SUSTAINABILITY SERVICES

ESD Report

PLANNING and ENVIRONMENT ACT
Warrnambool PLANNING SCHEME

PERMIT NO. PA2201869

ENDORSED PLAN
Sheet 1 of 18

Signed: for
MINISTER FOR PLANNING
Date: 16/6/2023

consulting engineers
BRT

Edmund Rice - Year 9 Centre
Emmanuel College Warrnambool

DOCUMENT REVISION

Stage	Revision	Revision Description	Author	Checked by	Issue Date
CI	00	Client Issue	LE	LR	19.05.2023
CI	01	Client Issue	LE	LR	22.05.2023

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Project Information

Job Number	11596
Job Name	Emmanuel College - Year 9 Centre
Address	140 Botanic Road Warrnambool VIC 3280

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2 REPORT SCOPE AND INFORMATION

The following Sustainability Report (also referenced as an ESD Report or Sustainability Management Plan) has been commissioned by Emmanuel College Warrnambool, for the development of their proposed Year 9 Centre located at 140 Botanic Road, Warrnambool.

The report has been provided to be reviewed by the Minister for Planning and its purpose is to demonstrate the proposed environmental initiates incorporated in the project. The further aim is to provide integrated sustainability solutions that will provide meaningful, and real sustainable outcomes for the project. Improving the buildability and usability of the final project.

The report has been compiled in conjunction with the following documentation:

1. Emmanuel College Year 9 Centre Drawing/Specification Pack - Revision: TP, Baldasso Cortese
2. NCC Section J Energy Efficiency - Assessment Report | Part J1 – J8 Compliance, SUHO
3. Building services documentation, revision: TI-00, BRT Consulting
4. Landscape drawing package, revision: T, T1, T2, Fraser Design Collaborative
5. Acoustic report, SLR Consulting Australia
6. Civil drawing set, revision: G, CSE Group
5. Structural drawing set, revision: Tender 1, CSE Group

Whilst all information and proposals contained in this report are accurate at the time of publishing, changes through the regular design process are expected.

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3 INTRODUCTION

3.1 Client Specific Requirements

As part of Emmanuel College's ongoing strategic efforts, the establishment of a new Year 9 Centre marks a significant milestone in their journey towards having a dedicated space, reflecting and providing for a crucial phase of their continuous learning process.

This state-of-the-art facility encompasses a range of specialized areas such as STEM, wood technology, arts, food technology, media, gymnasium, and general classrooms. By incorporating these diverse spaces, the building is designed to cater to the multifaceted needs of today's students.

Right from the initial stages of design, ECW made a conscious decision to integrate sustainability initiatives as integral components of the project, rather than mere add-ons or temporary solutions. These initiatives were carefully implemented from the foundation of the scheme, ensuring their essential role in the project's success. Notable measures included rainwater reuse systems, the use of timber components in construction, and ventilation solutions surpassing the requirements outlined by the National Construction Code (NCC).

One of the client's major objectives in undertaking the new development was to provide a sustainable facility with enhanced internal and external environment for students and staff whilst reducing recurrent energy consumption and the environmental impact on the site.

3.2 Report Requirements

This ESD report has been designed to inform and demonstrate how this project will address each of the Sustainable Design Assessment in the Planning Process (SDAPP) 10 Key Sustainable Building Categories. Details of each of these are provided as follows:

1. Indoor Environment Quality
Objective: To achieve a healthy indoor environment quality for the wellbeing of building occupants.

2. Energy Efficiency
Objective: To ensure the efficient use of energy, to reduce total operating greenhouse emissions and to reduce energy peak demand.

3. Water Efficiency
Objective: To ensure the efficient use of water, to reduce total operating potable water use and to encourage the appropriate use of alternative water sources.

4. Stormwater Management
Objective: To reduce the impact of stormwater run-off, to improve the water quality of stormwater run-off, to achieve best practice stormwater quality outcomes and to incorporate the use of water sensitive urban design, including rainwater re–use.

5. Building Materials
Objective: To minimise the environmental impacts of materials used by encouraging the use of materials with a favourable lifecycle assessment.

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

7. Waste Management
Objective: To ensure waste avoidance reuse and recycling during the construction and operation stages of development.

8. Urban Ecology
Objective: To protect and enhance biodiversity and to encourage the planting of indigenous vegetation.

9. Innovation
Objective: To encourage innovative technology, design and processes in all development, so as to positively influence the sustainability of buildings.

10. Construction and Building Management
Objective: To encourage a holistic and integrated design and construction process and ongoing high performance.

Reference: SDAPP Guidelines 2022

3.3 Location Specific Requirements

The proposed development is located in the Victorian local government area of Warrnambool City Council.

Warrnambool City Council (WCC) are active in their strategic planning to meet the ongoing challenges that climate change presents to their communities. WCC have recently investigated net zero carbon opportunities in their LGA, as demonstrated in their recent 2020 investigative report.

In addition, WCC have committed that "Warrnambool will be the most environmentally sustainable regional city in Australia" - Green Warrnambool report, September 2018.

