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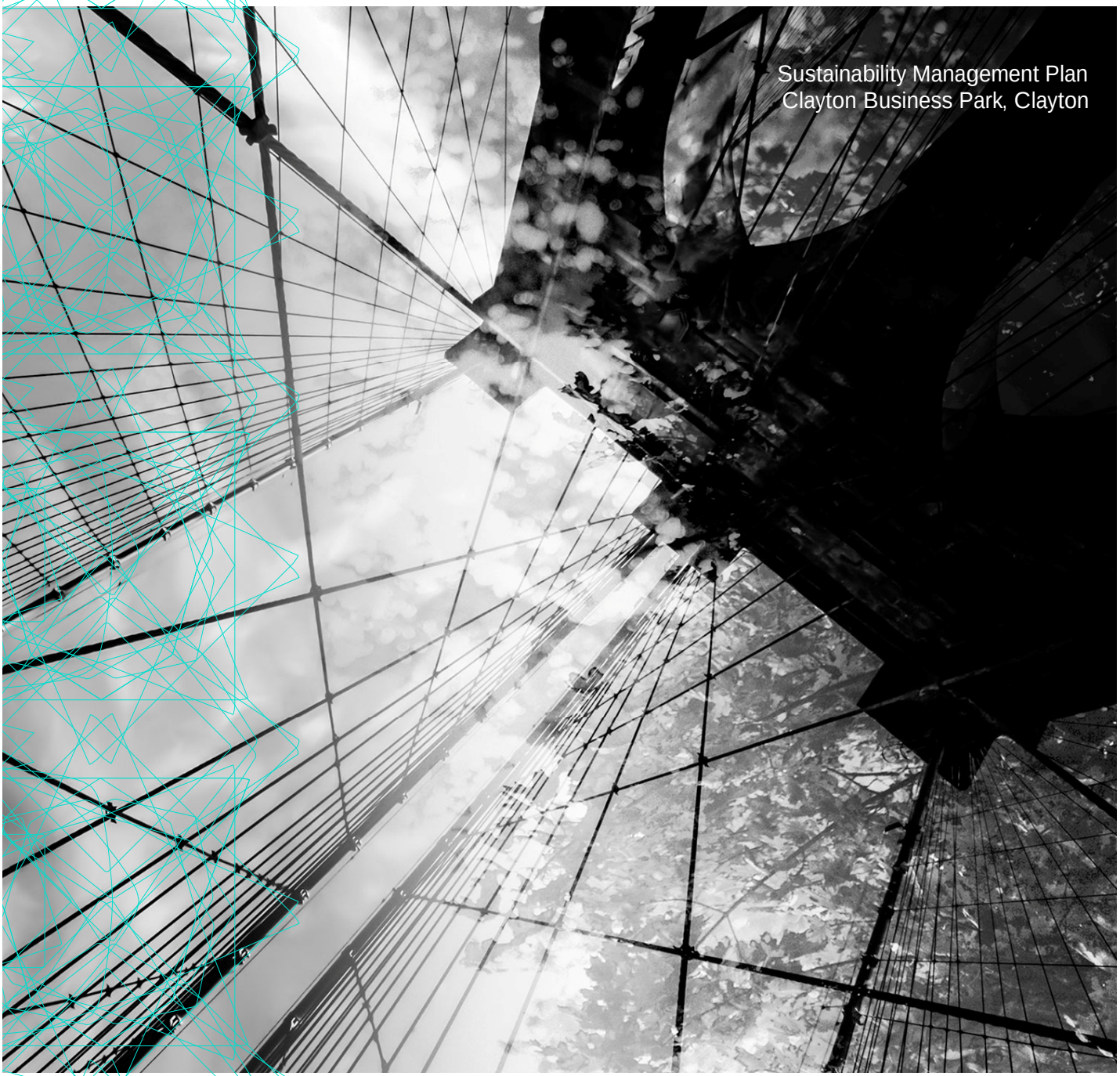

Sustainability Management Plan
Clayton Business Park, Clayton

SUSTAINABLE DEVELOPMENT
_CONSULTANTS

Proposed Industrial Development
Clayton Business Park, 1508 Centre Road, Clayton

Sustainability Management Plan

August 2023

S4814 SMP.V1

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Version	Date of Issue	Description	Author	Approved
V1	18-08-2023	For Council Approval	SR	LR

1. Introduction

This Sustainability Management Plan (SMP) has been prepared to assist the design, construction, and operation of the proposed Clayton Business Park.

Sustainable Development Consultants have assessed the proposed development and provided input to the design team. This SMP captures initiatives necessary to ensure that the development meets the sustainability requirements of the City of Kingston, as outlined in Section 1.3 of this report.

This document has been prepared by Sustainable Development Consultants with reference to the architectural drawings prepared by Group GSA.

1.1 Site Description

The site for Clayton Business Park lies on the corner of Centre and Westall Roads in Clayton's Industrial Zone. It is approximately 20km south-east of the Melbourne CBD with Westall Railway Station located on the southern boundary of the site. The site is currently occupied by an industrial park to be demolished.

