wrap consulting engineering

Bacchus Marsh Grammar, 37 S Maddingley Road
Science Building

SUSTAINABILITY MANAGEMENT PLAN

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DOCUMENT PROPERTIES

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PROJECT NAME: Bacchus Marsh Grammar, Science Building

PROJECT SITE: 37 S Maddingley Road, Bacchus Marsh

PROJECT NUMBER: 24243

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REVISION	DETAILS	AUTHOR/S	DATE	ISSUED BY
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CONTENTS

1 INTRODUCTION

This Sustainability Management Plan (SMP) has been prepared to assist the design, construction and operation of the proposed development of 37 S Maddingley Road, Bacchus Marsh (Science Building) to achieve a range of best-practice sustainable development objectives.

WRAP Engineering have assessed the proposed plans and provided input to the design team.

This SMP captures initiatives necessary to ensure that the development meets the sustainability requirements of Moorabool Shire Council, in particular the ESD requirements of the following Planning Clauses:

- 15.01-2L-01 Building Design
- 53.18 Stormwater Management in Urban Development

1.1 SITE DESCRIPTION

The project site at 37 S Maddingley Road, Bacchus Marsh is part of the Bacchus Marsh Grammar and has an area of approximately 2,270 m^2. The existing building on the site will be demolished prior to construction of the project.

Figure 1 Subject site (approximate)

1.2 DEVELOPMENT SUMMARY

The proposed development will consist of the following:

- Ground – Science laboratories, amphitheatre and amenities
- Level 1 – General classrooms, science laboratories, amphitheatre and offices
- Level 2 – Science laboratories, communal terrace, roof garden and services plant room
- Roof – Roof services

1.3 COUNCIL PLANNING REQUIREMENTS

The Moorabool Shire Council expects new developments to be designed, built and maintained at a level that reflects best practice sustainable development outcomes. The ESD response will need to ensure that the design meets sustainability targets in the areas of energy reduction, water use reduction and water sensitive urban design, indoor environment quality, materials selection, transportation, waste management and urban ecology.

Ten key sustainable building categories have been addressed by the building, as follows:

- Energy Efficiency;
- Water Efficiency;
- Stormwater Management;
- Indoor Environment Quality;
- Building Materials;
- Construction and Waste Management;
- Transport;
- Urban Ecology; and
- Building Management

While Council's Planning Scheme does not directly outline ESD requirements, good sustainable design is a priority for the project team and Baccus Marsh Grammar. To demonstrate the effectiveness of the proposed ESD initiatives, the following tools will be used:

- Daylight factor assessment
- NCC Section J
- Melbourne Water STORM calculator

This SMP incorporates initiatives to ensure that the council's ESD requirements are satisfied by addressing the key sustainable building categories, demonstrating that best practice standards will be achieved, and using relevant and appropriate ESD assessment tools.

1.4 REFERENCE DOCUMENTATION

This SMP should be read in conjunction with the other relevant documentation included within the development's town planning submission to council. These documents may include the following:

- Architectural documentation
- Landscape plans
- Waste Management Plan
- Traffic engineer's report
- Arboriculture report

2 ESD ASSESSMENT

The following sections outline the ESD assessment which has been completed for the project. The assessment is presented within the Key Sustainable Building Categories, and for each item following information is provided:

1. A short description of the ESD initiative and/or the project's design response;
2. The nominated party responsible for implementation of the initiative; and
3. The stage of the project at which implementation could be demonstrated.

Within this assessment, the level of detail that has been provided is generally in proportion to what is appropriate or practicable at this early stage of design. This is described or explained within each item, with future commitments included as appropriate.

2.1 INDOOR ENVIRONMENT QUALITY

2.1.1 OBJECTIVES

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

2.1.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Volatile Organic Compounds All paints, adhesives, sealants and carpets will not exceed the limits outlined in Appendix A.	Architect Services Engineer	Contract Documentation
Formaldehyde All engineered wood products will have 'low' formaldehyde emissions, certified as E0 or better, or will not exceed the limits outlined in Appendix A.	Architect	Contract Documentation
Daylight Glazing with a VLT of at least 40% will be specified for the development. A daylight assessment has been completed for the project and indicates that 33% of the teaching and staff spaces will achieve a Daylight Factor of at least 2%. This is compliant with industry best practice standards. Please refer to Appendix B for details.	Architect Consultant	Contract Documentation

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Glare External shading features and internal blinds will reduce glare in classrooms.	Architect	Design Development
External Views The learning and main staff areas have high-quality external views.	Architect	Design Development
Effective Ventilation The outside air will be provided through a combination of operable windows and mechanical outside air tempered by energy recovery ventilators (ERVs). Mechanically supplied outside air levels for all classrooms will exceed AS1668:2012 by 50%.	Architect Services Engineer	Contract Documentation
Thermal Comfort The development will include low-e glazing for all windows and fixed shading for most of glazing areas, diminishing glare, reducing solar heat gains and enhancing thermal comfort. External shading is provided to control direct solar heat gains, improving thermal comfort for staff and student.	Architect ESD Consultant	Contract Documentation
Artificial Lighting The lighting design will ensure that the minimum illuminance levels and uniformity are in accordance with the requirements of AS1680.	Services Engineer	Contract Documentation

2.2 ENERGY EFFICIENCY

2.2.1 OBJECTIVES:

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

2.2.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Heating and Cooling Systems The project will utilise high efficiency reverse-cycle HVAC units.	Services Engineer	Contract Documentation
Building Fabric Energy Efficiency A preliminary Section J assessment have been completed for this project. The building fabric will meet the NCC Deemed-to-Satisfy requirements for energy efficiency and utilise external shading to reduce summer heat loads. Zincalume material will not be used in the construction of the building fabric to comply with section 15.01-2L-01 (Building Design) of the Moorabool planning scheme.	Architect ESD Consultant	Design Development
Domestic Hot Water The project will implement a centralised air sourced heat pump hot water system.	Services Engineer	Contract Documentation
Artificial Lighting - The lighting design throughout the development will meet BCA 2019 Table J6.2a requirements. - External and common area lighting systems will use daylight and occupancy sensors to control lighting energy usage.	Services Engineer	Contract Documentation
Solar PV A solar array of at least 5 kW will be provided, with final sizing to be coordinated during the design development phase.	Services Engineer	Contract Documentation

2.3 WATER EFFICIENCY

2.3.1 OBJECTIVES:

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

2.3.2 DEVELOPMENT RESPONSE

<table>
<tr><th>ESD INITIATIVE</th><th>RESPONSIBILITY & IMPLEMENTATION</th><th>PROJECT STAGE</th></tr>
<tr><td>Water Fixtures and Fittings
The following minimum Water Efficiency Labelling Scheme (WELS) star ratings will be specified:
- Toilets: 4 Star
- Taps (bathroom and kitchen): 5 Star</td><td>Architect</td><td>Contract Documentation</td></tr>
<tr><td>Rainwater Collection and Reuse
Rainwater harvesting for non-potable uses will be implemented as a water saving initiative. The details of this system for this development are as follows:
<table>
<tr><th>RWT</th><th>Size</th><th>Catchment</th><th>Re-use</th></tr>
<tr><td>1</td><td>10kL</td><td>Roofs</td><td>Toilet flushing</td></tr>
<tr><td>2</td><td>10kL</td><td>Terraces</td><td>Irrigation</td></tr>
</table>
Refer to Appendix C for details.</td><td>Architect
Services Engineer</td><td>Contract Documentation</td></tr>
<tr><td>Landscape Irrigation
Landscape will use water-efficient irrigation systems as appropriate to each application.</td><td>Services Engineer
Landscape</td><td>Contract Documentation</td></tr>
</table>

2.4 STORMWATER MANAGEMENT

2.4.1 OBJECTIVES:

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

2.4.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Stormwater Pollution Reduction The project will achieve a best practice stormwater pollution reduction outcome with a STORM score of at least 100%. Refer to Appendix C for details.	Architect Services Engineer Civil Engineer	Contract Documentation

2.5 BUILDING MATERIALS

2.5.1 OBJECTIVES:

- To minimise the environmental impacts materials used by encouraging the use of materials with a favourable lifecycle assessment based on the following factors:
- Fate of material
- Recycling/Reuse
- Embodied energy
- Biodiversity
- Human health
- Environmental toxicity
- Environmental responsibility.

2.5.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Recycled Content All bulk thermal insulation used in the project will contain a minimum of 50% post-consumer recycled material.	Contractor	Construction
Insulation All insulants will have zero ozone depletion potential (ODP).	Contractor	Construction
Refrigerants All HVAC refrigerants used in the development will be selected to have an Ozone Depletion Potential (ODP) of zero.	Services Engineer	Contract Documentation

2.6 TRANSPORT

2.6.1 OBJECTIVES:

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

2.6.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Access to Public Transport The Baccus Marsh train station is located approximately 300m northeast of the development.	n/a	
Active Transport Facilities The development will utilise the school's existing bike parking facilities. Refer to the transport impact report for details	n/a	

2.7 WASTE MANAGEMENT

2.7.1 OBJECTIVES:

- To ensure waste avoidance, reuse and recycling during the design, construction and operation stages of development.
- To ensure long term reusability of building materials.