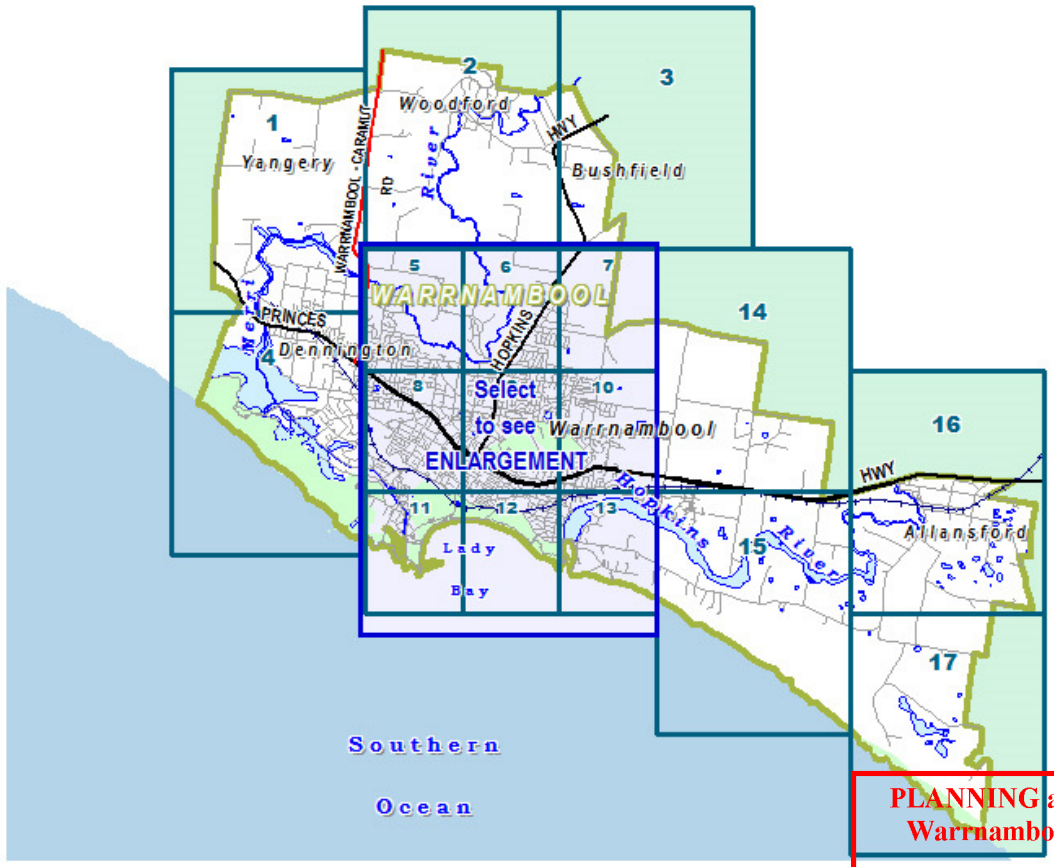

Figure 1 Warrnambool City Council LGA Region. Vic Planning website ©

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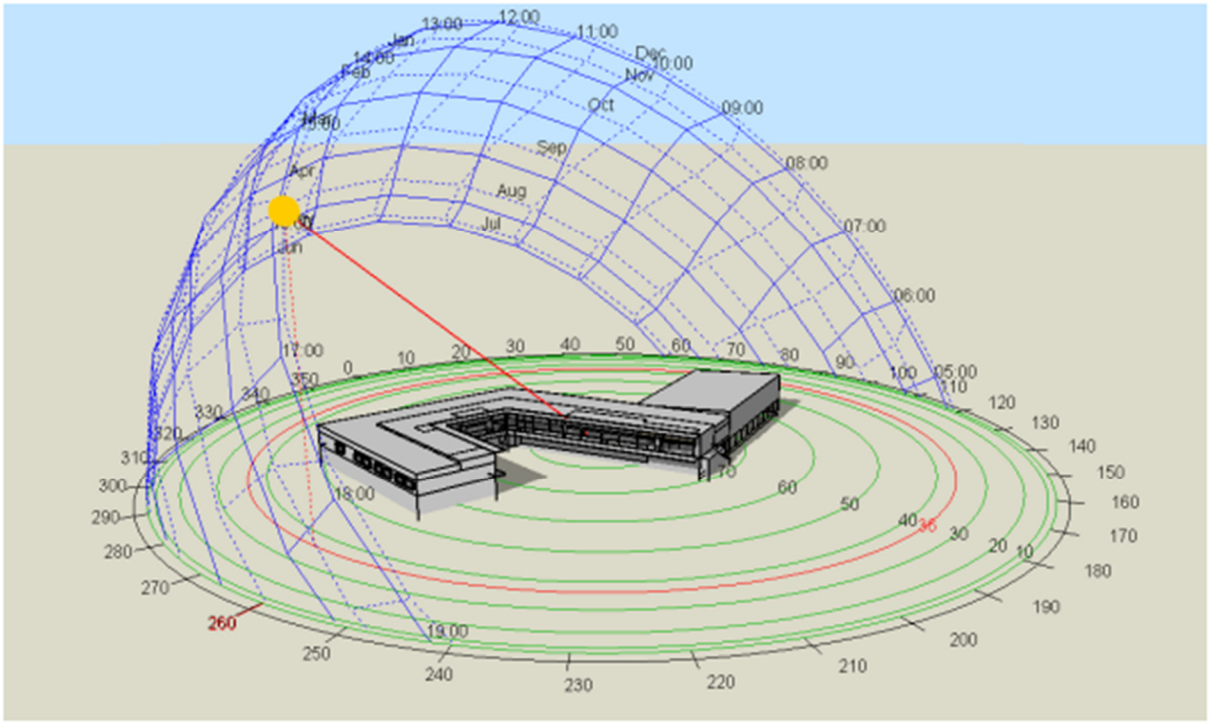

Figure 2 Energy modelling of proposed building, SUHO JV3 report ©

4 EXECUTIVE SUMMARY

4.1 Project Details

Address:	140 Botanic Road
Suburb:	Warrnambool
Development Type:	Commercial - Education facility
Number of Storeys:	2
Climate Zone:	6
Total Site Area:	130,000m^2
Total Floor Area:	3,550m^2

The project involves the construction of one new building, a double storey Year 9 Centre, on a large existing school site. The building contains several general teaching areas, staff work/offices, staff lounge, laboratories, project open spaces, amenities, an amphitheatre, and gymnasium.