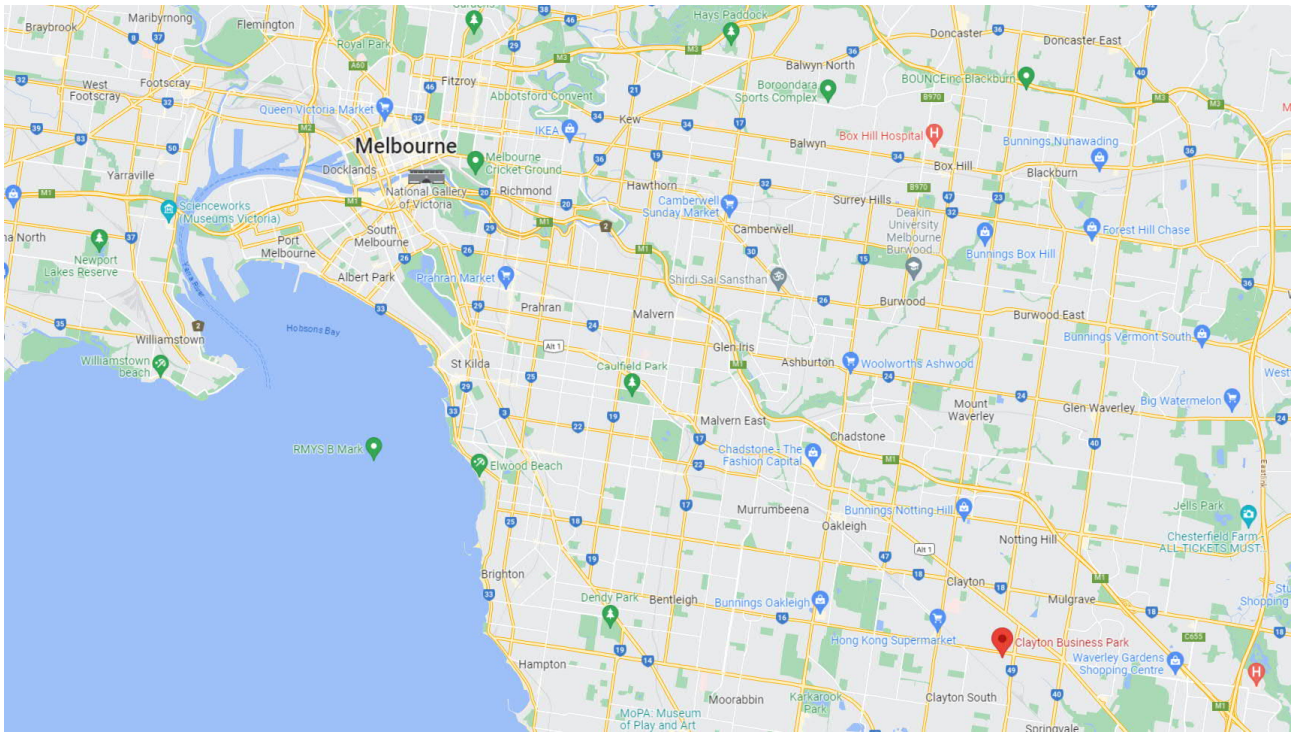


Figure 1: Location of Clayton Business Park, Clayton, in relation to the Melbourne CBD (Source: Google Maps)

Figure 2: Aerial image of the development site at Centre Road and Westall Road, Clayton (Source: LandChecker, mark-up by SDC)

1.2 Development Summary

Set out in Table 1 below is a development summary for this project.

Table 1: Development Summary

Development Information	
Total Site Area	Approximately 232,024 m^2
Total Warehouse	101,176 m^2
Total Office Spaces	12,944 m^2
Rooftop Terraces	1,729m^2
Café Building 15	408m^2
EOT Building 28	687m^2
Carparking and Bikes	• 44 bicycle parking spaces plus the bike parking provided within the EoT building • 1,021 car parking spaces

1.3 Kingston City Council Requirements

Kingston City Council is committed to facilitating development that minimises environmental impact. Critical to this is achieving best practice in environmentally sustainable development from the design stage through to construction and operation.

The City of Kingston expects that the Clayton Business Park development should achieve best practice in environmentally sustainable development from the design stage through to construction and operation. To comply with the Local Planning Scheme including Clause 15.01-2L *Environmentally Sustainable Development*, this project is required to satisfy the objectives as set out within the following categories, where applicable:

- Energy Performance
- Integrated Water Management
- Indoor Environment Quality
- Transport
- Waste Management
- Urban Ecology

This requires a Sustainability Management Plan (SMP) which demonstrates how for this project, the relevant policy objectives will be achieved.

The City of Kingston also requires that this project addresses the following planning scheme provisions:

- Clause 52.34 *Bicycle Facilities*
- Clause 53.18 *Stormwater Management in Urban Development*

In January 2020, the City of Kingston declared a climate emergency and as part of this, are committed to enhanced Environmentally Sustainable Design.

1.4 ESD Assessment Tools

There are several calculators and modelling programs available in Victoria to assess proposed developments against benchmarks for ESD, as set by the Victorian government, local councils and the Building Code of Australia.

For this project, set out below are the assessment tools that have been adopted for this project.

1.4.1 GREEN STAR BUILDINGS V1

The Green Star Buildings tool was created by the Green Building Council of Australia (GBCA) for new buildings and major refurbishments. The tool helps to assess and benchmark projects against a thorough set of criteria, specifically designed to ensure that all buildings meet the new definition of a sustainable building and reward both best practice and innovative sustainable design approaches. Green Star Buildings aims to meet both current and future demands of the built environment, and to address the key issues of the next decade being climate action, resource efficiency and health and wellbeing.

Green Star Buildings strives to push all buildings to be net zero carbon in operations. The goal is that all buildings from 2030 onwards in Australia are delivered net zero in operations to support the Paris Agreement (the international treaty on climate change). The tool was designed to address sustainability megatrends of the next decade, and to support the strategic goals of governments, developers, building owners, tenants and investors. All new buildings must meet the same set of minimum expectations to set a benchmarked understanding of what a Green Star certified building looks like. Further, Green Star Buildings aims to drive supply chain transformation by creating demand for low carbon, innovative and responsible products.

The tool assesses projects against a set of eight (8) categories, which represent key issues that will define the built environment over the next decade. These are:

- Responsibility
- Healthy
- Resilient
- Positive

- Places
- People
- Nature
- Leadership

The levels of achievement in this tool are defined as: 4 Star Green Star being "Best Practice", 5 Star being "Australian Excellence", and 6 Star being "World Leadership". The project will be registered to achieve a Green Star Buildings v1 rating, with a 5 Star rating being targeted, which requires a minimum of 35 points in addition to the 15 minimum expectations which are applicable at all levels of certification.

There are 15 minimum expectations which must be achieved in order to receive a certified rating, ensuring that all buildings are energy efficient, water efficient, good healthy spaces, built responsibly, and are not built on highly sensitive sites. Further, there is a Net Zero Carbon in Operations minimum expectation for all buildings aspiring to a 6 Star Green Star Rating. This path also becomes mandatory for 5 Star buildings registering from 1 January 2023, and then for all buildings registering from 1 January 2026. From 1 January 2030, all buildings achieving certification must comply with the Net Zero Carbon in Operations path.

The results of the Green Star Buildings assessment can be found in Appendix 1 of this report.

1.4.2 DESIGNBUILDER

DesignBuilder is a comprehensive analytical software package that analyse the energy and economic impacts of building-related selections such as architectural features; heating, ventilation and air-conditioning (HVAC) systems; HVAC equipment; building utilisation or scheduling, and financial options. DesignBuilder includes weather data including, latitude, longitude, altitude, time zone, and summer and winter design conditions; hourly observations information such as dry-bulb and wet-bulb temperatures (OADB, OAWB), humidity ration (HR), cloud cover (CCM), wind velocity, and outdoor air pressure (OAP). DesignBuilder was used for both the thermal performance modelling (verification method JV3) and daylight modelling of the proposed building.

Results of the thermal performance modelling are presented in Appendix 2.

Results of the daylight modelling are presented in Appendix 3.