2.7.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Construction Waste Management The contractor will prepare a construction waste management plan for the project and will divert at least 80% of all demolition and construction waste from landfill.	Contractor	Construction
Operational Waste Bacchus Marsh Grammar currently has a dedicated storage area for the separation and collection of recyclable waste. Recycling facilities will be separated from general waste but will be co-located to provide convenient access to recycling.	Architect & Waste Consultant	Contract Documentation

2.8 URBAN ECOLOGY

2.8.1 OBJECTIVES:

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

2.8.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Vegetation Approximately 29% of the site area will be covered by vegetation or permeable surface as per landscape drawings. Landscaping will consist of a variety of native species and will contribute to reducing in heat island effect.	Landscape	Contract Documentation
Impact on Native Vegetation The development is repurposing an existing part of the site which will minimise the impact of the local flora and fauna and the proposed works introduce landscaping which will encourage biodiversity.	Landscape	Design Development
Arboriculture Value The project has undergone a development impact assessment to evaluate the sites existing trees and their protection value. Refer to development impact assessment for details.	Landscape	Contract Documentation

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Pollution Minimisation The development will minimise its impact on the local flora and fauna through: - Reduction of magnitude and improvement of quality of stormwater runoff - Avoiding light pollution from site, with no lighting pointing directly upwards into the sky - Selection of low ozone-depleting insulation and refrigerants	Architect Services engineers Civil engineering	Contract Documentation

2.9 CONSTRUCTION AND BUILDING MANAGEMENT

2.9.1 OBJECTIVES:

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

2.9.2 DEVELOPMENT RESPONSE

ESD INITIATIVE	RESPONSIBILITY & IMPLEMENTATION	PROJECT STAGE
Construction Environmental Management The contractor will prepare and implement a Best Practice project-specific EMP at the start of construction. The EMP will be developed in accordance with the industry standard NSW Environmental Management Systems Guidelines or equivalent.	Contractor	Construction
Building Commissioning and Tuning A comprehensive building commissioning and tuning plan will be implemented for all major building services.	Contractor	Construction onwards

APPENDIX A – VOC & FORMALDEHYDE LIMITS

VOC LIMITS – PAINTS, ADHESIVES & SEALANTS

PRODUCT CATEGORY	MAX. TVOC (g/L OF READY TO USE PRODUCT)
General purpose adhesives and sealants	50
Interior wall and ceiling paint, 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 sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

VOC LIMITS – CARPETS

COMPLIANCE OPTIONS	COMPLIANCE CRITERIA
A – PRODUCT CERTIFICATION	The product is certified under a recognised Product Certification Scheme (listed on the GBCA website http://new.gbca.org.au/product-certification-schemes/) or other recognised standards. The certificate must be current at the time of project registration or submission and list the relevant product name and model.
B – LABORATORY TESTING	ASTM D5116: - Total VOC limit: 0.5mg/m^2 per hour, & - 4-PC limit: 0.05mg/m^2 per hour ISO 16000 / EN 13419: - TVOC at three days: 0.5mg/m^2 per hour ISO 10580 / ISO/TC 219 (Document N238): - TVOC at 24 hours: 0.5mg/m^2 per hour

FORMALDEHYDE LIMITS

TEST PROTOCOL	EMISSION LIMIT/ UNIT OF MEASUREMENT
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ 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	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ 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)	≤0.1 mg/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)	≤0.12mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m²hr

APPENDIX B – DAYLIGHT ASSESSMENT

A daylight assessment of the building's primary and secondary spaces has been completed in accordance with the industry standard GBCA *Green Star Daylight Hand and Views Calculation Guide*, to estimate the areas which will receive a daylight factor of at least 2%.

Under this assessment methodology, there is a requirement that the project will specify glazing with Visible Light Transmission (VLT) at least 40%.

Table 1 Daylight compliance

Level	Occupied Floor Area (m²)	Daylight Complaint Area (m²)
Ground	420	137
Level 1	528	179
Level 2	244	75
TOTAL	**1,192**	**391**
Overall Compliance	**33%**	

To provide a high level of amenity and energy efficiency through design for natural light, a minimum score of 30% is considered best practice. The project has achieved a daylight factor of 2% to 33% of the regular occupied areas.

The performance of the north-west and east-south windows that cannot be assessed with the Green Star daylight methodology due to overshadowing structures. It's important to recognize the actual performance of these space will surpass that estimated through this assessment.