The site address in Warrnambool is located in NatHERS Climate Zone 63. The site is approximately 130,000m^2, with the proposed new building area of 3,550m^2 (lower ground, mezzanine, and ground floor). The site is currently located in a General Residential Zone with residential housing, associated educational stock, a major highway, a nursing home, and a hospital surrounding the site and several other meaningful amenities within short distance of the site.

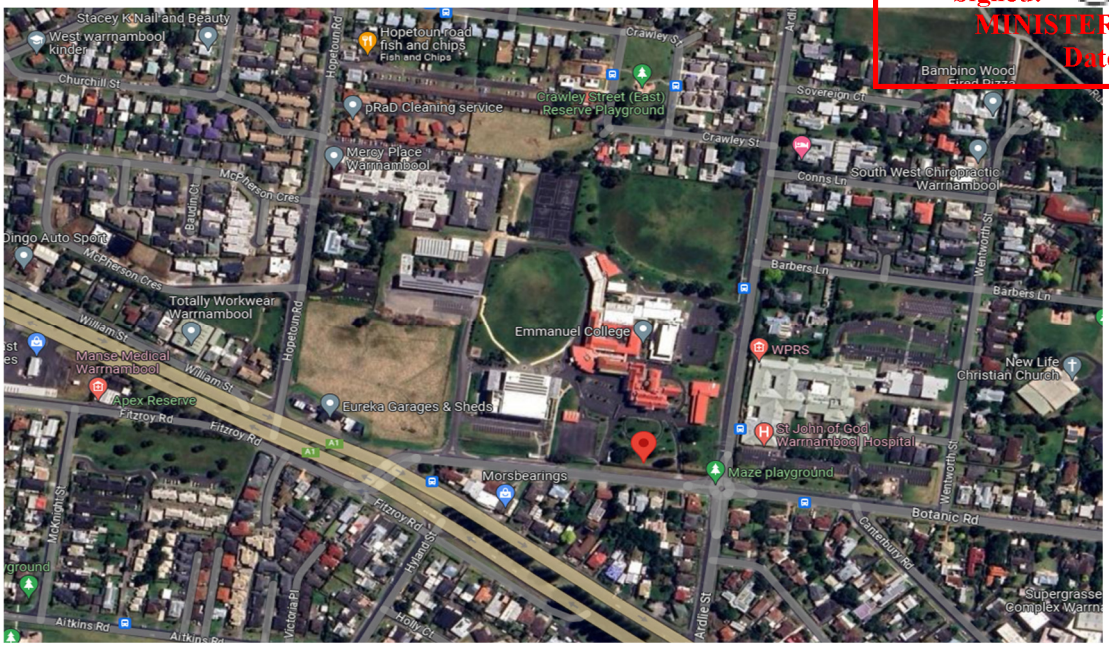

Figure 3 Locality image showing site. Google Maps©

4.2 ESD Summary

The following is a summary of the proposed sustainable design initiatives proposed for the development;

Indoor Environment Quality

- Supplementary mechanical ventilation to 80% of the general teaching areas, in excess of NCC requirements
- Natural ventilation and light to all habitable rooms where possible. Mechanical ventilation to be provided where this is not feasible
- Independent climate control to all classrooms, staff offices, common areas and habitable rooms
- Double glazing throughout the development to improve acoustic and thermal performance of the building envelope
- Engagement of an acoustic consultant to advise on project specific requirements

Energy Efficiency

- A mix of hybrid and standard variable refrigeration flow (VRF) air-conditioning systems are proposed. These are high-quality AC systems. The hybrid systems also have reduced refrigeration in use compared to standard systems
- Heating and cooling energy consumption shall be >1% below the reference case (NCC 2019 Section J)
- Greenhouse gas emissions shall be >1% below the reference case for the new building (NCC 2019 BCA Volume 1 Section J)
- Double glazed window system through the development to provide increased thermal and acoustic performance for the facility. Emphasis on additional acoustic glazing where required
- Installation of LED lighting throughout reducing the maximum illumination power density by at least 5% than the requirement of the NCC 2019 BCA Volume 1 Section J (Class 2 to 9)
- Centralised electric hot water system
- No gas connection to the building, all electric building
- Provision for future installation of a 50kW photovoltaic system
- Lighting controls throughout

Water Efficiency

- The following fixture star ratings are proposed for the development;
  - Basins – 5 Star WELS rating (not including science or process related units)
  - WC's – 4 Star WELS (dual flush)
  - Dishwashers – 4.5 Star Water rating
  - Showerheads – 4 Star (>= 6l/min but <= 7l/min)
- Water efficient landscaping including garden planting and lawn areas
- Rain water capture & reuse is proposed throughout to all WCs and irrigation, via two off 50kL tanks. Note that this is a combined system with detention for stormwater

Stormwater Management

- Provision of appropriate filtration to minimise negative environmental impacts of stormwater runoff and maximise onsite re-use of stormwater
- The project has passed the STORM modelling with a 100% result