2. Sustainability Initiatives

The following sections outline the initiatives that will be incorporated into the development throughout its design, construction and operation. Initiatives which contribute to the Green Star Buildings benchmark have a reference next to them, e.g. (Green Star Buildings – Credit 2). Some initiatives without the Green Star reference have been included as they also contribute to the overall sustainability of the development.

The proposed points pathway may be altered during design development, however the 5 star Green Star rating will be achieved as will all of the minimum expectations listed.

The following are the broad project stages:

1	Design Development	• Consultants develop conceptual design drawing to a detailed stage suitable as a basis for preparing working drawings - Integration of architectural, services, structure and site attributes • Checking compliance with all statutory requirements, codes and standards • Arranging special surveys or reports as required
2	Construction Documentation	• Architectural and services drawing sets completed • All specialist reports completed • All necessary planning and building consents obtained as required by authorities
3	Construction	• All work carried out onsite – site preparation, construction, alteration, extension, demolition • Purchase of all materials / certification • Evidence gathering from subcontractors • Commissioning
4	Post Occupancy	• Operation and Maintenance • Education – Building Users Guides

2.1 Responsible

The 'Responsible' category encourages buildings to be designed, procured, built and handed over in a responsible manner.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
1 - Industry Development	*Credit Achievement (1 point)* One of the project's consultants will be a Green Star Accredited Professional. They will advise through the design and construction phases of the project. SDC can fulfil this role. The building owner/developer is required to disclose the cost of sustainable building practices to the Green Building Council of Australia (GBCA) and market the building's sustainable achievements. Provision of a display showcasing the building's sustainability features, to be placed in a prominent position within the building, alongside the framed Green Star certificate or plaque commemorating the 5 Star achievement of the building.	Owner / ESD Consultant	Design Development
2 - Responsible Construction *Waste Management*	*Minimum Expectation* The builder or head contractor will create and implement a project specific EMP to cover the scope of construction activities, to manage environmental performance conditions and impacts arising from demolition, excavation, and construction. This EMP is to align with the NSW Environmental Management System Guidelines. The head contractor must be ISO14001 certified and provide training on the sustainability targets to 95% of all contractors present on site for at least three days, covering the role site workers play in delivering a sustainable building and the ESD initiatives included. *Credit Achievement (1 point)* At least 90% of construction and demolition waste will be diverted from landfill. A Disclosure Statement from waste contractors and processing facilities will outline how the company and their reporting aligns with the Green Star Construction and Demolition Waste Reporting Criteria.	Builder / Head Contractor / ESD Consultant	Construction Documentation

Credit Name	Project Response	Responsibility & Implementation	Project Stage
3 - Verification and Handover *Construction Management*	*Minimum Expectation* The design of the development will include electronic metering systems that will be integrated into the building to monitor and report on all energy and water uses. Documented targets will be set, monitored, and reported on for the environmental performance of the building (energy and water). The following must be metered (where applicable): • Incoming inputs (electricity, mains water) – to the site. • Solar PV generation. • Water end use (potable water use, rainwater use, outdoor water use, with sub-meters to separately meter): - Kitchens. - Truck wash. - Irrigation. - Amenities at Ground Level and Level 1 of each office - Any other major water uses on site (those that exceed 10% or more of the project's water use). • Electricity end use (interior lighting, HVAC (heating + cooling + fans), hot water system), with submeters to separately meter: - Each separate warehouse tenancy and space type (freezer, refrigerated, confectionary, ambient if any); - Office areas (one meter covering each floor of each office); - Lifts. • Exterior lighting; • Refrigeration equipment (tenant process load if any); • Any other major energy use on site (those that exceed 5% of the project's total energy use, or 100kW, e.g. emergency systems, charging of specialist equipment). The meters and automatic monitoring system must provide continual information, be commissioned, and validated to 'Validating Non-Utility Meters for NABERS Ratings' protocol, be capable of identifying inaccuracies in the meter network and producing alerts. The monitoring system must accurately and clearly present the metered data and include reports on consumption trends for the automatic monitoring system. The monitoring strategy must be developed in accordance with a recognised standard such as CIBSE TM39 Building Energy Metering and must include a metering schedule with location and types of meters.	Services Consultants	Design Documentation

Credit Name	Project Response	Responsibility & Implementation	Project Stage
	Prior to construction, a services and maintainability review is to be undertaken, and design for airtightness confirmed. During construction and practical completion, the head contractor will commission the building, engage a building tuning service provider and test for airtightness. The air tightness test is to be conducted according to AS/NZS ISO 9972:2015, across all conditioned spaces (excluding unconditioned warehouse areas). After practical completion the building must be tuned for the first 12 months, with quarterly adjustments and measurements. Operations and Maintenance information must be provided for all nominated building systems. A building logbook must be developed and presented to the building owner before practical completion, in line with CIBSE TM31: Building Logbook Toolkit. Building user information is a source of relevant up-to-date information relevant to the building user. Building user information must be available to the building owner and facilities management team at the time of practical completion, which may be provided by way of a Building Users' Guide. *Credit Achievement (1point)* An Independent Commissioning Agent (ICA) will be appointed to advise, monitor and verify the commissioning and tuning activities throughout the design, tender construction, commissioning, and tuning phases. The ICA will provide an unbiased perspective of the commissioning process, assisting the project team in undertaking the commissioning of the nominated building systems, ensuring that the building functions in an efficient and safe manner. This process will also include air tightness testing as part of the commissioning and tuning process, which is to be carried out by the builder. The ICA will also help the services trades to commission and hand over all tenant equipment in the building as the project will include over $20 million worth of equipment. This process is known as the soft landings approach to building hand over and is considered best practice for large, complicated building systems.	Builder Builder	Commissioning

Credit Name	Project Response	Responsibility & Implementation	Project Stage
4 - Responsible Resource Management *Waste Management*	*Minimum Expectation* Indicative waste areas will be shown on plans that align with best practice access for occupants and waste contractors. This will be sized appropriately for multiple waste streams appropriate for the development during its operation. A tenant fitout guide will also be prepared which outlines the recommendations for different waste streams suitable for the operation of the facility to be actioned by the tenant. A waste specialist will sign off on the size and location of the facilities to ensure they are in line with best practice outcomes.	Waste specialist	Design Development
7 – Responsible Envelope *Materials*	*Credit Achievement (2 points)* 30% of all building envelope components (by cost) will have a Responsible Products Value (RPV) of at least 10 (defined as per the below): • FSC certification • GECA certificate • GreenRate Level A certification • Responsible Wood certification • Product Specific EPD + Climate Active Carbon Neutral certification This credit is being targeted but until the final construction materials and their cost are determined the achievement of the credit cannot be guaranteed. Likely products that will be used for compliance are Colorbond cladding, Zincalume and any recycled building elements.	Builder	Construction Documentation

2.2 Healthy

The 'Healthy' category emphasises the important role the built environment has in enhancing the health and wellbeing of occupants.