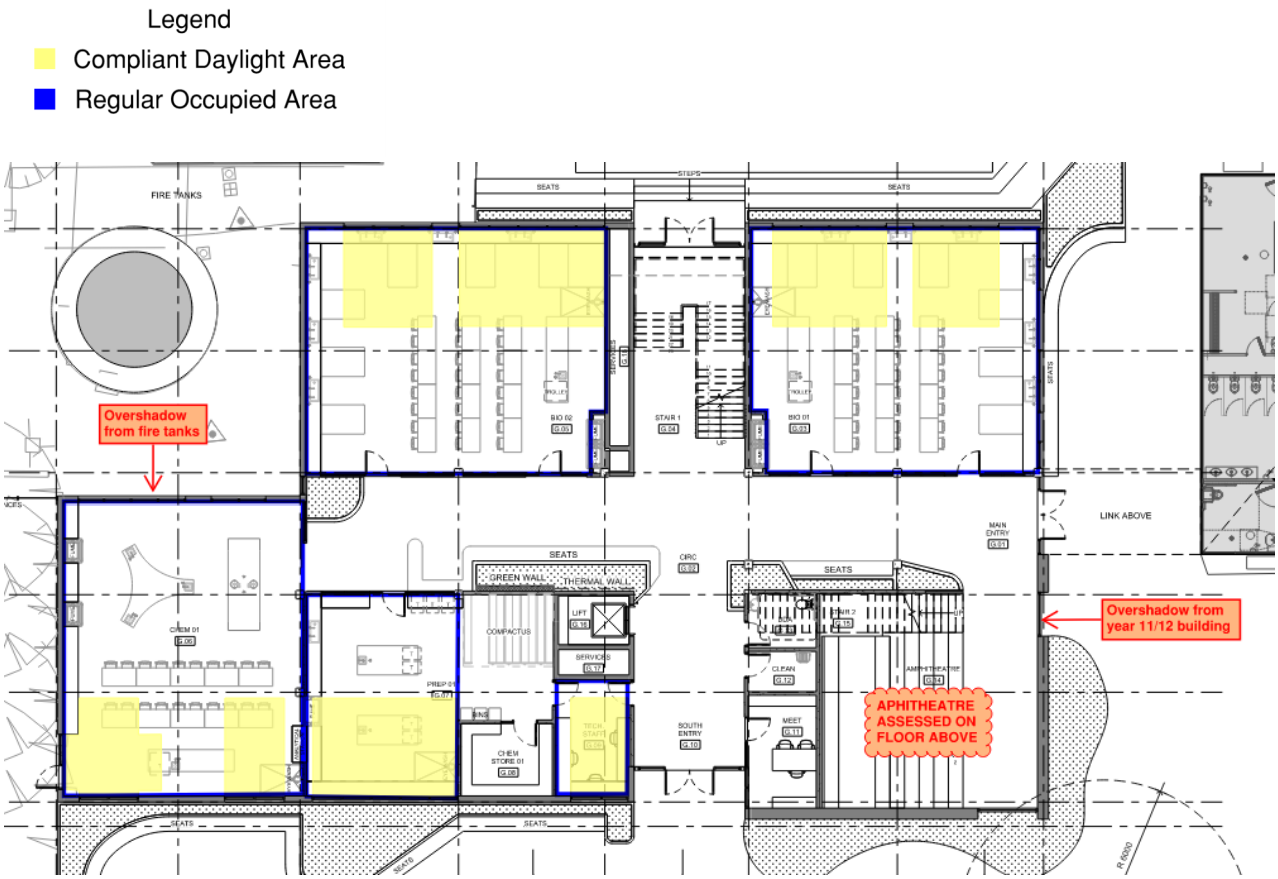

Figure 2 Daylight compliant area for level ground

Legend

Compliant Daylight Area

Regular Occupied Area

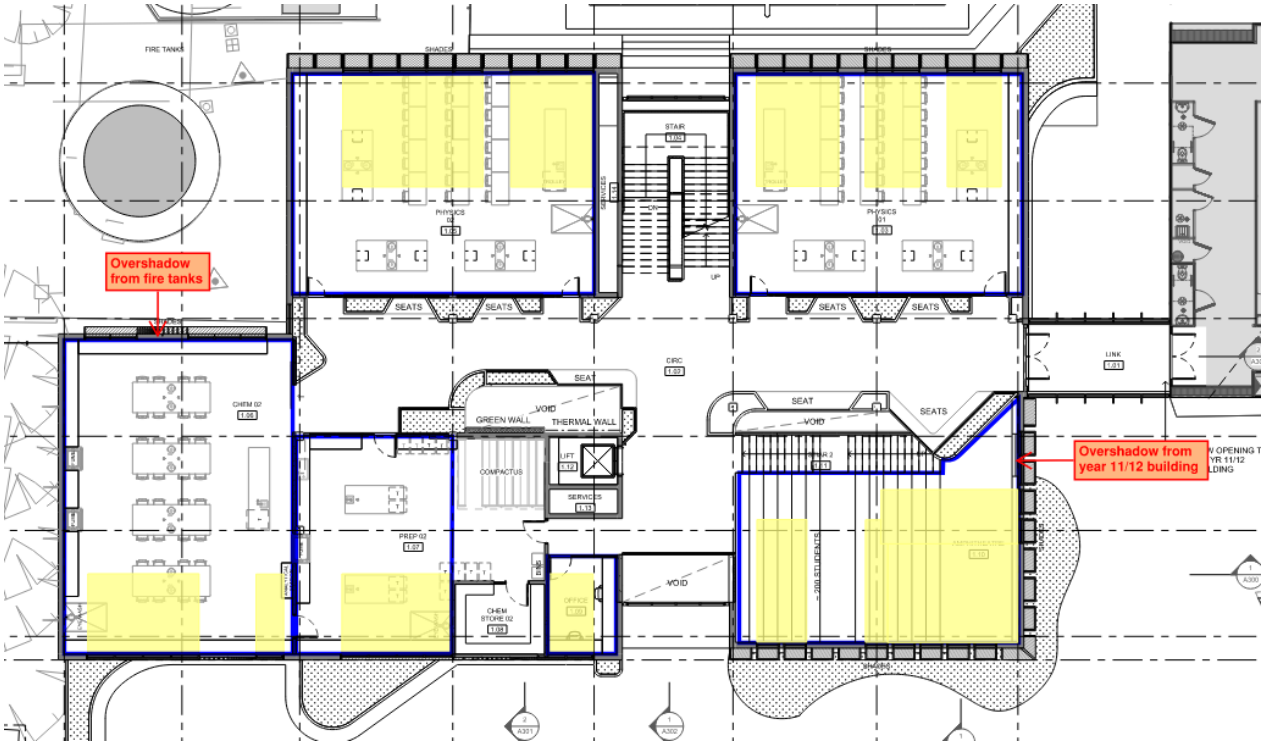

Figure 3 Daylight compliant area for level 1

Legend

Compliant Daylight Area

Regular Occupied Area

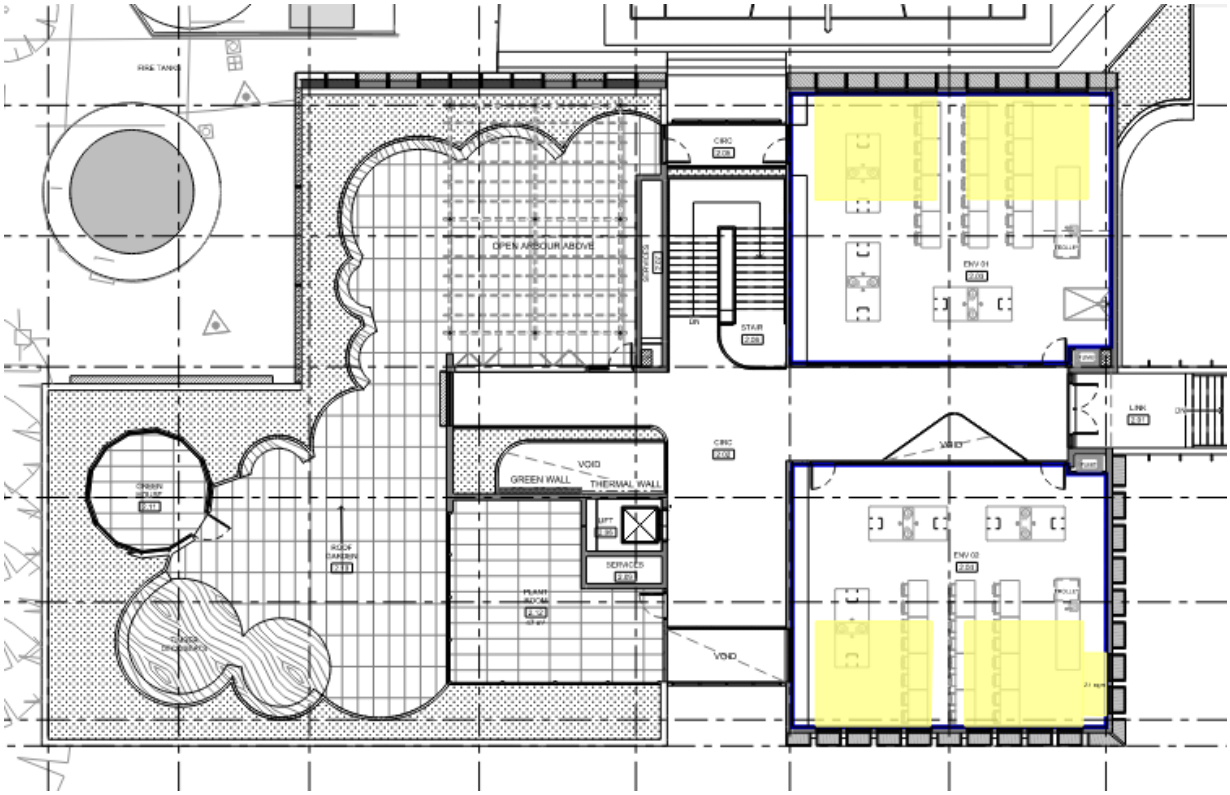

Figure 4 Daylight compliant area for level 2

APPENDIX C – STORMWATER ASSESSMENT

OVERVIEW

Under clause 53.18 of the Moorabool Shire Planning Scheme, "Storm Water Management (Water Sensitive Urban Design)", the proposed development is required to demonstrate, as part of its town planning application, its ability to meet the water quality performance objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victorian Stormwater Committee 1999.

In response to this, the Water Sensitive Urban Design Response proposed for this development has been assessed using Melbourne Water STORM software.

The preliminary stormwater treatment proposed for this development achieves best practice performance objectives outlined in the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999) to achieve the objectives of the State Environment Protection Policy (Water of Victoria).

General considerations and potential maintenance activities for the proposed WSUD response have been outlined in this report. The final detailing of the systems will be agreed with the civil and hydraulic design consultants.

General measures to be considered by the building contractor to minimise stormwater pollution during construction have also been included.

BASIS OF ASSESSMENT

Clause 53.18 of the Moorabool Shire Council Planning Scheme aims to achieve improved stormwater quality. The policy is based on the best practice performance objectives outlined in the Urban Stormwater Best Practice Environmental Management Guidelines (CSIRO 1999) to achieve the objectives of the State Environment Protection Policy (Water of Victoria). These performance objectives are:

- Suspended solids - 80% retention of typical urban annual load
- Total Nitrogen – 45% retention of typical urban annual load
- Total Phosphorus – 45% retention of typical urban annual load
- Litter – 70% reduction of typical urban annual load.

The policy also aims to promote use of Water Sensitive Urban Design (WSUD) strategies as well as stormwater re-use, minimise peak stormwater flows and pollutants, and mitigate the detrimental effect of development on downstream waterways.

In accordance with the requirements outlined in Clause 53.18, the application must address the following:

- Site layout plan showing location of proposed stormwater treatment measures;
- A report outlining how the application achieves the objectives of the policy;
- Design details, such as cross sections, to assess the technical effectiveness of the proposed stormwater treatment measures;

- A Site Management Plan which details how the site will be managed through construction; and
- A maintenance programme setting out future operational and maintenance arrangements.

PERFORMANCE MEASUREMENT TOOL

The Water Sensitive Urban Design Response proposed for this development has been assessed using Melbourne Water STORM software.

DEVELOPMENT RESPONSE – WSUD

The dimensions of the raingarden adhere to Melbourne Water's design guidelines, with each raingarden covering approximately 1% of the catchment area.

A summary of the development's WSUD response is presented below:

CATCHMENT AREA	AREA	TREATMENT TYPE
Roof	522m²	10kL RWT (RWT-1) re-use to toilets on ground floor.
Terrace	207m²	10kL RWT (RWT-2) re-use to irrigation throughout the site.
Planter Area	647m²	No treatment
Impervious North	420m²	4m² Raingarden (300mm deep)
Impervious South	474m²	5m² Raingarden (300mm deep)