Building Materials

- Timber construction has been proposed in the construction of the gymnasium. A mix of steel and timber rafters throughout
- Gymnasium purlins are of timber construction
- Lower ground floor is constructed of masonry in lieu of steel

Transport

- Access to public transport by a short walk
- New car parking
- Access to showers

Waste Management

- Provision of individual rubbish and recyclable waste throughout the facility

Urban Ecology

- Provision of communal spaces for staff and students, internal and external
- Provision of new vegetation to supplement existing vegetation

Innovation

- All electric project. As a facility providing STEM and food technology this is in itself an innovative project. Most senior school food technology and/or STEM facilities will utilise natural gas where available, this facility has been designed as all-electric despite the fact that gas is available on site
- Engagement of ESD consultant to provide ESD assessment and report for town planning
- Engagement of an acoustic consultant to assist with improved IEQ
- Metering to allow monitoring and management of energy
- Responding to local climate conditions. The building has been designed with local conditions in mind

5 INDOOR ENVIRONMENTAL QUALITY

5.1 Window Systems

The facility is proposed to be provided with double-glazed windows throughout all habitable spaces which will enhance the indoor environment for students and staff.

The double-glazed window system will also enhance the thermal and acoustic performance for all building occupants. Double glazed windows will minimise the inducement of cold drafts during low ambient temperatures which will allow students and staff to minimise the use of window furnishings and enhance their outlook through uncovered windows.

The double-glazed system will also provide acoustic treatment and reduction of transmission of external noises including traffic noise. The acoustic performance will enhance the indoor environment.

5.2 Shading

The proposed building incorporates design features on several elevations including building overhangs and extended eaves together with selected trees to provide shade.

5.3 Ventilation

The building is to be naturally and/or mechanically ventilated to the Building Code of Australia and Australian Standards requirements as a base.

However, in one of the most impactful client driven decisions for the building, supplementary ventilation in excess of the NCC code requirements has been provided throughout many areas, via air-to-air heat exchanger mechanical ventilation systems.

These systems are market leading ventilation systems and allow for not only additional mechanical ventilation, providing a higher quality of indoor environment throughout, but by utilising a heat exchanger device; these systems will capture approximately 80% of the available energy in the air when being discharged. This will result in reduced power required to run the air-conditioning plant throughout the ground floor of the facility, whilst also providing a far greater indoor environment quality that will not rely on the opening of windows.

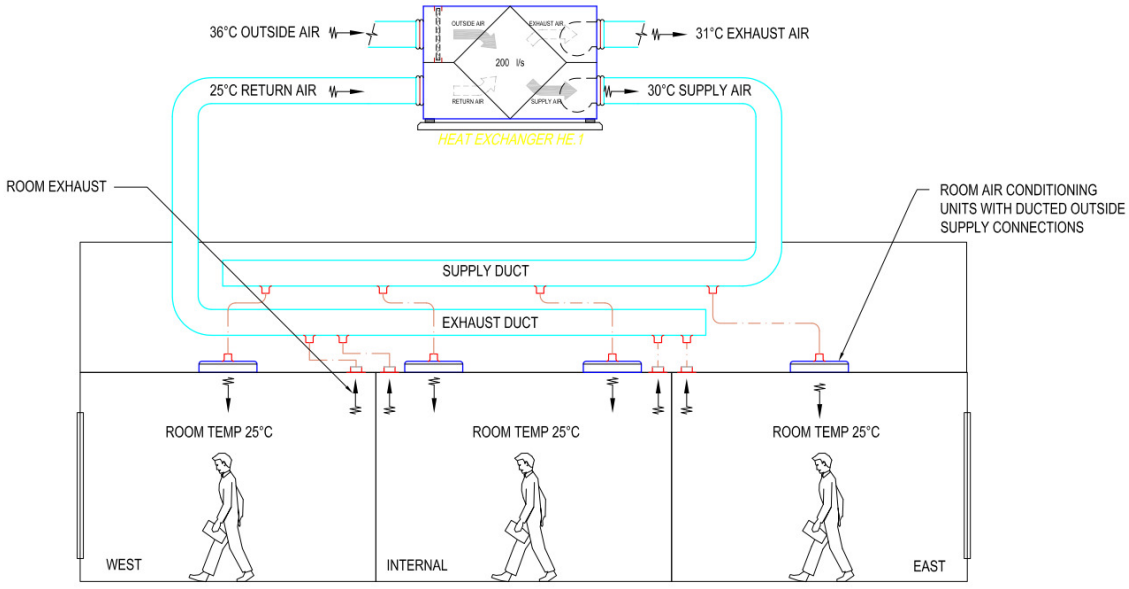

Figure 4 Air-to-air heat exchanger schematic BRT Consulting ©

5.4 Air Conditioning & Heating

The air-conditioning systems proposed throughout the facility are industry leading systems for facilities of this type and are designed with efficiency and quality in mind.

Variable Refrigeration Flow (VRF) systems are nominated throughout, and are either heat recovery (3-pipe) or hybrid systems.

The use of local control of heating/cooling and lighting systems provides the spaces with increased environmental quality to allow users to locally control the internal temperature in the space.

The ability to locally and/or centrally isolate individual air conditioning units enables energy consumption to be reduced by not conditioning areas that aren't occupied. Similarly operating and controlling individual room temperatures to potentially higher or lower temperature (variable setpoints) during summer and winter will also enable the environment to be better controlled as well as potentially reduce energy consumption for the facility.