In industrial buildings, staff are the most valuable resource, and small improvements in morale and productivity will more than pay for any extra costs in delivering better infrastructure.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
10 – Clean Air *Indoor Environment Quality*	*Minimum Expectation* Building ventilation systems must be designed to comply with ASHRAE Standard 62.1:2013 or AS 1668:2012 (whichever is greater) regarding minimum separation distances between pollution sources and outdoor air intakes. The ventilation system will be designed for ease of maintenance and cleaning and all new and existing ductwork will be cleaned prior to occupation and use. Kitchen areas are required to be provided with an exhaust fan which draws air directly out of the building without any recirculation. Any other additional indoor pollutants will also be directed outside. Outdoor air will be provided to all occupied spaces within the facility are a rate of 50% above those required by AS1668.2 (or be naturally ventilated in accordance with AS1668.4). This will ensure a healthy indoor environment quality for the wellbeing of staff and visitors to the building.	Architect / Mechanical Services	Design Development
11 - Light Quality *Indoor Environment Quality*	*Minimum Expectation* All LED lighting across the development is to meet best practice illuminance levels for each task with a maintained illuminance that meets AS/NZS 1680.1:2006 and will have no observable effect as per the standard IEEE 1789-2015. Light sources in all industrial warehouse areas will be selected to have a minimum Colour Rendering Index (CRI) of 60-80 or higher (depending on application) in accordance with Table E1 of AS1680.2.4-2017. Office lighting to achieve CRI of 85 or higher. Glare from light sources will be with LED luminaires not exceeding the maximum values listed in Table 8.2 of AS/NZS 1680.1:2006. Maintained illuminance levels must achieve a uniformity of no less than that specified in Table 3.2 of AS/NZS 1680.1:2006, with a maintenance factor method as defined in AS/NZS 1680.4, and	Electrical Services / Architect	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
	all light sources must have a minimum of 3 MacAdam Ellipses in offices and a minimum of 7 in industrial warehouse areas. The daylight into the development has been maximised through the following initiatives: • Provide translucent roof sheeting to ambient warehouse roofing; • Include large windows to all occupied office areas • Providing internal blinds to all external windows and also incorporate large shading devices / awnings to help protect the occupants from glare. *Credit Achievement (2 points)* The daylight within the facility will provide best practice daylight (defined as meeting a Useful Daylight Index (UDI) of 40% overall and no individual floor being less than 20%). Please see daylight modelling appendix for further information on how this project performs for indoor daylight amenity.		
12 - Acoustic Comfort *Indoor Environment Quality*	*Minimum Expectation* An Acoustic Comfort Strategy will be prepared describing how the building design will deliver acoustic comfort to the building occupants. This will include: • Quiet enjoyment of space • Functional use of space • Control of intrusive or high levels of noise • Privacy • Noise transfer • Speech intelligibility *Credit Achievement (2 points)* Acoustic testing will demonstrate that the acoustic comfort strategy prepared was implemented. The testing will focus on demonstrating that specific criteria is met for maximum internal noise levels and acoustic separation.	Acoustic Consultant	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
13 - Exposure to Toxins *Indoor Environment Quality*	*Minimum Expectation* Indoor air pollutants will be reduced by the use of low-VOC or non-toxic materials, ensuring that workers in all office and warehouse areas are not exposed to toxins. All paints, adhesives and sealants, flooring, wall and ceiling coverings will not exceed the limits outlined in Appendix 4. The development will ensure that paints with an Ultra-Low VOC are used where available, not exceeding the maximum TVOC content of 5g/L for over 50% of paints (by volume) used. All engineered wood products will be 'low' formaldehyde, certified as E0 or better. Alternatively, products with no formaldehyde will be specified. Emissions limits are listed in Appendix 7. *Credit Achievement (2 points)* The project will undertake air quality testing to demonstrate that upon completion the toxin levels within the facility do not exceed: • 0.27ppm for VOCs • 0.02ppm for Formaldehyde	Architect / Builder	Design Development

2.3 Resilient

The 'Resilient' category allows building owners to demonstrate to the community that risks that threaten the short- and long-term performance of the building have been considered.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
16 - Climate Change Resilience	*Minimum Expectation* A pre-screening checklist will be developed to identify the building's exposure to climate change risks. The checklist can include, but is not limited to, direct damage, failure of accelerated deterioration of project components, reduced design life and operating capacity, impacts to surrounding areas and the health and wellbeing of occupants.	Architect / ESD Consultant	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
	Credit Achievement (1 point) At the beginning of design development a site-specific climate change risk and adaptation assessment will be undertaken for the development and all risks rating as high or extreme will be addressed. The assessment is to be undertaken at one medium-term (i.e. 2040) and one long-term (i.e. 2070) time scale.		
19 – Heat Resilience *Urban Ecology*	To reduce the impact of urban heat island effect on the development, lighter-coloured material surfaces are to be selected wherever possible. Key strategies to be used on this site will be the use of Zincalume roof sheeting for all roofs (which is much more reflective than alternative darker colours which could be used). Additionally solar panels will shade much of the roof area. Landscaped areas which cover much of the site frontage and side, and light-coloured concrete that is shaded by large awnings will be used for the majority of hardstands and driveways, all help to provide a more heat reflective site that reduces the impact of the urban heat island effect.	Architect / Landscape Designer	Design Development

Figure 3: Examples of urban heat island effect reduction techniques (Zincalume roof sheeting, landscaping and green roof)