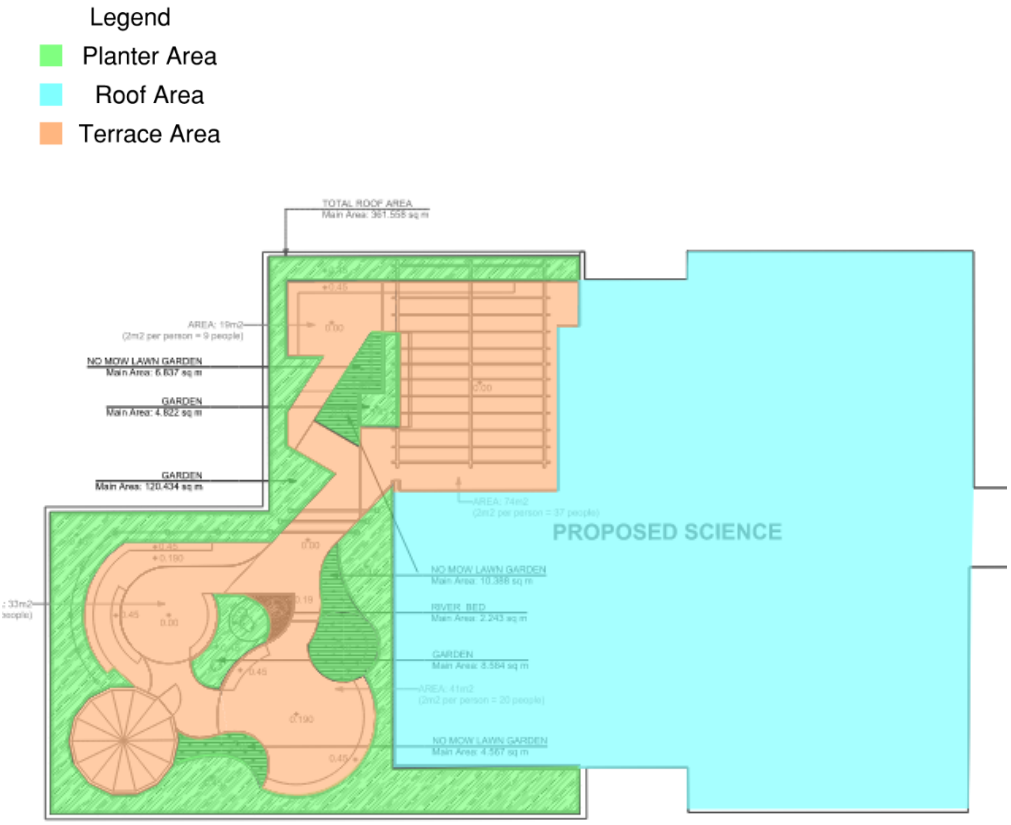

Figure 5 Site plan mark-up showing proposed catchment area on roof

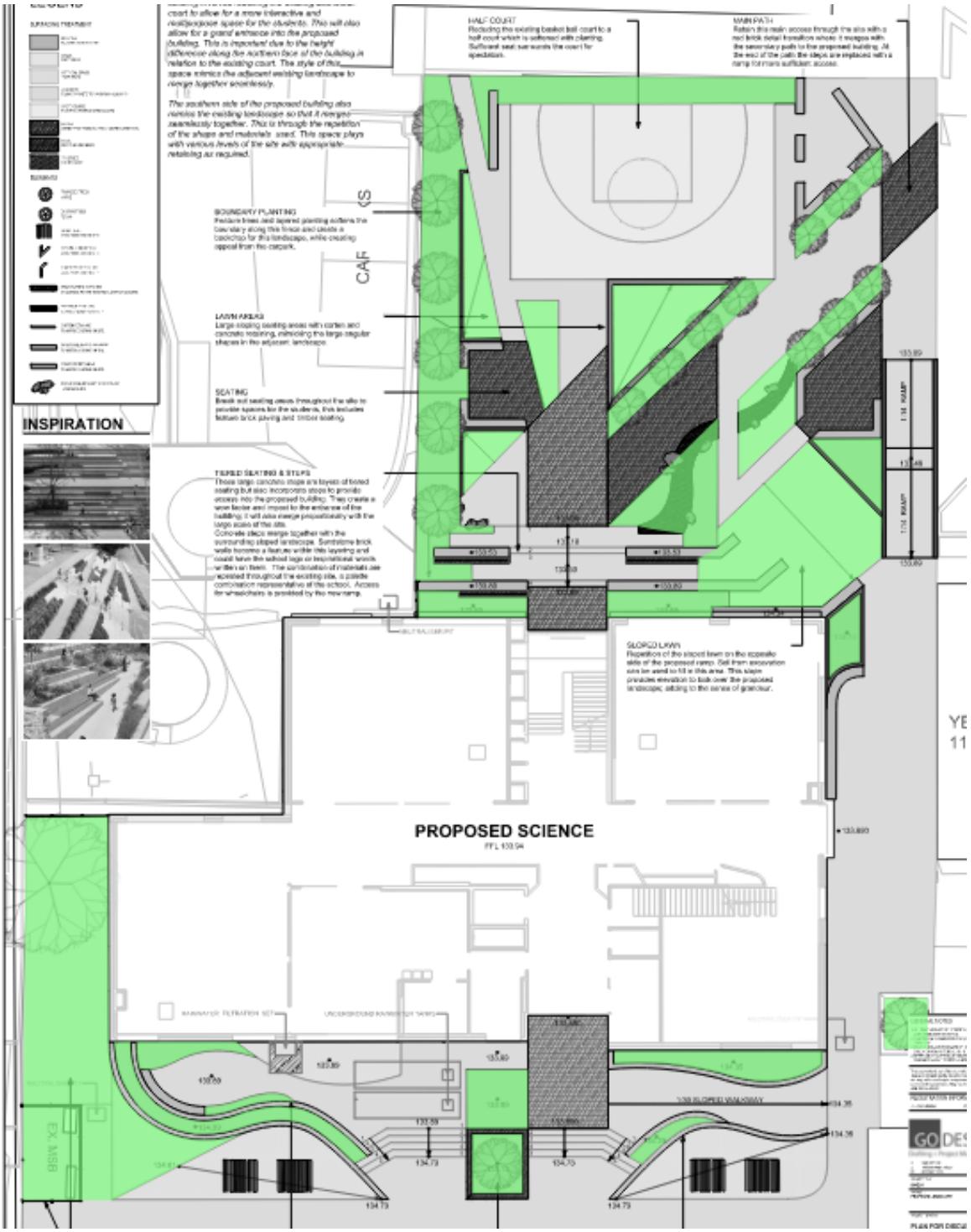

Figure 6 Site plan mark-up showing proposed planted areas on ground floor

DAILY IRRIGATION REUSE CALCULATION

As STORM does not consider reuse from irrigation, we have calculated the daily irrigation rainwater use based on a comprehensive method which considers:

- The irrigated area
- Crop coefficient of 0.5
- Daily weather data from the Bureau of Meteorology, including rainfall and evapotranspiration
- Soil runoff coefficients for the proposed location
- Daily rainwater tank balance to determine the likely amount of rainwater available for reuse

The daily irrigation demand is shown in Figure 7.

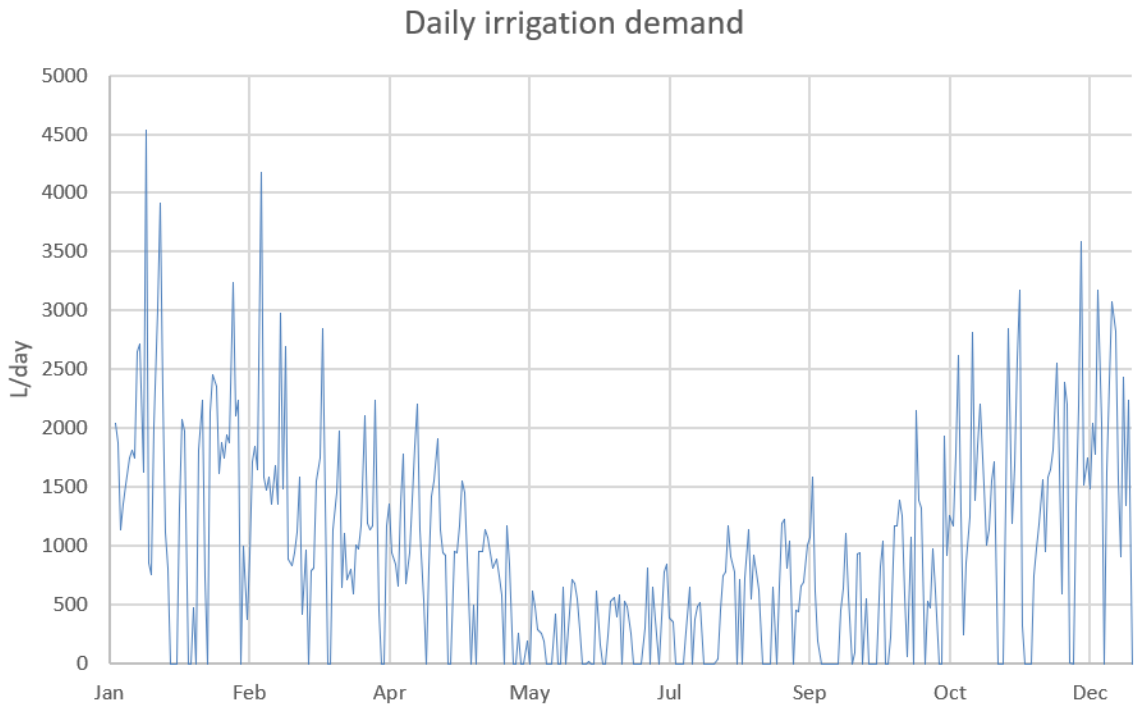

Figure 7 Daily irrigation demand

The predicted water level for RWT-2 is shown in Figure 8.

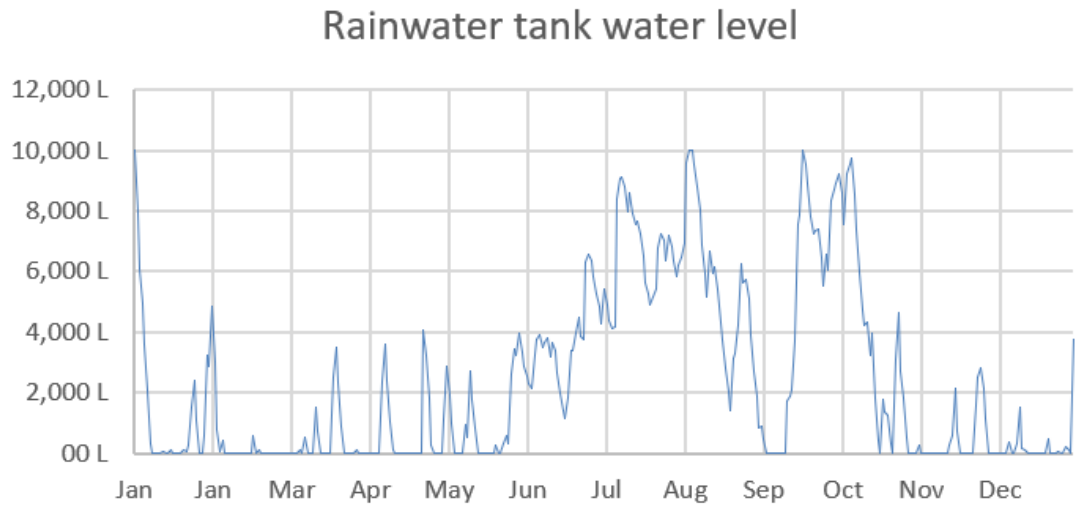

Figure 8 RWT-2 annual balance

The annual irrigation reuse for the STORM rating has been calculated using the worst-case demand for winter months (June, July and August) extrapolated for whole year (Figure 9).

	Sum of Supplementary irrigation requirement
Jan	**45,364 L**
Feb	**47,726 L**
Mar	**35,955 L**
Apr	**33,797 L**
May	**18,301 L**
Jun	**7,325 L**
Jul	**9,021 L**
Aug	**15,856 L**
Sep	**11,979 L**
Oct	**27,207 L**
Nov	**36,145 L**
Dec	**53,757 L**
Annual Total	**342,435 L**
Equivalent Winter Total	**128,811 L**

Figure 9 Monthly irrigation demand

The annual irrigation demand has been converted to "occupants" for STORM by dividing by 20L/per person x 365 days as per STORM methodology.

The equivalent occupancy for STORM is as follows:

ANNUAL RW IRRIGATION CONSUMPTION	EQUIVALENT STORM OCCUPANTS
128.8kL	128,811 / (365 x 20) = 18 occupants

STORMWATER ASSESSMENT RESULTS

Based on the stormwater treatment details described above, the development achieves a STORM score of 126%.

Melbourne Water STORM Rating Report

TransactionID:	0	
Municipality:	MOORABOOL	
Rainfall Station:	MOORABOOL	
Address:	37 S Maddingley Road	
	Bacchus Marsh	
	VIC	3340
Assessor:	WRAP	
Development Type:	Other	
Allotment Site (m2):	2,270.00	
STORM Rating %:	126	

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
RWT-1	522.00	Rainwater Tank	10,000.00	15	120.80	89.00
RWT-2	207.00	Rainwater Tank	10,000.00	15	170.00	82.00
Impervious North	420.00	Raingarden 300mm	4.00	0	117.40	0.00
Impervious South	474.00	Raingarden 300mm	5.00	0	120.40	0.00

Figure 6: STORM assessment report

RAINWATER TANK DESIGN & INSTALLATION CONSIDERATIONS

Rainwater tanks provide flow retention capacity and storage for reuse. They reduce stormwater run-off, decrease the demand of potable water and allow particle settlement within the tank, thus treating rainwater. General considerations for rainwater tank systems design and potential maintenance activities include:

- Incorporating a first flush device to the rainwater collection system. First flush devices divert the initial most polluted portion of water runoff.
- Automated switches to divert water supply from the tank to mains need to be incorporated.
- Connection to toilets ensure water tanks are run down on a daily basis, leaving spare capacity for new rainwater collection.

STORMWATER RUNOFF TREATMENT DURING THE CONSTRUCTION STAGE

Stormwater management in the construction stage will be required to minimise the likelihood of contaminating stormwater discharge from the site and reducing the velocity of the flows generated from the development as it is being constructed.