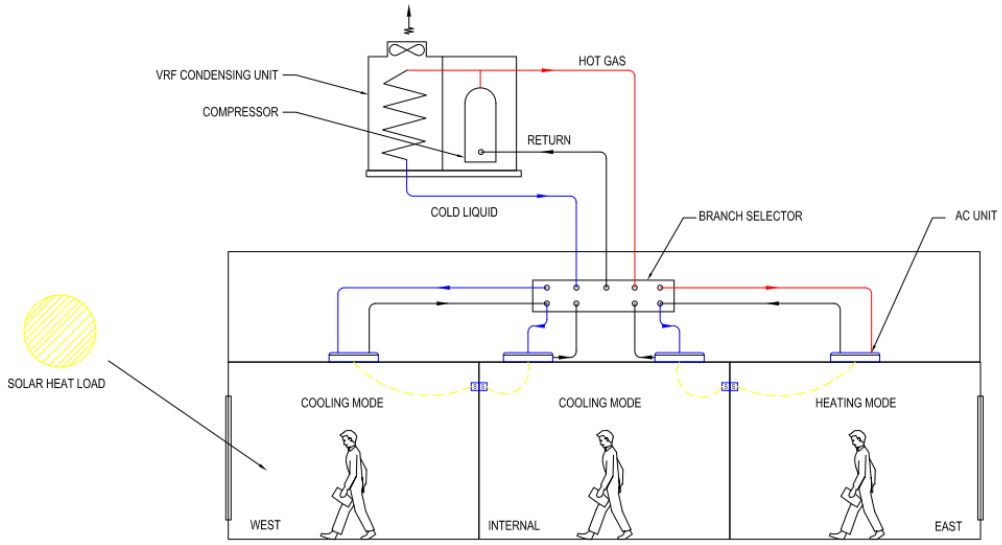

Figure 5 VRF Heat recovery schematic BRT Consulting ©

5.4.1 Variable Refrigeration Flow Systems

VFR systems can come as either a two-pipe system or a three-pipe system. No standard two-pipe VRF systems are proposed in this project.

A two-pipe system is essentially multiple indoor heads (cassette, wall mounted or ducted) connected to a single condenser. This can provide savings both in installation cost and plant space due the condensing unit being one, larger unit. The disadvantage is that all the heads off the one condenser can only be either in heating mode or cooling mode at the one time. In addition, one unit needs to be the master. This means that if the master is set to cooling, all the other units can only be in cooling mode or fan only. Obviously, the reverse is the same, if the master is on heating, all units can only be heating or fan only. This requires careful selection of zoning of each system and selection of the master unit. The advantage of individual on/off of each internal unit remains.

A three-pipe system is similar to a two-pipe system in that there are multiple indoor units connected to one condenser. The indoor units however are connected to the external compressor unit via a branch selector box. This selects heating or cooling for each unit simultaneously. The has an added benefit of allowing heat from one zone to be transferred to another zone without the need for the compressor to run. It is sometimes called a heat recovery system and has obvious energy efficiencies above the two-pipe system and single split units.

Relative to other air-conditioning options, the VRF (three-pipe) system offers the following benefits.

i) Each indoor unit has independent temperature control and operation.
ii) Indoor units can be on either on cooling or heating cycle independent of other indoor units (zones).
iii) High energy efficiency but not as high as central plant.
iv) Longer life than packaged AC units.

5.5 Acoustic Treatment

An acoustic consultant has been engaged for the project to ensure acoustics are a key consideration for the design team. This has impacted the design throughout, and will have positive benefits not just for the users of the building, but also neighbours and adjacent properties.

The use of appropriate wall, ceiling and floor finishes are proposed for the development to provide the required acoustic performance for individual spaces. The use of angles can also be utilised to minimise reverberation of noise. Good design principles in regards to meeting spaces, sound isolation shall also be considered between spaces. With typically the treatment of visual and touch senses used to improve IEQ, the hearing sense often is forgotten.

Refer clause 11.3 for further information.

5.6 Thermal Comfort

Each of the above five initiatives will ensure that the new project achieves a high level of thermal comfort for the staff and students.

The treatment and use of the natural light have been carefully located to minimise solar heat gain to the building envelope and/or cause nuisance of glare or shadowing internally.

The double-glazed window system also enhances the thermal and acoustic performance for all building occupants. Double glazed windows will minimise the inducement of cold drafts during low ambient temperatures which will allow residents and staff to minimise the use of window furnishings and enhance their outlook through uncovered windows.

Along with the use of shading, acoustic and ventilation considerations throughout the building the project shall provide high level of thermal comfort.

6 ENERGY EFFICIENCY

6.1 JV3 Modelling Results

To minimise energy usage the development has been modelled using JV3 for insulation, glazing, heating and cooling systems and the water heating system;

- Heating and cooling energy consumption is >1% below the reference case (NCC 2019 Section J)

This has been verified by the JV3 report, accompanying this report.

6.2 Internal Lighting

The development is proposed to try and exceed the minimum BCA Section J requirements for lighting energy efficiency by at least 5%. Following table details the proposed requirements;

BCA Section J Items	BCA Minimum Requirements	Proposed Requirements
Lighting	*(w/m2)*	*(w/m2)*
Corridor	8	7.6
Common room	8	7.6
Office	9	8.5
Utility Space	6	5.7
Amenities	6	5.7

Note that these are not mandated, but targeted requirements and to be confirmed.

Artificial lighting is proposed to use LED fittings for all areas.