2.4 Positive

The 'Positive' category encourages buildings to strive towards two goals: reducing energy consumption and switching to renewable energy. The category also focuses on the importance of reducing water consumption and acknowledges the value in understanding the full life cycle impacts of the building.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
21 - Upfront Carbon Emissions *Materials*	*Minimum Expectation* The materials chosen for the design and construction of the building will aim to achieve a reduction of at least 10% in embodied carbon, when compared to a reference building. This will be achieved through efficient design and high-quality material selection.	Architect / ESD Consultant / Structure	Design Development
22 - Energy Use *Energy Performance*	*Exceptional Performance (6 points)* The buildings energy use will be at least 30% less than a reference building (including 5% improvement against NCC Part J1 requirements). It will be demonstrated that for the Proposed Project each of the following building system complies with the relevant DTS requirements of NCC Section J: • Part J5 Mechanical • Part J6 Lighting Additionally, the improvement will be met with the provision of a minimum solar PV system of 250kW per 10,000m2 of GFA. This would provide the development with a significant boost to the overall greenhouse gas emissions reduction being targeted, along with the low wattage LED lighting that will have daylight control throughout the ambient warehouse.	Architect / Building Services / ESD Consultant	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
23 - Energy Source *Energy Performance*	*Exceptional Performance (6 points)* A Zero Carbon Action Plan (ZCAP) will be signed off by the building owner, detailing how the building will be fossil fuel-free and achieve net zero in operations. The ZCAP will detail the ESD initiatives implemented to reduce the Greenhouse gas emissions, such as: • High-performance building fabric and mindful building design, • Highly efficient building systems; • Building designed as electric only (thus no reliance on fossil fuels onsite); and • Electricity demand reduced through the onsite solar PV system. All onsite power (base building) will be sourced from renewables due to the significant solar array.	Owner / Services Engineer	Design Development
24 – Other Carbon Emissions	*Exceptional Performance (4 points)* The design team will undertake a full LCA on the upfront carbon emissions within the building during construction (materials and refrigerants) and the building owner will commit to purchasing Carbon Offsets to match this volume of CO_2 equivalent.	Owner	Construction Documentation
25 - Water Use *Integrated Water Management*	*Credit Achievement (3 points)* The building will aim to use 45% less potable water compared to a reference building (minimum improvement). The building will include efficient fittings and fixtures to reduce the volume of mains water used in the development. The following minimum Water Efficiency Labelling Scheme (WELS) star ratings will be specified: • Taps: 5 Star minimum; • Toilets: 4 Star; • Urinals: 6 Star • Showers: 4 Star (max. 6L/min); The building also reduces its reliance on potable water through use of the captured rainwater to meet the toilet and urinal flushing and irrigation demand. A total of 135kL of rainwater tanks will be installed onsite (minimum) in line with the Integrated Water Management Plan prepared by Spiire.	Architect / Hydraulic / Civil / ESD Consultant	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
	Landscaping provided onsite is to be drought tolerant with a crop factor (a measure of how much water the plants require comparatively) of 0.35 (35% that of a high-water use plant such as vegetables), with irrigation via sub-surface drippers. Fire system test water will be recirculated back into the sprinkler tank(s) during testing to save over 80% of fire test water from being sent to stormwater annually. Refer to Appendix 2 for Potable Water Calculator results which currently predicts >45% reduction in potable water use for the development.		
26 – Life Cycle Impacts	*Credit Achievement (2 points)* A whole-of-building, whole-of-life Life Cycle Assessment (LCA) will be conducted for the proposed building, demonstrating a 30% reduction of environmental impacts against a reference building. Building materials used in the construction will be assessed, including concrete, steel, timber and PVC, with a push to incorporate use of recycled and re-used materials. Additionally, an extensive solar array will have operational energy improvements throughout the life cycle of the development.	Architect / Services Consultant / ESD Consultant	Construction Documentation

2.5 Places

The 'Places' category focuses on the integration of buildings into the urban fabric and delivering places that increase social cohesion. The category investigates the building's impact on the wider surroundings, maximising the positive impacts whilst limiting negative ones. Importantly, the category celebrates our Aboriginal and Torres Strait Islander communities and uses placemaking to give a sense of belonging to the spaces we spend time at.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
27 - Movement and Place *Transport*	*Credit Achievement (3 Points)* The building will minimise car dependency and private vehicle use by promoting walking, cycling and public transport in that order. The development will provide a least total of 44 bike spaces plus the extra spaces provided within the End of Trip building in Precinct 3. To encourage walkability, the roadways within the site boundary will be limited to 10km/hr with designated and convenient cross walk areas. The development will provide end-of-trip facilities to encourage staff and visitors to adopt active forms of transport. 16 showers as well as dedicated male and female change facilities have been provided within the communal EOT block. 1 locker per 8 regular building occupants/staff is also required to be located within the EOT block. The shower/change rooms are to be either unisex or split equally as male/female. Access to the change room facilities is to be safe, well-lit, and signed accordingly. Change facilities are located within easy access of the building are located within close proximity to bicycle parking. Ready to charge electric vehicle charging points will be provided to at least 5% of all car parking spaces. This equates to 52 EV charging spaces with appropriate signage and charging infrastructure. The design of charging infrastructure should take into consideration requirements for further expansion to more spaces as electric vehicles become more prevalent. Making the use of EV more convenient will encourage its adoption and reduce vehicle emissions. The proposed development has direct access within 1.5km walking distance to the following public transport options: Train Line: • Pakenham Line via Westall Railway Station	Architect / Electrical Services	Design Development

Credit Name	Project Response	Responsibility & Implementation	Project Stage
	• Cranbourne Line via Westall Railway Station Bus Routes • 704: Oakleigh – Clayton • 978: Clayton Station – Dandenong Station • 824: Moorabbin – Keysborough • 800: Dandenong – Chadstone		