Stormwater management will form a part of the contractor's EMP, and it will need to specifically address the following objectives:

1. Prevent discharge of contaminated stormwater;
2. Prevent impact on offsite surface or groundwater due to construction works; and
3. Slow down stormwater flows during heavy rainfall.

The EMP should consider the following specific items in relation to stormwater management:

- Storage of materials, chemicals and construction waste must be well clear of site drainage lines or other infrastructure;
- Immediate clean-up of chemical spills;
- Soil and dust containment;
- Regular cleaning of roadways and other impervious surfaces;
- Install sediment or silt traps around stormwater drain points;
- Prevent stormwater from adjacent properties entering the site;
- Capping/bunding of piles of contaminated materials or soil;
- Inspect and clean all sediment filters and traps after heavy rains; and
- Regularly evaluate site stormwater management systems for effectiveness.

More information is available from Melbourne Water booklet "*Keeping Our Stormwater Clean – A Builder's Guide*".

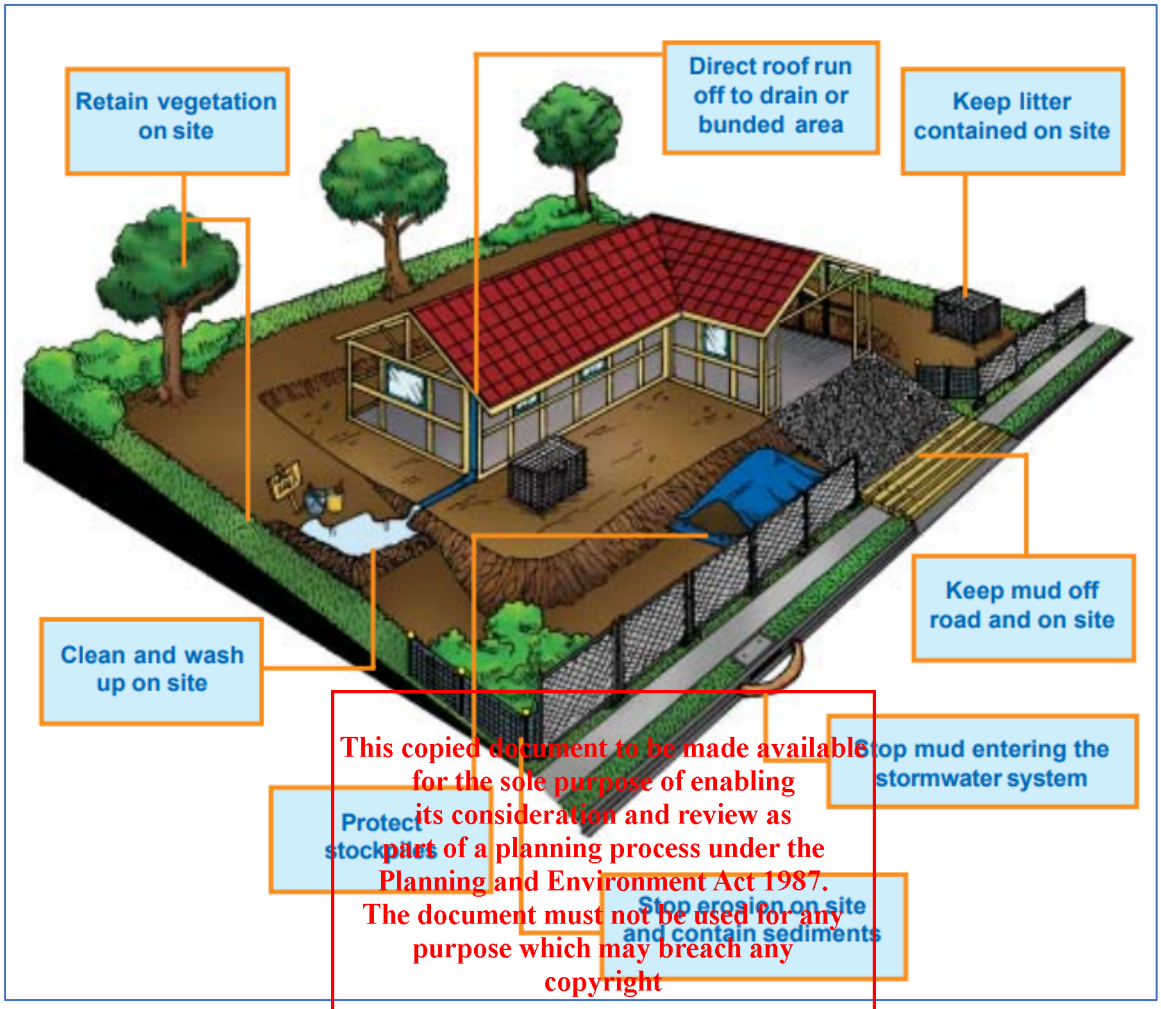

Figure 10: Site stormwater management considerations. Source: Melbourne Water – Keeping Our Stormwater Clean: A Builder's Guide

STORMWATER MAINTENANCE PROGRAMME

The proposed rainwater harvesting system will be maintained in accordance with the manufacturer's requirements. The building owner, body corporate or facility manager will be responsible for undertaking the routine maintenance and ensuring that the system is operating as designed.

The following specific maintenance activities will be required as a minimum:

- Roof and other rainfall collection areas are to be inspected regularly, at minimum every 3 months, to ensure they are kept free of pollutants, leaves and other debris;
- First flush devices should be cleaned at least every 6 months; and
- Routine maintenance as specified by the manufacturers for the hardware; pumps, tanks and filters.
- General maintenance of the raingarden, including cleaning the inlet, outlet and garden bed is scheduled every 3 months.
- Regular inspection of the filter media is to be conducted with repair or replacement performed every 3 months.
- Weeding of the filter media, as well as removal of dead diseased vegetation every 3 months
- Replant individual bare patches (greater than 5% of the area) every 3 months

- If bare patches represent greater than 30% of the raingarden area, refer to Water Design (2012) *Rectifying Vegetated Stormwater Treatment Assets.*

Sludge layers and biofilms can be formed in the tanks walls. If water colour and smell become an issue, professional tank cleaners should be engaged.

For more information use Melbourne Water *WSUD maintenance guidelines.*

APPENDIX D – PRELIMINARY SECTION J ASSESSMMENT

wrap consulting engineering

DESIGN MEMORANDUM

PROJECT:	Bacchus Marsh Grammer	**DM NO:**	01
PROJECT NO:	24243	**REVISION:**	01
FROM:	Patrick Kiploks	**DATE:**	16/04/2024

ATTENTION:	**COMPANY:**	**EMAIL:**
Sovina Chow	McIldowie Partners	schow@mcildowiepartners.com.au

NCC SECTION J ASSESSMENT

INTRODUCTION

This Design Memorandum provides a summary of the NCC 2019 Section J assessment which has been completed for the proposed Science Building at Bacchus Marsh Grammer, 37 S Maddingley Road, Bacchus Marsh.

NCC SCOPE

This assessment addresses the following Parts of the NCC only:

- Part J1 – Building Fabric
- Part J2 – Glazing
- Part J3 – Building Sealing

CLASSIFICATIONS

This assessment assumes the following:

- NCC 2019
- Building Class 9b –assembly building

SOURCES OF INFORMATION

The following sources of information were used in the assessment:

- Architectural plans and elevations drawings revision A- dated 26/02/24.

BUILDING ENVELOPE

This assessment applies to all building elements that form the thermal envelopes of the buildings, specifically those that separate a conditioned space or habitable room from the exterior of the building or from an adjacent non-conditioned space such as a car park, plant room or similar.

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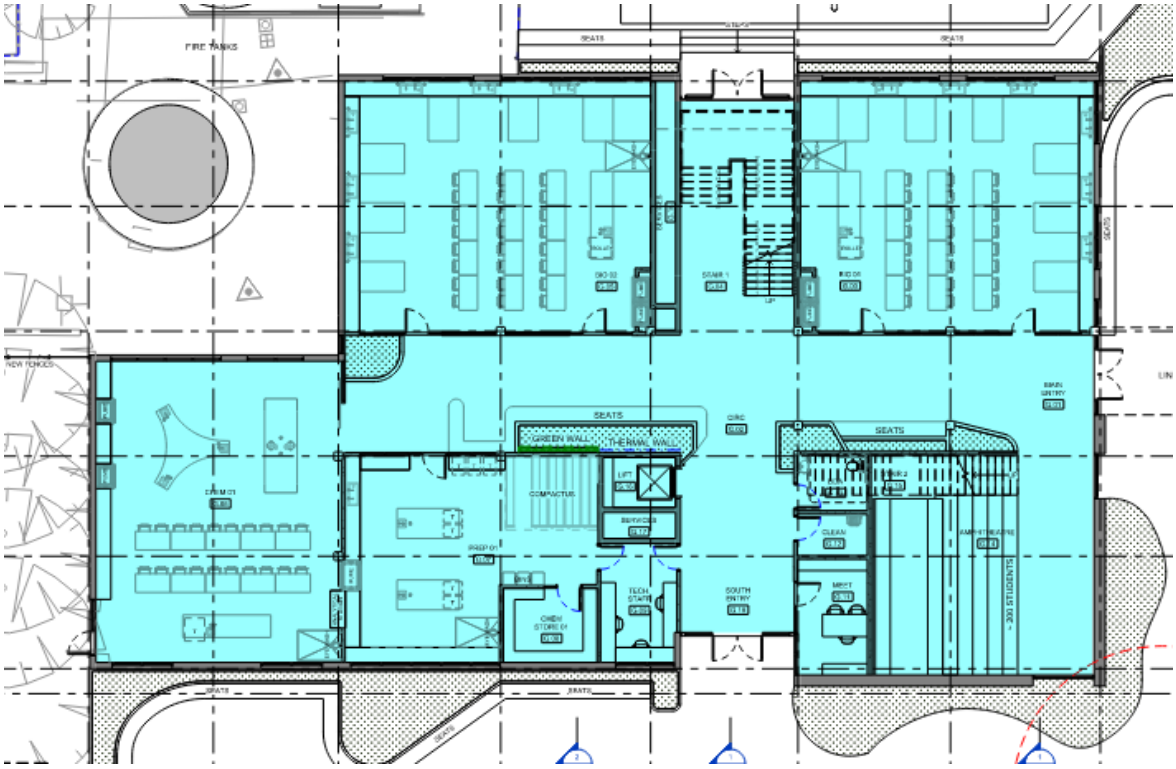