6.3 Glazing Treatment

The development is proposed to be provided with double glazing to all external/envelope openings.

6.4 Domestic Hot Water

The development is proposed to be served by a centralised electric, hot water system. The system is to be connected to a timeclock to allow for the unit and circulation pump to be deactivated when not required.

6.5 External Shading

The project is proposed to have sections of landscape shading to the facades and windows.

Figure 6 Excerpt of proposed building from architectural drawings

6.6 Natural Light

Almost all habitable rooms will be provided with natural light via external windows. This combined with local switching of lighting in all rooms, will enable natural light to be utilised without the need for artificial lighting to be on when not required.

6.7 Renewable Energy Generation - Future Provision

The new building has provision for the future installation of a new photovoltaic system, via space in the switchboards and conduit installation. The location of the new photovoltaic system will be north facing, and centrally to the building.

6.8 All Electric Building

Refer to clause 11.1 for further information.

6.9 Lighting Controls

Artificial lighting throughout the building shall be provided with connection to local motion (and sound in appropriate circumstances) sensors. This will allow for all lighting in the appropriate areas to be deactivated when not required. This will also have a run-on timer to ensure no unsafe conditions occur.

7 WATER EFFICIENCY

7.1 Water Efficient Fixtures

The site is proposed to be provided with water efficient fixtures throughout. Using the Water Efficient Labelling Standard (WELS) rating system, the following ratings are proposed;

- Basins – 5 Star WELS rating (not including science or process related units)
- WC's – 4 Star WELS rating (dual flush)
- Dishwashers – 4.5 Star WELS rating
- Showerheads – 4 Star (>= 6l/min but <= 7l/min)

7.2 Landscape Design

The landscape design will enhance the developments energy performance, water resources and the urban ecology using the following principals.

The developments water resources will be maximised through the use of drought tolerant plants to reduce the reliance on irrigation; while irrigation requirements will be met by the capture, storage and reuse of stormwater reducing potable water use.

The landscape design will also improve the urban ecology of the site with the retention and protection of existing trees to protect the natural habitat and biodiversity, while the increased provision of a variety of trees and shrubs will increase biodiversity while providing a natural habitat for birds and animals. Due to the provision of permeable surfaces and soft landscaping including trees and garden beds which will improve air and water quality, carbon sequestration and minimise the urban heat island effect.

7.3 Rainwater Capture & Reuse System

In conjunction with the stormwater design, the two off 50,000-litre tanks for detention are to be combined system units and configured in a manner that allows for half of the capture volume for retention and half for detention.

The rainwater system with then be pumped throughout the new facility, for reuse throughout all WCs, as well as irrigation connections across the site.

8 STORMWATER MANAGEMENT

8.1 Stormwater Treatment

The new development shall incorporate best practice stormwater management utilising two off 50,000-litre rainwater tanks to reduce the volume of run-off and the pollutant load on local waterways. This will be in addition to an underground stormwater tank prior to entering the authority infrastructure.

The Melbourne Water STORM tool has been used and a STORM rating of 100% achieved, demonstrating best practice for the project.

The stormwater design achieves the urban stormwater best requirements as set out by the CSIRO in 1999.

This rain water tanks for detention listed above, are also proposed for reuse of rainwater for the WCs throughout.

9 BUILDING MATERIALS

There are no specific requirements for the project with regards to building materials beyond the minimum NCC requirements.

Regardless, as per the specific client requirements prior to the project commencing, the following commitments have been made for this project:

- The gymnasium has a significant component of the structural construction via timber. A mix of timber and steel rafters is used throughout. In addition, the purlins throughout are of timber construction
- The lower ground floor structure is of masonry construction in lieu of steel

The above items have been intentionally selected and proposed as a result of the clients sustainability desires.

10 TRANSPORT

The site is currently well served by public transport, with buses and V-Line train station within short walking distances from the site.

The public buses that run a short distance away from the proposed development are as follows;

- Warrnambool Bus Route 2 – Stop: Emmanuel College/Ardlie St

The development also proposes to have 40 additional car spaces installed as part of a future upgrade to the site.

11 WASTE MANAGEMENT

11.1 Convenience of Recycling

The installation of general and recycling bins will be provided throughout the facility to enable the separation of rubbish at the source.

Provision has been made for the location of waste collection in the plans. See figures 7 & 8.