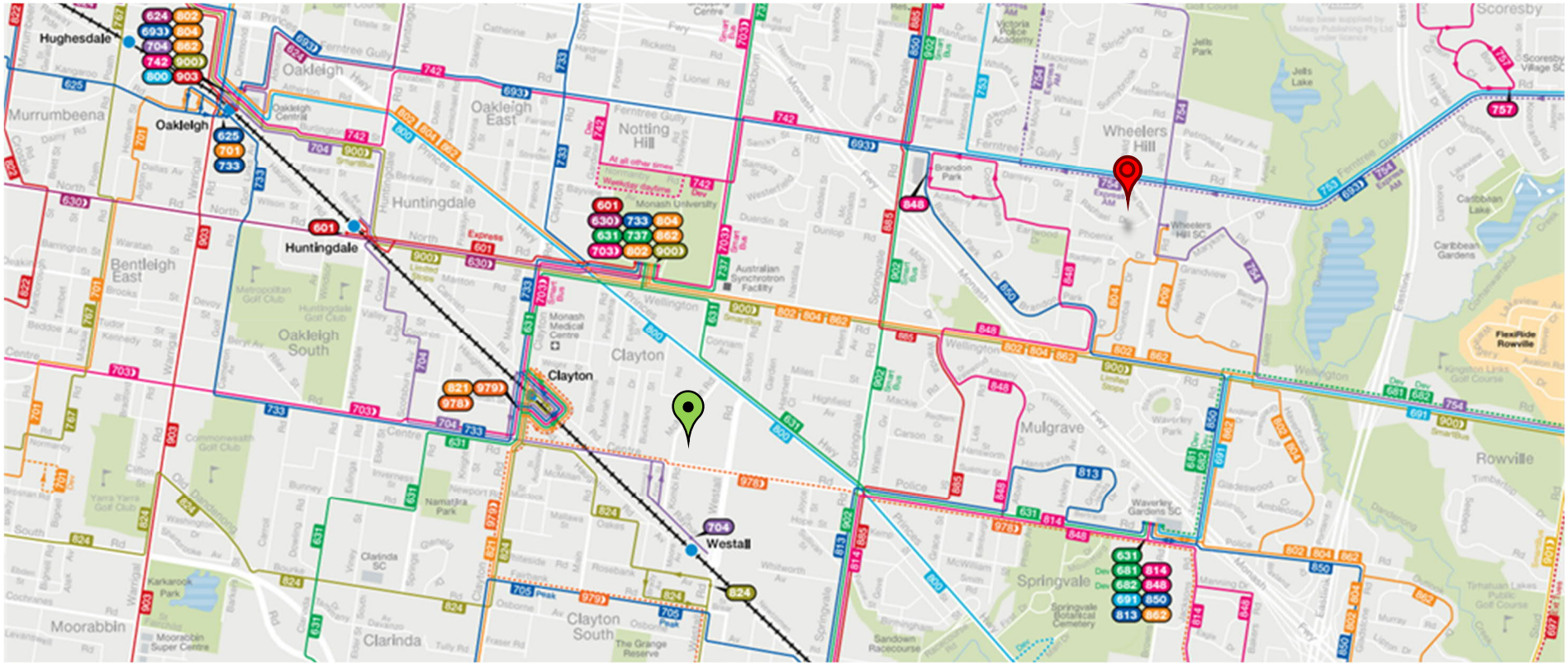


Figure 4: PTV Local Area Map indicating the public transport options surrounding the site (marked by the red balloon. Source: ptv.vic.gov.au)

2.6 People

The 'People' category encourages solutions that improve environmental and social outcomes beyond the project boundary. It highlights issues such as diversity and gender equity, inclusion, and mental health.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
31 - Inclusive Construction Practices	*Minimum Expectation* The head contractor will ensure the following is provided or available on-site: • Separate gender-inclusive bathroom facilities and changing amenities; and • Diverse gender-specific fit-for-purpose personal protective equipment (PPE) for diverse body sizes and types. PPE is defined as anything that needs to be worn to minimise risk to a worker's healthy and safety. In many instances PPE does not cater to different body types and shapes and in particular for women, they are ill fitting. This risks their health and safety. The head contractor must: • Implement policies to address issues of discrimination, racism, and bullying on-site; • Introduce on-site redress procedures for any relevant breaches, and corrective measures to be put in place should any incident be identified; • Empower a diverse lead team to manage these policies on-site, and • Provide training to all contractors and sub-contractors on these policies (as per below). The head contractor must provide training on drug and alcohol awareness and mental health, with policies implemented which address discrimination, racism, and bullying on site, to 95% of all contractors and subcontractors present on site for at least three days. *Credit Achievement (1 point)* The Builder is to set up or expand the EAP program to include confidential assessments, short-term counselling, referrals, and follow-up services to employees who have personal and/or work-related problems. This is to cover at least 5 key physical and mental health impacts. A needs analysis of the most appropriate programs must be undertaken to define the EAP programs signed up to and then reviewed at least every 3 years.	Head Contractor	Construction

2.7 Nature

The 'Nature' category aims to protect, minimise impacts on and enhance value of ecology and biodiversity. The category also aims to connect natural networks by creating links between native or built corridors and manage off-site natural spaces to restore the impact to nature from the development.

Credit Name	Project Response	Responsibility & Implementation	Project Stage
35 - Impacts to Nature *Urban Ecology*	*Minimum Expectation* The development is not being built on a site with high ecological value as it is previously developed. Approximately 18% of the site (43,300m^2) is covered with vegetation across the development. It is recommended that several indigenous species be included in the landscaping of the site. This will help maintain/enhance local biodiversity and encourage native birds to visit the space. All external lighting in the development will comply with the requirements and will not shine into the night sky or towards a neighbour. To obtain the minimum achievement in this credit, it must be ensured that light spill values are in strict accordance with AS4282:2019 values requirements. No external luminaire on the project will have an Upward light Output Ratio (ULOR) exceeding 5%, relative to its mounted orientation.	Electrical Services	Design Development
39 – Waterway protection *Integrated Water Management*	*Credit not being sought in Green Star* An Integrated Water Management plan will be prepared as required under the Kingston City Council Planning Scheme requirements to ensure best practice environmental management guidelines are met.	Civil Engineer / ESD Consultant	Construction

3. Conclusion

As set out in this SMP the proposed industrial development at Centre and Westall Roads, Clayton, will meet best practice requirements through the initiatives outlined in this report including the use of energy efficient systems, rainwater tank(s) and the use of low to zero VOC content materials, as well as reduced environmental impacts during the construction stage. This will be verified through the attainment of a certified Green Star Buildings 5 Star rating for each stage of the development.

The initiatives that have been included within this SMP all have a proven track record of serving their individual purpose and can be easily maintained with any failures obvious to the users of the development. This helps to ensure the ongoing sustainability of the development, as the systems installed in the beginning are maintained for purpose throughout the life of the building.

The implementation of this SMP requires a clear process that will include:

- Full integration with architectural and building services plans and specifications;
- Endorsement of the SMP with town planning drawings; and
- SMP initiatives to be included in plans and specifications for building approval.

Appendix 1 – Green Star Scorecard

Submission planner

Summary

Registering from	2020 onwards		
Net zero carbon in operations targeted	No	**Targeted Green Star rating**	5 Star
Minimum expectations met	Yes	**Core points targeted**	37
Credit Achievement points targeted	29	**Leadership points targeted**	0
Exceptional Performance points targeted	8	**Total points targeted**	37

Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted
Responsible				**17**		
Industry Development	-	1	-	**1**	Credit Achievement	**1**
Responsible Construction	•	1	-	**1**	Credit Achievement	**1**
Verification and Handover	•	1	-	**1**	Credit Achievement	**1**
Operational Waste	•	-	-	**0**	Minimum Expectation	•
Responsible Procurement	-	1	-	**1**		
Responsible Structure	-	3	2	**5**		
Responsible Envelope	-	2	2	**4**	Credit Achievement	**2**
Responsible Systems	-	1	1	**2**		
Responsible Finishes	-	1	1	**2**		
					Total	**5**

Healthy				14		
Clean Air	•	2	-	**2**	Minimum Expectation	•
Light Quality	•	2	2	**4**	Credit Achievement	**2**
Acoustic Comfort	•	2	-	**2**	Credit Achievement	**2**
Exposure to Toxins	•	2	-	**2**	Credit Achievement	**2**
Amenity and Comfort	-	2	-	**2**		
Connection to Nature	-	1	1	**2**		
					Total	**6**