Figure 1 Conditioned space: ground floor

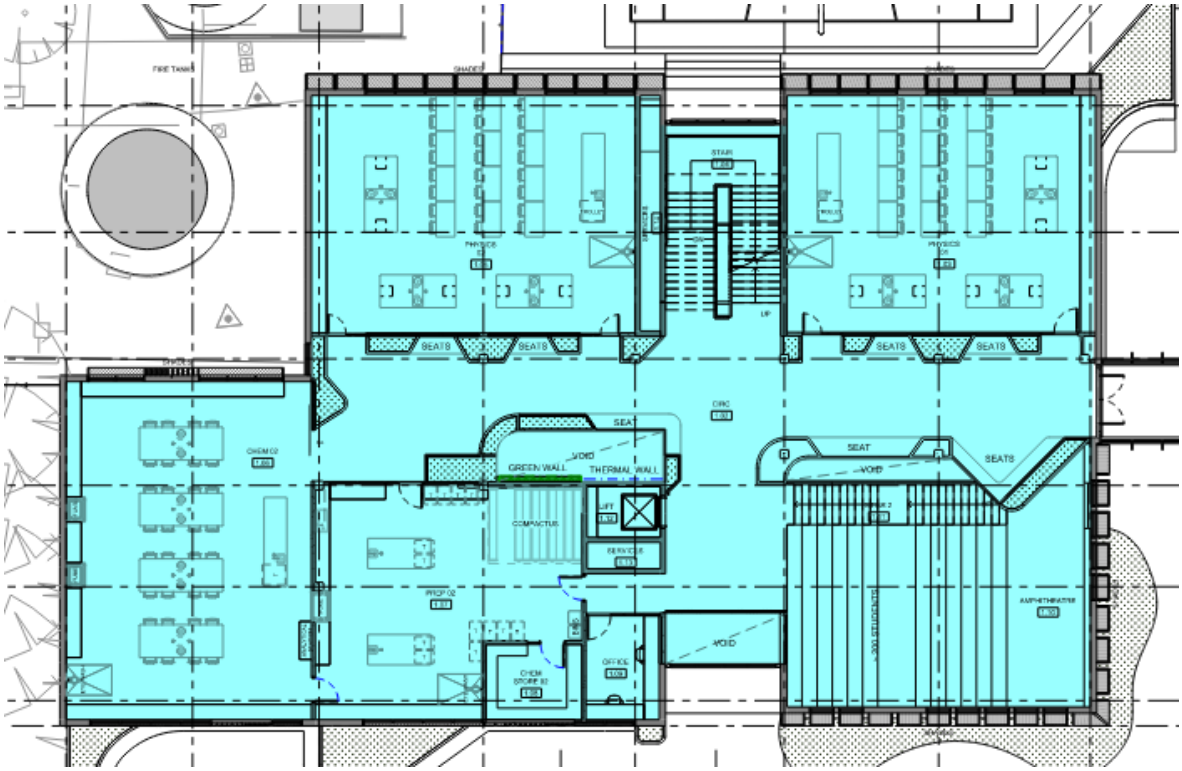

Figure 2 Conditioned space: level 1

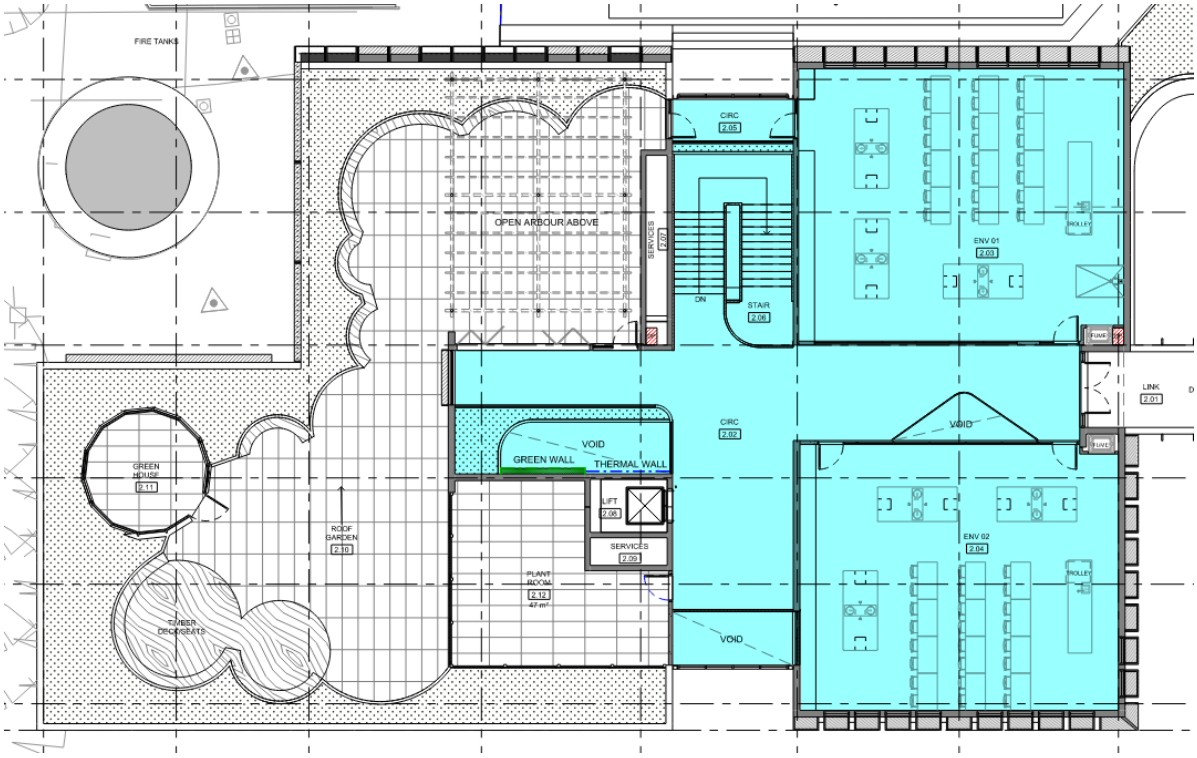

Figure 3 Conditioned space: level 2

DISCLAIMER

This assessment is only a review against the minimum regulatory energy efficiency requirements as stipulated in the Building Code of Australia. It has not taken into consideration any related design or construction criteria or considerations such as operational energy efficiency, capital costs, construction detailing, thermal comfort, condensation, mechanical services design, or acoustic performance.

USE OF THIS MEMORANDUM

The following notes apply in relation to the acceptable use of this document:

1. For the building permit submission, all thermal performance and construction details must be explicitly documented within the architectural documentation. It is not acceptable for the architectural drawings, schedules or specifications to include notes such as “refer to ESD/energy/Section J report” or similar.
2. This document is not to be used by contractors or suppliers for the purpose of tendering, quoting or pricing.

BUILDING FABRIC REQUIREMENTS

The following table provides a summary of the required construction detailing and minimum total thermal insulative requirements for the different façade elements within the building:

Table 1: Part J1 construction and insulation requirements for Late Lab.

ITEM	ELEMENT	NCC DEEMED-TO-SATISFY REQUIREMENTS
J1.2	**Thermal Constructions**	**General Insulation:** Must comply with AS/NZS 4859.1 and be installed so that it— (i) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and (ii) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and (iii) does not affect the safe or effective operation of a service or fitting. **Reflective Insulation:** Must be installed with— (i) the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and (ii) the reflective insulation closely fitted against any penetration, door or window opening; and (iii) the reflective insulation adequately supported by framing members; and each adjoining sheet of roll membrane being— (A) overlapped not less than 50 mm; or (B) taped together. **Bulk Insulation:** Must be installed so that— (i) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and (ii) in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.
J1.3	**Roofs**	**External Roofs and Ceilings Below Terraces:** - Minimum added insulation R-Value **R_M3.5.** - External roof/terrace material solar absorptance must be **≤ 0.45.** Note that zincalume does **not** achieve this requirement.

ITEM	ELEMENT	NCC DEEMED-TO-SATISFY REQUIREMENTS
J1.5	**Walls and Glazing**	**External Walls:** Minimum **R_M 2.5 added insulation** for all external walls. Thermal spacers are required between the wall stud and external fabric/structure. **Eternal Glazed Windows and Doors:** - Total U-Value (Uw) ≤ 3.5 W/m² - SHGC (SHGCW) ≤ 0.38 - VLT ≥ 40 Note: Glazing colour, reflectivity, acoustic, wind, structural and other requirements to be confirmed with architect.
J1.6	**Floor**	**Suspended External Floor** (above open air): - Minimum **R_M 1.7 added insulation**.

Notes:

- **R_T** is the total R-value of the building element, including cladding, internal finishes, air gaps and air films.
- **R_M** means the R-value of the insulation.
- **U_W** is total U-value of the window element, including glazing and frame.

Mark-ups showing the above details are included in Figure 4 to Figure 11 below.