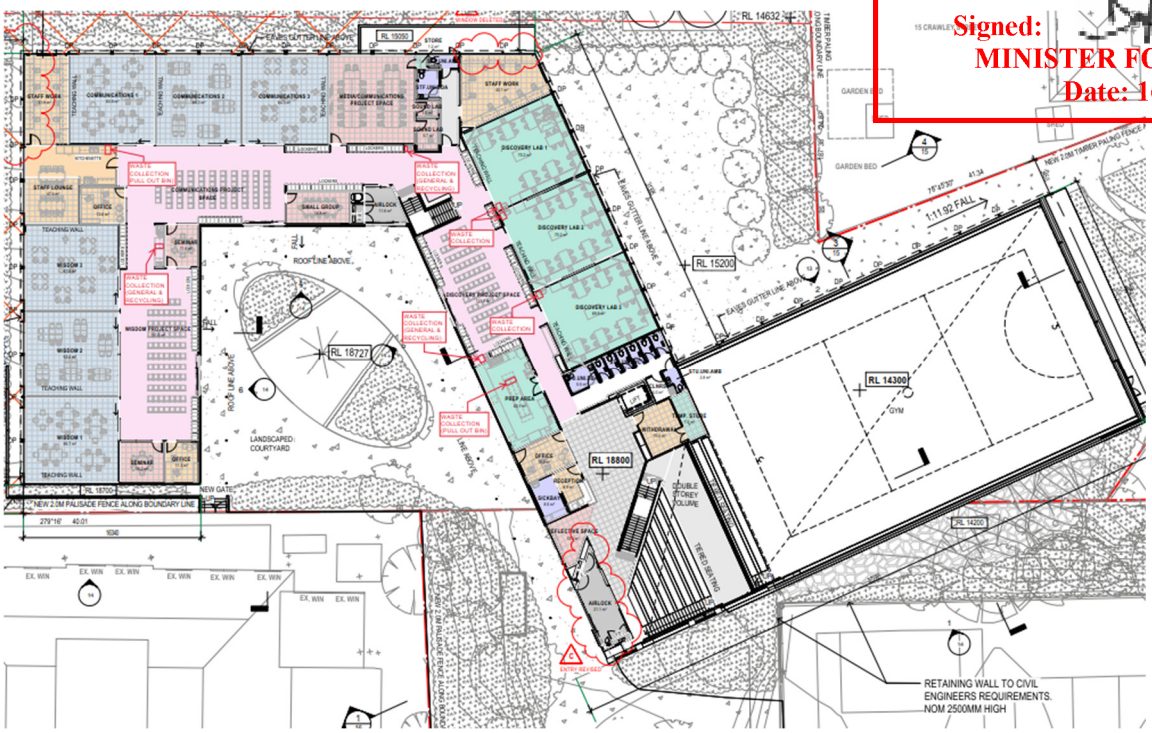

Figure 7 Internal waste collection points, ground floor, architectural drawings

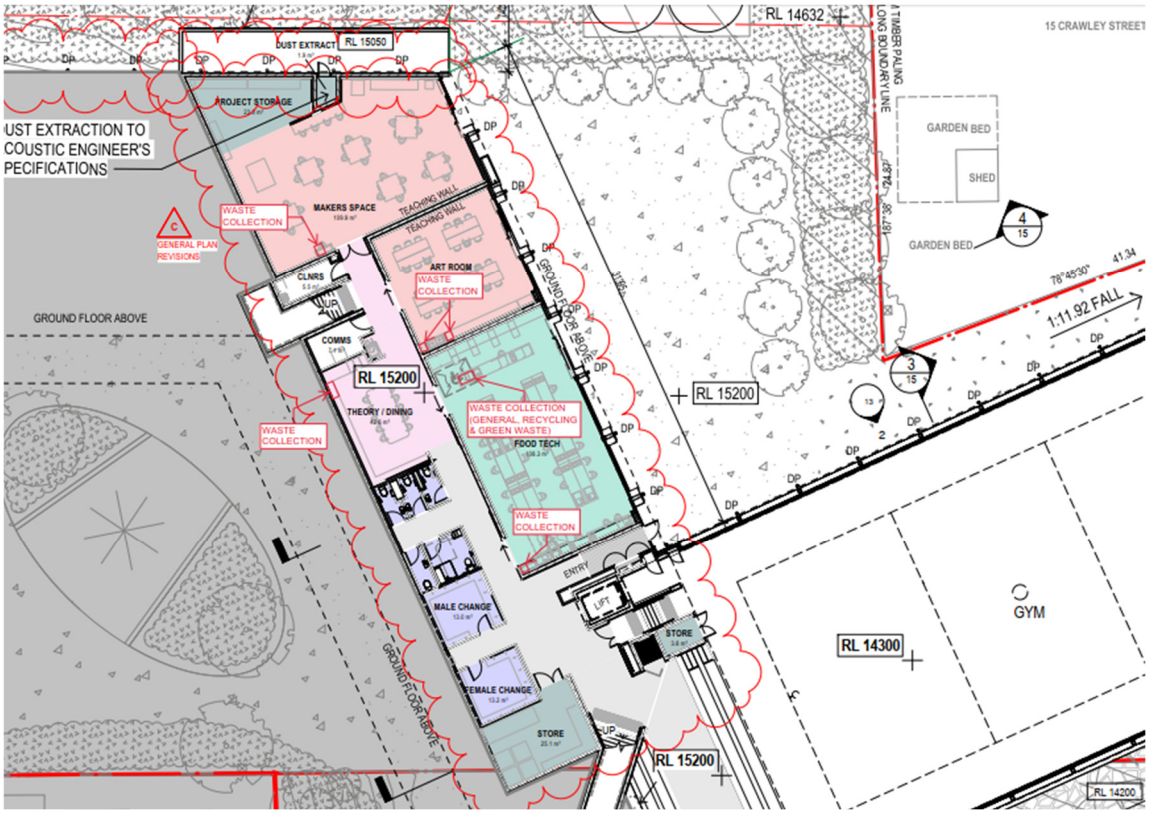

Figure 8 Internal waste collection points, lower ground floor, architectural drawings