Resilient				8		
Climate Change Resilience	•	1	-	**1**	Credit Achievement	**1**
Operations Resilience	-	2	-	**2**		
Community Resilience	-	1	-	**1**		
Heat Resilience	-	1	-	**1**		
Grid Resilience	-	3	-	**3**		
					Total	**1**

Positive				30		
Upfront Carbon Emissions	•	3	3	**6**	Minimum Expectation	•
Energy Use	•	3	3	**6**	Exceptional Performance	**6**
Energy Source	•	3	3	**6**	Exceptional Performance	**6**
Other Carbon Emissions	-	2	2	**4**	Exceptional Performance	**4**
Water Use	•	3	3	**6**	Credit Achievement	**3**
Life Cycle Impacts	-	2	-	**2**	Credit Achievement	**2**
					Total	**21**

Places				8		
Movement and Place	•	3	-	**3**	Credit Achievement	**3**
Enjoyable Places	-	2	-	**2**		
Contribution to Place	-	2	-	**2**		
Culture, Heritage and Identity	-	1	-	**1**		
					Total	**3**

People				9		
Inclusive Construction Practices	•	1	-	**1**	Credit Achievement	**1**
Indigenous Inclusion	-	2	-	**2**		
Procurement and Workforce Inclusion	-	2	1	**3**		
Design for Inclusion	-	2	1	**3**		
					Total	**1**

Nature				14		
Impacts to Nature	•	2	-	**2**	Minimum Expectation	•
Biodiversity Enhancement	-	2	2	**4**		
Nature Connectivity	-	2	-	**2**		
Nature Stewardship	-	2	-	**2**		
Waterway Protection	-	2	2	**4**		
					Total	

Leadership				0		
Market Transformation	-		-	**0**		
Leadership Challenges	-		-	**0**		
					Total	

Appendix 2 – Preliminary JV3 Assessment

The preliminary JV3 modelling assessment demonstrates that the proposed development can meet the requirements of the NCC 2019 BCA - Volume One, Section J (Verification Method: JV3 Verification using a reference building), as described in this appendix.

The proposed development underwent a preliminary energy modelling assessment using DesignBuilder – both as a deemed-to-satisfy designed building and as currently proposed on plans (available to this point). It has been found that the proposed design can meet the requirements of Verification Method JV3 of the 2019 NCC.

Please note that this is a preliminary assessment for information only – more detailed modelling will be required to assess the design against the energy efficiency provisions of Section J at the building approval stage.

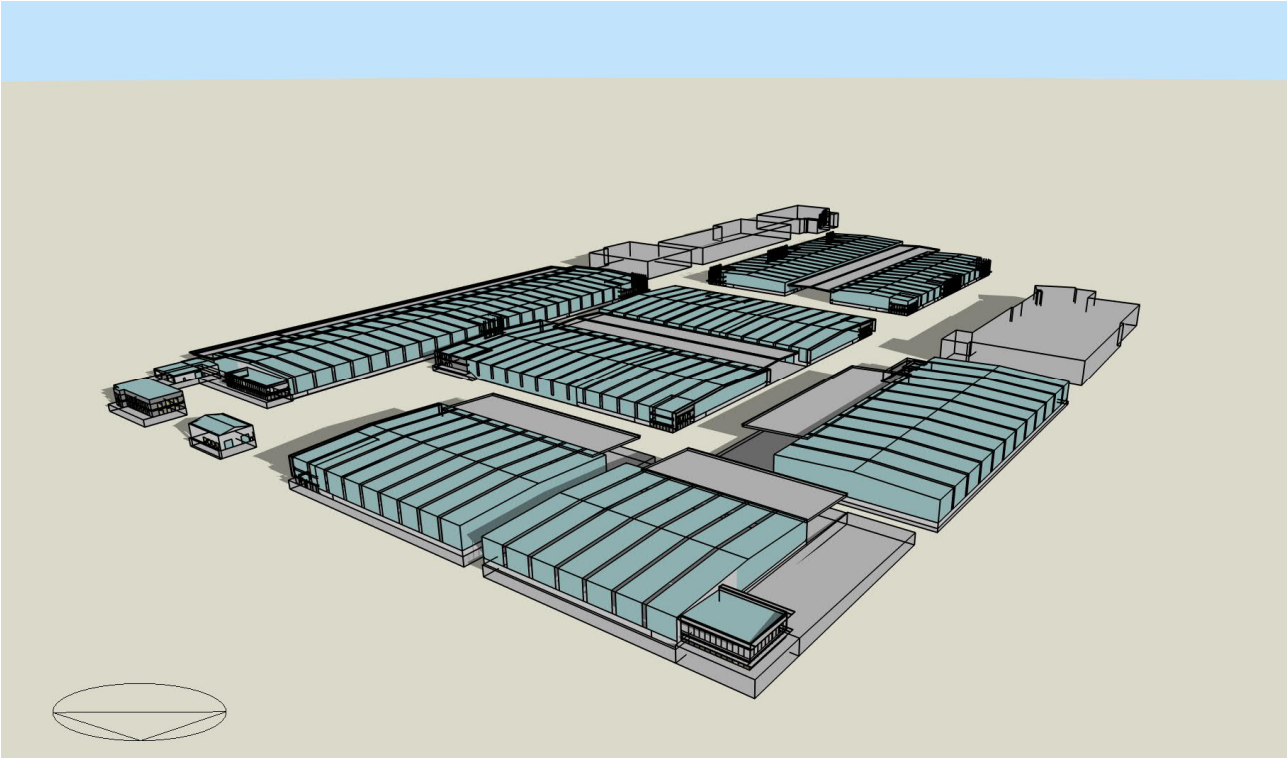


Figure 5: Isometric view of the DesignBuilder energy model for this JV3 assessment

Modelling Parameters

The modelling parameters used in the preliminary assessment are outlined in the table below:

Building Fabric Element	Description
Thermal Envelope	Spandrel walls forming part of the thermal envelope require a minimum R2.0 added insulation. Non-spandrel external and internal walls forming part of the thermal envelope require a minimum of R1.4 added insulation. All non-spandrel walls require a thermal break material or air gap between the stud member and the external finish/unconditioned side. • **Spandrel Glazing Suite** Solar Absorptance: SA0.60 Construction Details and Insulation Requirement: o per NCC 2019 Specification J1.5b Configuration 1 or 2, with R2.0 insulation. • **Precast Concrete Wall**

<table>
<tr><th>Building Fabric Element</th><th>Description</th></tr>
<tr><td></td><td>
Solar Absorptance: 0.60
Construction Details and Insulation Requirement:
o 150mm concrete wall
o Air gap
o 90mm steel stud with 70mm R1.4 added insulation installed between studs
o 13mm plasterboard lining

• Metal Clad Wall
Solar Absorptance: 0.60
Construction Details and Insulation Requirement:
o 1mm metal cladding
o Air gap
o 90mm steel stud with 70mm R1.4 added insulation installed between studs
o 13mm plasterboard lining

Refer to Figures 8-33 for a mark-up of the thermal envelope where these insulation requirements apply.