Legend

- Soffit Insualtion R3.5
- Soffit Insulation R1.7
- Wall Insulation R2.5

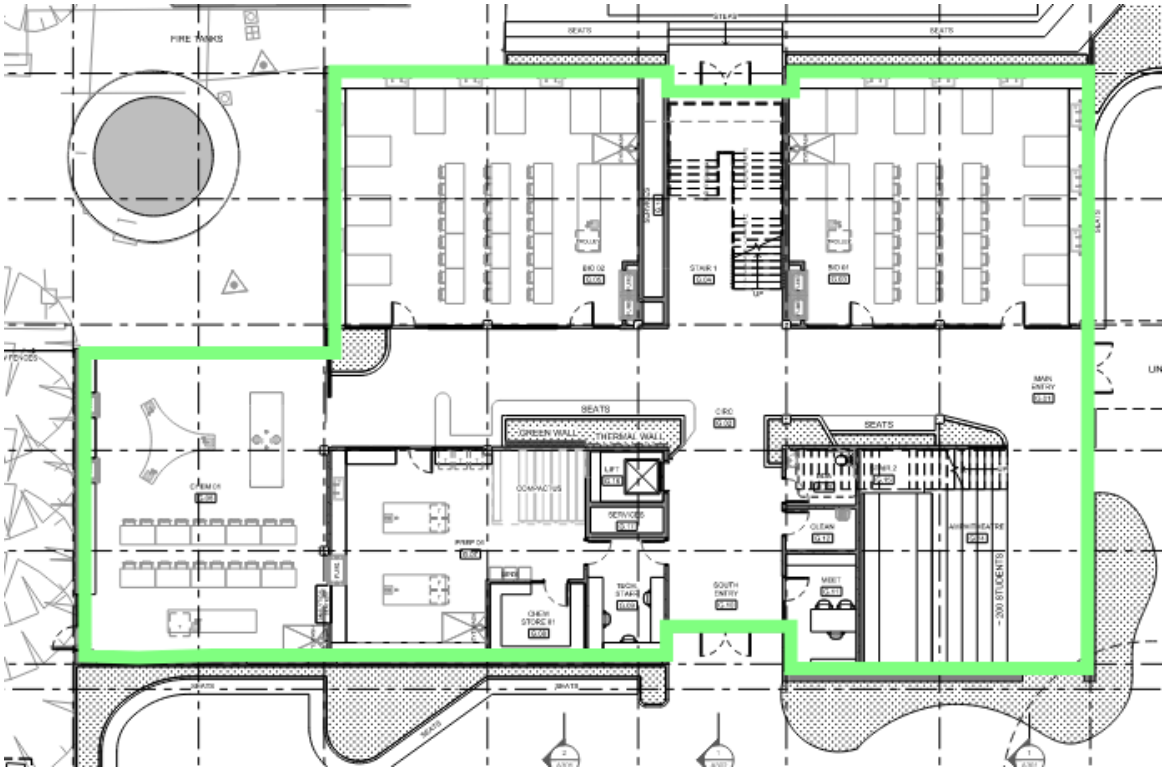

Figure 4 Insulation markups level ground (floor plan)

Legend

- Soffit Insualtion R3.5
- Soffit Insulation R1.7
- Wall Insulation R2.5

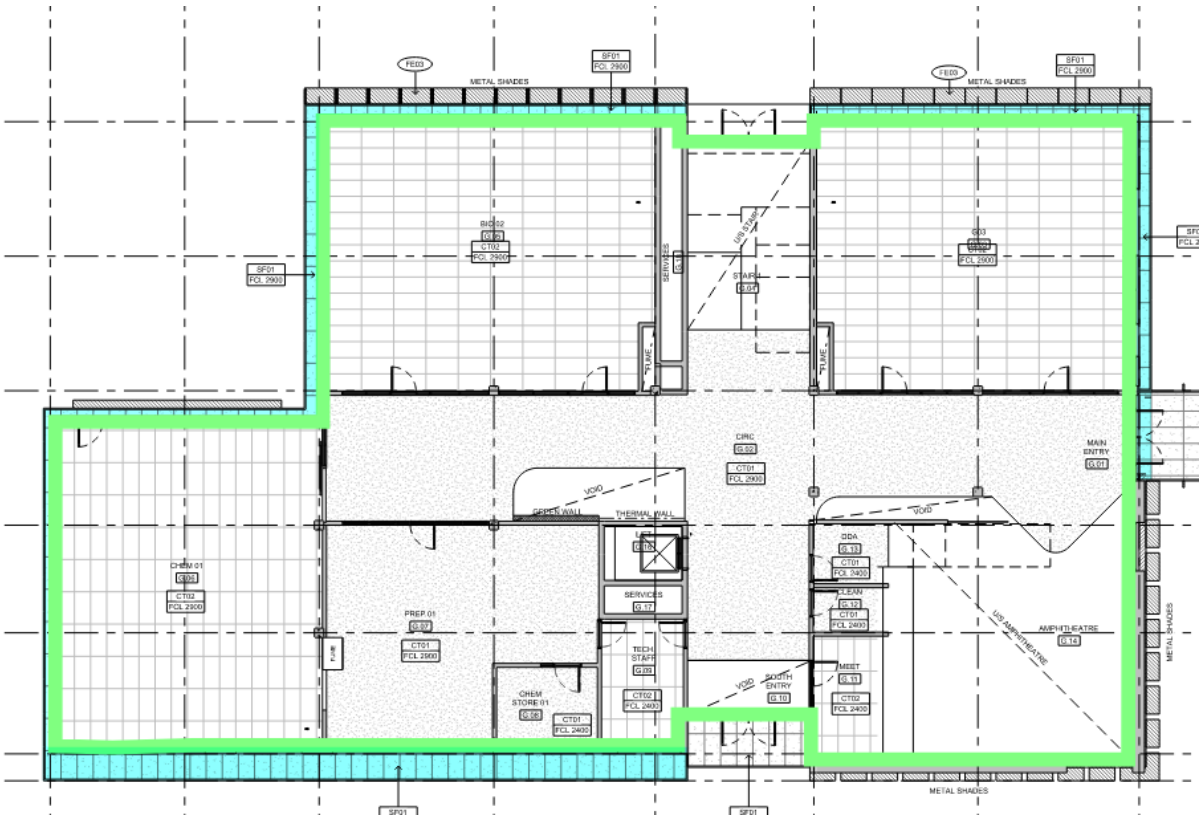

Figure 5 Insulation markups level ground (RCP)

Legend

- Soffit Insualtion R3.5
- Soffit Insulation R1.7
- Wall Insulation R2.5

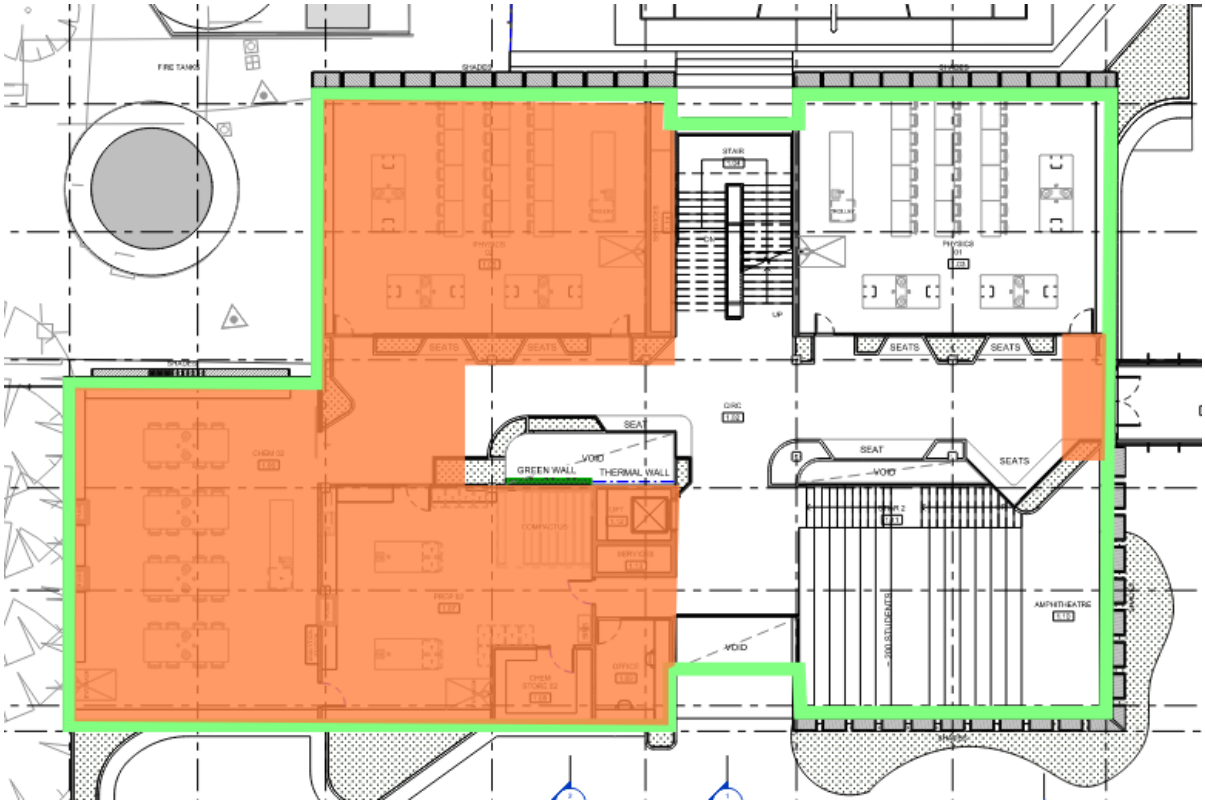

Figure 6 Insulation markups level 1 (RCP)

Legend

- Soffit Insualtion R3.5
- Soffit Insulation R1.7
- Wall Insulation R2.5

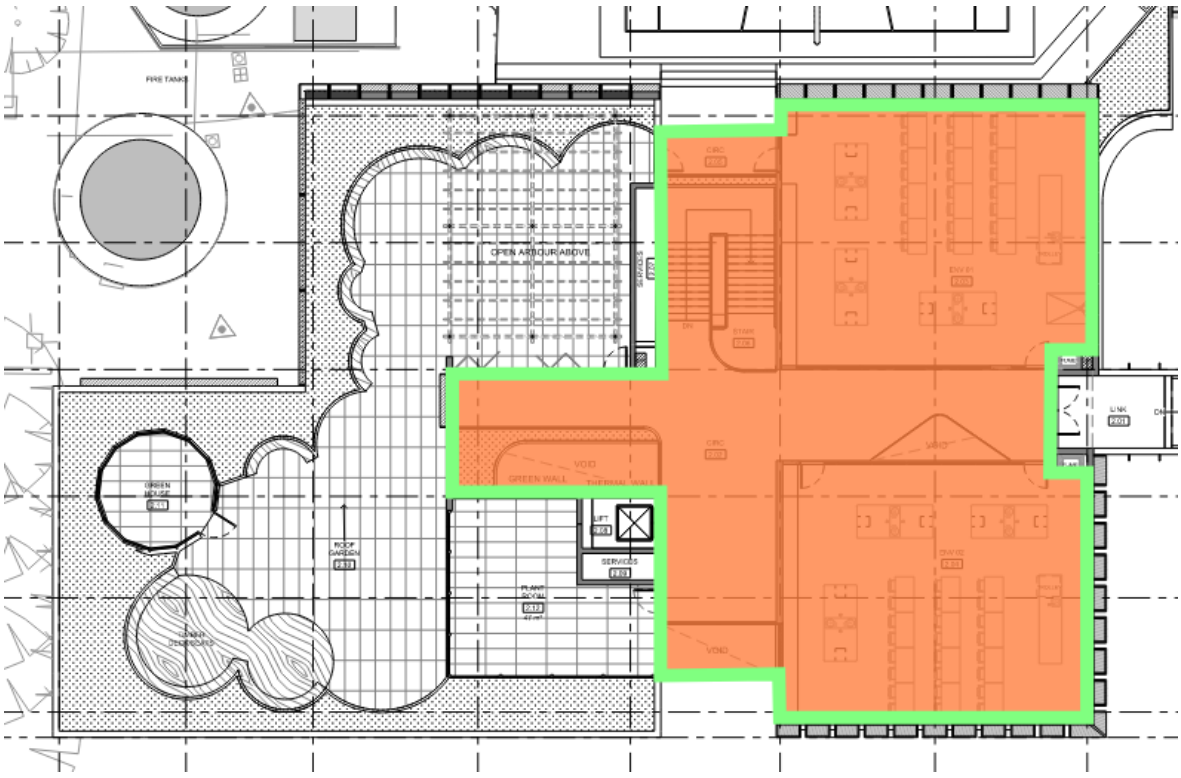

Figure 7 Insulation markups level 2 (RCP)