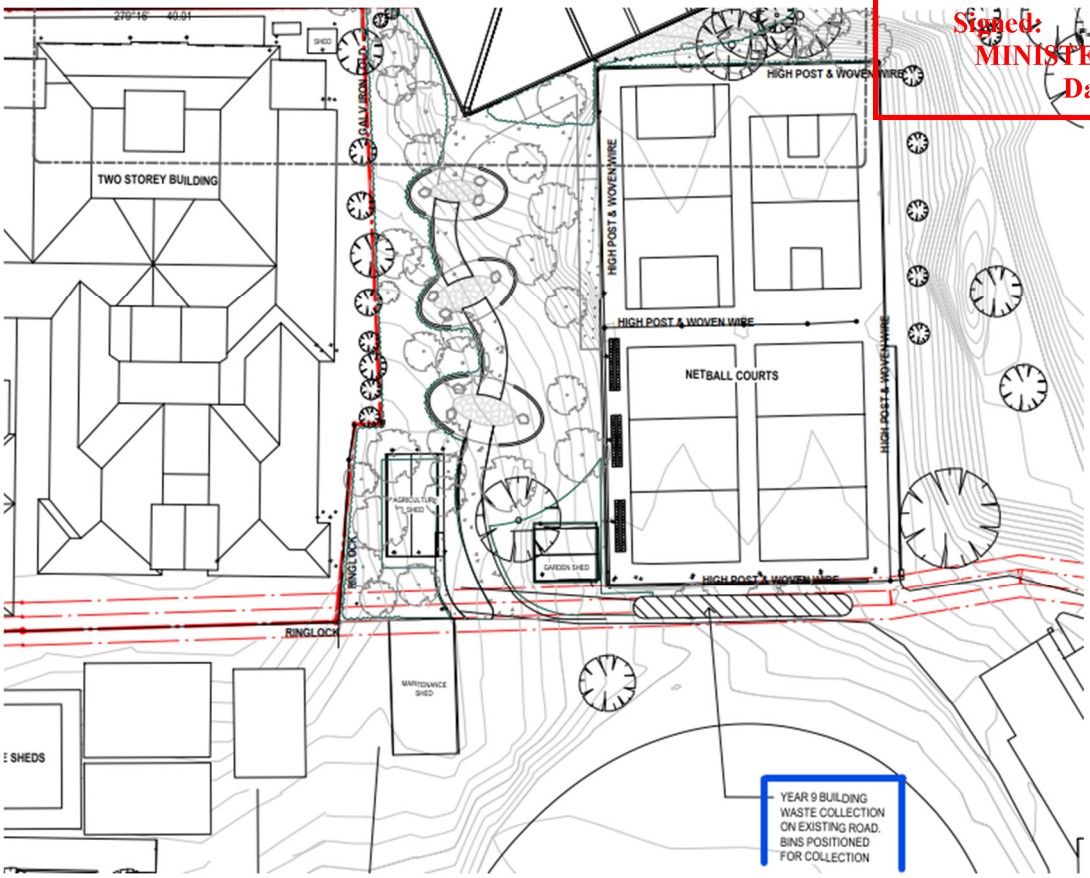

Figure 9 External waste collection point

12 URBAN ECOLOGY

12.1 Communal Spaces

Communal spaces are places where people gather for social exchange, enhancing the health of the community. The new Year 9 Centre is proposed to have many areas and zones of communal space for the staff and students in the form of communal & recreation areas. In addition, several outdoor communal spaces are provided, for socialising, education and general use.

12.2 Vegetation

As noted in the landscaping section above, the landscaping is proposed to compliment the current environment, protecting the natural habitat and increasing the biodiversity with the provision of a variety of native and indigenous trees, shrubs and understorey planting which will provide a natural habitat for birds and animals.

13 INNOVATION

13.1 All Electric Project

Whilst the opportunity to connect natural gas to the building was available, as natural gas is reticulated on the site; the building will be all electric.

Despite having science rooms throughout, as well as food technology, where typically gas would be utilised heavily; the client has committed to an electric only project. This itself is a great example of innovation in the project as this bucks the trend of continuing use of gas in food technology areas.

Electric cooktops shall be utilised, and portable, electric bench elements in lieu of Bunsen burners.

13.2 ESD Consultant

An ESD professional (BRT Consulting) has been engaged to provide sustainability advice to accompany the town planning submission (in the form of this report). This is to ensure that appropriate sustainability measures are incorporated into the project.

13.3 Acoustic Consultant

An acoustic professional (SLR Consulting) has been engaged to provide acoustic advice to the project. This has been critical through many areas, particularly food technology and the makers space with both having industrial grade mechanical equipment in place.

The result is that a customised and inidivudal acoustic solution has been nominated to the project.

2.19 ACOUSTIC TREATMENT OF EQUIPMENT

The following acoustic treatment shall be included to air handling equipment and systems. The work described below is in addition to other clauses in the specification like insulation etc.

2.19.1 Ductwork

- Flexible connection at all equipment;
- Insulation for acoustic reasons. Refer to the insulation section for more details;

2.19.2 Fans

- The in-line fans shall be mounted with steel springs with 45mm deflection with neoprene;
- Fans within fan coil units shall include vibration isolation between the fans and equipment
- Fans shall be wrapped with 5kg/m2 acoustic lagging with 25mm decoupling foam layer, of Soundlag 4525C or approved equivalent. Extend lagging 600mm along ductwork either side of fan.

2.19.3 Condensing Units

- All roof mounted condensing units shall be mounted on rubber isolators to achieve a minimum deflection, under load, of 5mm. Provided using Mason Mercer Super Waffle Pads with the durometer capacity selected to suit the required load.

Figure 10 Excerpt from mechanical specification with acoustic treatment requirements BRT ©

13.4 Metering

All energy to the new building shall be metered to allow for monitoring and management of energy consumption.

13.5 Locally Relevant Design

The building has been entirely designed with local conditions in mind. Rain water capture and reuse systems have been designed with the assistance of local historical weather data. The mechanical systems have been sized to suit Warrnambool conditions.