37%	✔ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the nominated floor area has at least 2% daylight factor?		
Question	Percentage Achieved?		
Public building	37 %		
2.3 Ventilation - Non-Residential		83%	✔ Achieved
Score Contribution	This credit contributes 35.3% towards the category score.		
Criteria	What % of the regular use areas are effectively naturally ventilated?		
Question	Percentage Achieved?		
Public building	60 %		
Criteria	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668.2:2012?		
Question	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668:2012?		
Public building	0 %		
Criteria	What CO2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain?		
Question	Value		
Public building	500 ppm		
3.4 Thermal comfort - Shading - Non-Residential		0%	
Score Contribution	This credit contributes 17.6% towards the category score.		
Criteria	What percentage of east, north and west glazing to regular use areas is effectively shaded?		
Question	Percentage Achieved?		
Public building	30 %		
3.5 Thermal Comfort - Ceiling Fans - Non-Residential		50%	
Score Contribution	This credit contributes 5.9% towards the category score.		
Criteria	What percentage of regular use areas in tenancies have ceiling fans?		
Question	Percentage Achieved?		
Public building	50 %		
4.1 Air Quality - Non-Residential		100%	
Score Contribution	This credit contributes 5.9% towards the category score.		
Criteria	Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits?		
Question	Criteria Achieved ?		
Public building	Yes		

Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Public building	Yes
Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Public building	Yes

Transport Overall contribution 0%

1.4 Bicycle Parking - Non-Residential		0%	
Score Contribution	This credit contributes 50.0% towards the category score.		
Criteria	Have the planning scheme requirements for employee bicycle parking been exceeded by at least 50% (or a minimum of 2 where there is no planning scheme requirement)?		
Annotation	This is a campus wide issue.		
Question	Criteria Achieved ?		
Public building	No		
Question	Bicycle Spaces Provided ?		
Public building	-		
1.5 Bicycle Parking - Non-Residential Visitor		0%	
Score Contribution	This credit contributes 25.0% towards the category score.		
Criteria	Have the planning scheme requirements for visitor bicycle parking been exceeded by at least 50% (or a minimum of 1 where there is no planning scheme requirement)?		
Annotation	assume yes but this is a campus wide issue.		
Question	Criteria Achieved ?		
Public building	No		
Question	Bicycle Spaces Provided ?		
Public building	-		
1.6 End of Trip Facilities - Non-Residential		0%	⊘ Disabled
This credit is disabled	Credit 1.4 must be complete first.		
2.1 Electric Vehicle Infrastructure		N/A	⌖ Scoped Out
This credit was scoped out	NA This is a campus wide issue.		
2.2 Car Share Scheme		N/A	⌖ Scoped Out
This credit was scoped out	NA This is a campus wide issue.		
2.3 Motorbikes / Mopeds		N/A	⌖ Scoped Out
This credit was scoped out	NA This is a campus wide issue.		

Waste Overall contribution 6%

1.1 - Construction Waste - Building Re-Use	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used?
Question	Criteria Achieved ?
Project	Yes

2.1 - Operational Waste - Food & Garden Waste	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are facilities provided for on-site management of food and garden waste?
Question	Criteria Achieved ?
Project	Yes

2.2 - Operational Waste - Convenience of Recycling	100%
Score Contribution	This credit contributes 33.3% towards the category score.
Criteria	Are the recycling facilities at least as convenient for occupants as facilities for general waste?
Question	Criteria Achieved ?
Project	Yes

Urban Ecology Overall contribution 3%

1.1 Communal Spaces		100%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Is there at least the following amount of common space measured in square meters : * 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?	
Annotation	261+ including break out spces, auditoium, common rooms and external common areas	
Question	Common space provided	
Public building	261 m²	
Output	Minimum Common Space Required	
Public building	261 m²	
2.1 Vegetation		100%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area?	
Question	Percentage Achieved ?	
Project	30 %	
2.2 Green Roofs		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green roof?	
Question	Criteria Achieved ?	
Project	No	
2.3 Green Walls and Facades		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green wall or green façade?	
Question	Criteria Achieved ?	
Project	No	
3.2 Food Production - Non-Residential		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	What area of space per occupant is dedicated to food production?	
Question	Food Production Area	
Public building	0.0 m²	
Output	Min Food Production Area	
Public building	124 m²	

Innovation Overall contribution 0%

1.1 Innovation		0%	⊘ Disabled
This credit is disabled	A minimum project score of 50% is required before an Innovation Credit can be used.		

Disclaimer

The Built Environment Sustainability Scorecard (BESS) has been provided for the purpose of information and communication. While we make every effort to ensure that material is accurate and up to date (except where denoted as 'archival'), this material does in no way constitute the provision of professional or specific advice. You should seek appropriate, independent, professional advice before acting on any of the areas covered by BESS.

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