Legend

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- Wall Insulation R2.5

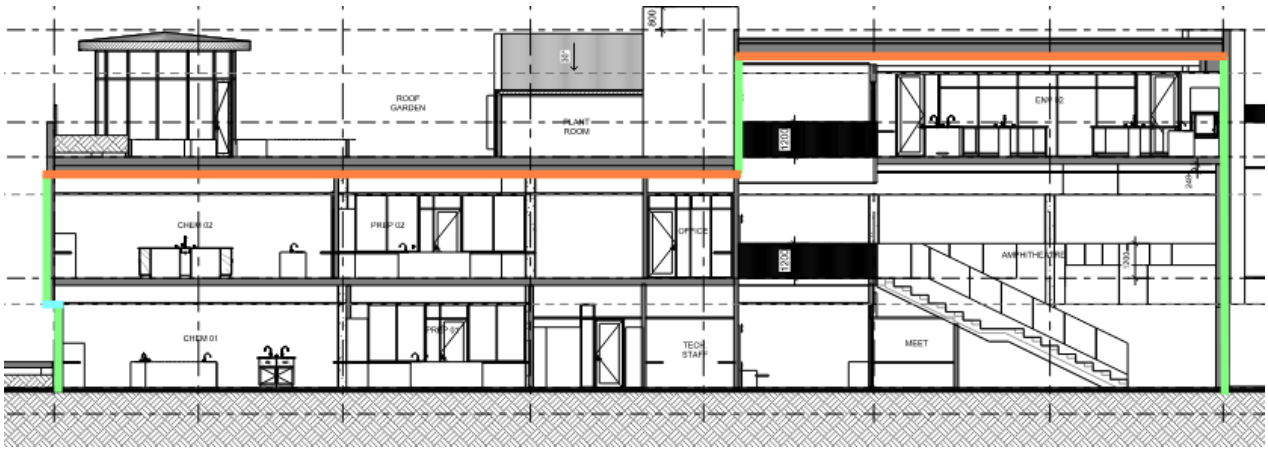


Figure 8 Insulation Section 1

Figure 9 Insulation Section 2

Legend

- Soffit Insualtion R3.5
- Soffit Insulation R1.7
- Wall Insulation R2.5

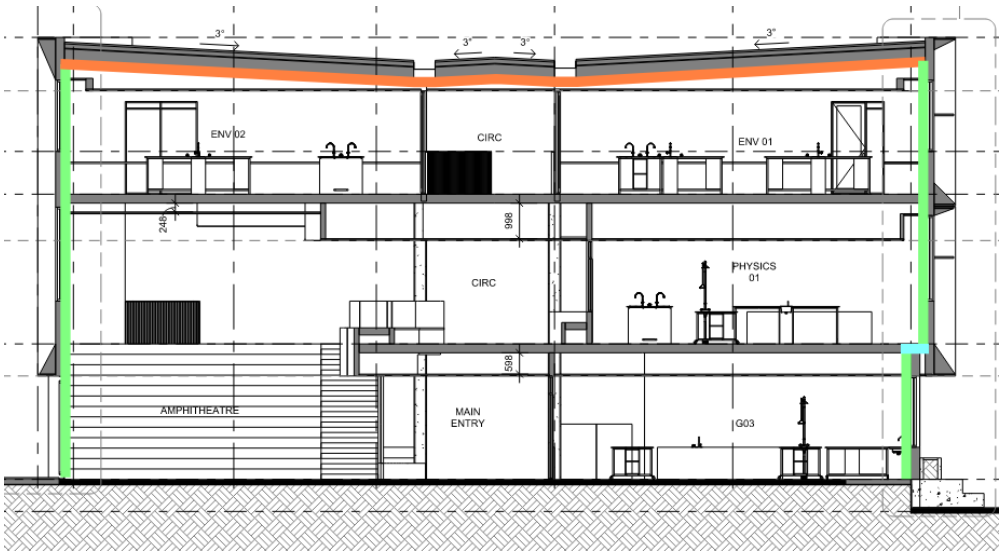


Figure 10 Insulation Section E

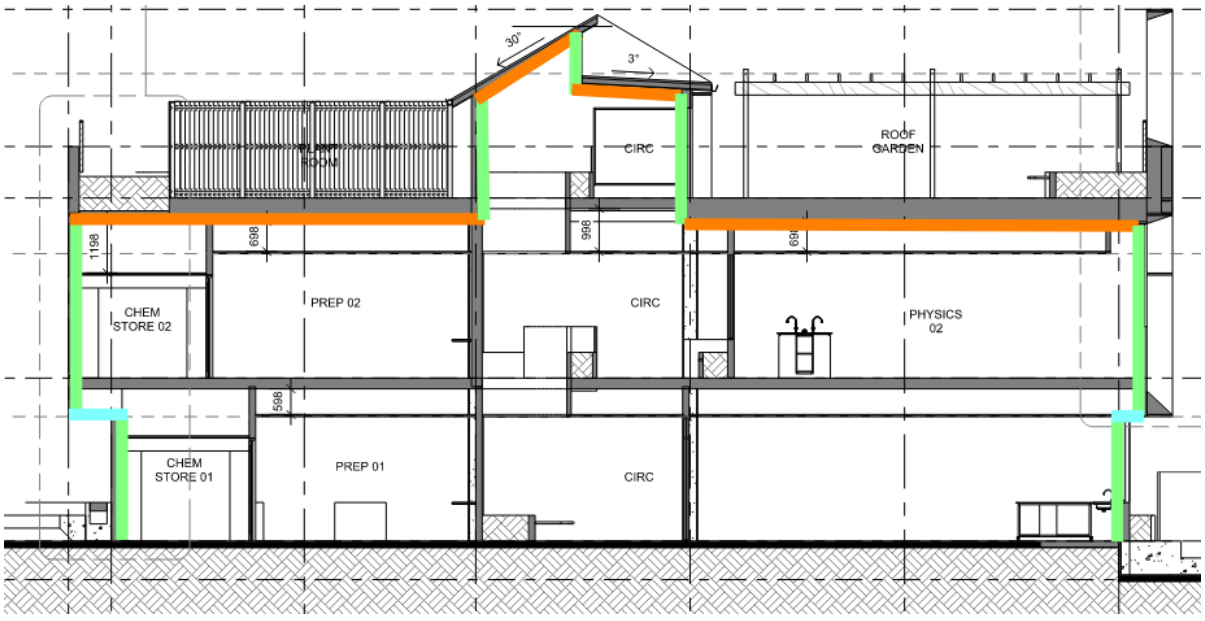


Figure 11 Insulation Section 4

BUILDING SEALING

The following table provides a summary of the design and construction provisions required to meet the BCA deemed-to-satisfy requirements for building sealing:

Table 2: Part J3 building sealing requirements.

ITEM	ELEMENT	RETAIL – BCA DEEMED-TO-SATISFY REQUIREMENTS
J3.4	**Windows and Doors**	- Operable external windows and doors must be fitted with a seal. - Windows must comply with AS2047. - External doors that lead into air-conditioned spaces greater than 50 m^2 must be self-closing or have an air-lock.
J3.5	**Exhaust Fans**	Exhaust fans serving a conditioned or habitable space must be fitted with a self-closing damper.
J3.6	**Roofs, Walls and Floors**	Must be constructed to minimise air leakage, using internal lining systems that are close fitting or by using sealants, caulking, skirting, architraves and the like.

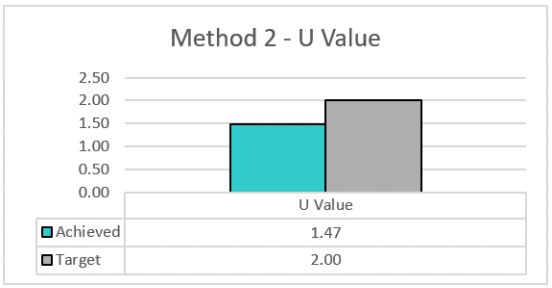
GLAZING CALCULATIONS

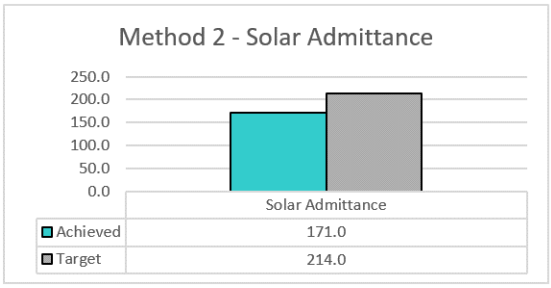
The preliminary J1.5 calculations for the Science Building are presented below:

METHOD 2

	Target	Achieved	Compliant?
Façade SA	214.0	171.0	Yes
Wall R Value	1.00	1.60	Yes
Façade U Value	2.00	1.47	Yes
Compliance			Yes

	U Value	SHGC	VLT
Glass 1	3.50	0.38	0.40
Glass 2			





— End of Design Memorandum —