Note: All wall insulation is required to run up to the roof/ceiling insulation to form an unbroken thermal barrier.
</td></tr>
<tr><td>Floors</td><td>Ground Floor floors have been modelled as concrete slab on ground, and do not require any additional insulation to achieve compliance.

First floor areas that are above a Warehouse under croft/ exposed to unconditioned air have been modelled as suspended concrete slab and require additional insulation to achieve a total system R-value of R2.0.

Please refer to Figure 34 for the mark up of applicable floor sections.</td></tr>
<tr><td>Roof & Ceiling</td><td>All roof sections forming part of the thermal envelope have been modelled as metal deck with solar absorptance 0.45. The Level 2 Terrace at 5 McLaren Drive, Precinct 1, is the only exception and has been modelled as suspended concrete with solar absorptance 0.45. These roof systems are required to have added thermal insulation to achieve a total system R-value of R3.7.</td></tr>
<tr><td>Windows and Glazed Doors</td><td>All proposed windows/glazed doors forming part of the thermal envelope have been modelled as per the floor plans and elevations provided.

These are required to have the following thermal performance values for glass and frame combined:

<table>
<tr><th></th><th>U-value</th><th>SHGC</th></tr>
<tr><td>Fixed Windows (External)</td><td>3.0</td><td>0.31</td></tr>
<tr><td>Hinged Doors (External)</td><td>3.8</td><td>0.25</td></tr>
<tr><td>Sliding Doors (External)</td><td>3.4</td><td>0.27</td></tr>
<tr><td>Translucent Wall Sheeting (External)</td><td>0.72</td><td>0.27</td></tr>
<tr><td>Sliding Windows (Internal)</td><td>6.5</td><td>0.59</td></tr>
</table>

External windows and glazed door values are based on Low E Grey double glazing in standard aluminium frames.

Translucent Wall Sheeting values are based on Danpalon Danpatherm K7 polycarbonate panels.</td></tr>
</table>

<table>
<tr><th>Building Fabric Element</th><th>Description</th></tr>
<tr><td></td><td>Internal glazing adjoining the warehouses are based on clear glazing in standard aluminium frames.

Warehouse translucent roof lights were modelled with the following thermal performance values:

<table><tr><th></th><th>U-value</th><th>SHGC</th></tr><tr><td>Skylight</td><td>4.4</td><td>0.46</td></tr></table>
These values are based on Ampelite Wonderglas GC in Opal.

Alternative glass and frame combinations may also be used provided they meet the thermal performance values above.</td></tr>
<tr><td colspan="2">Please note the above insulation, blinds and glazing systems are the minimum requirements to meet the energy efficiency requirement of Section J of the NCC and the Energy Section in this SMP. Please check with the insulation supplier and glazing contractor for other suitable products that may meet the above energy efficiency requirements along with any specific considerations to other project requirements such as structural adequacy, safety, wind loads, acoustics etc.</td></tr>
<tr><td>Shading</td><td>Overhangs and incidental shading onsite have been modelled as shown on the architectural plans. No changes are proposed.</td></tr>
<tr><td>Sealing</td><td>A seal to restrict air infiltration must be fitted to each edge of a door and operable window in accordance with Provision J3.4, other than glazed elements which comply with AS 2047.

All entrance doors leading to conditioned spaces must be fitted with a self-closing devices.

Exhaust fans serving conditioned spaces to be fitted with self-closing dampers.

Roofs, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like will be constructed to minimise air leakage by internal lining systems or sealed by caulking, skirting, architraves, cornices or the like.

Part J1.2 for general thermal construction & installation must be followed.

Part J1.3 for compensation for a loss of ceiling insulation must be followed if ceiling insulation is used other than that proposed and downlights are provided.</td></tr>
<tr><td>Thermal Construction & Insulation</td><td>Part J1.2 for general thermal construction & installation must be followed, which require insulation must be installed to comply with AS/NZS 4859.1 and be installed so that it forms a continuous barrier and installed with the required air space. Also, Insulation must maintain its position and thickness.

Part J1.3(c) for compensation for a loss of ceiling insulation must be followed if ceiling insulation is used instead of that proposed and downlights are provided.</td></tr>
<tr><td>Artificial Lighting</td><td>The default BCA 2019 illumination power density (W/m^2) values were used for each space. It is recommended that the proposed design not exceed the maximum wattages listed Table J6.2a of the BCA without the use of any adjustment factors.</td></tr>
<tr><td>Heating, Ventilation & Air-Conditioning (HVAC)</td><td>The systems were zoned as outlined below, Figures 8-33.

Packaged Terminal Heat Pump system air conditioners have been modelled for the proposed development.</td></tr>
</table>

Building Fabric Element	Description
	Heating and cooling systems must be within one energy rating star of the best available, and if no star rating applies, achieve an EER/COP at least 10% more efficient than minimum allowed under MEPS for an equivalent sized unit. All ventilation systems must be selected to meet DTS requirements of Part J5. No mechanical heating and cooling will be provided to the warehouse. If alternative HVAC zoning or equipment is proposed, please notify SDC of the proposed system types and zoning so that we can update the energy model and confirm that the provided building fabric advice is still relevant.
Access & Monitoring	Access must be provided to all plant, equipment and components of services that require maintenance. The development must have the facility to record consumption electricity, as well as record individually the energy consumption of the following for both offices in the development: • HVAC equipment; • Artificial lighting; • Appliance power; • Central hot water (if provided); and • Other ancillary power

To achieve compliance with NCC Section J (based on Verification Method JV3) the proposed development must have the annual greenhouse gas emissions less than the DTS building. The proposed building must also allow for a thermal comfort level of between a Predicted Mean Vote (PMV) of -1 to +1, across 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building. The energy modelling and thermal comfort results can be found below.

HVAC Zone Layout & Thermal Envelope Requirements

Coloured area mark-ups indicate the assumed HVAC zones, each being served by an individual indoor unit, and areas not highlighted indicate assumed non-conditioned spaces. The pink perimeter indicates non-spandrel envelope walls that require the following insulation as per the mark ups below. Please note that full height glazing areas have been included in the markup, as ceiling spaces within the thermal envelope require the specified insulation value for the corresponding wall type.

	Wall sections requiring added R1.4 insulation batts and air gap or thermal break material

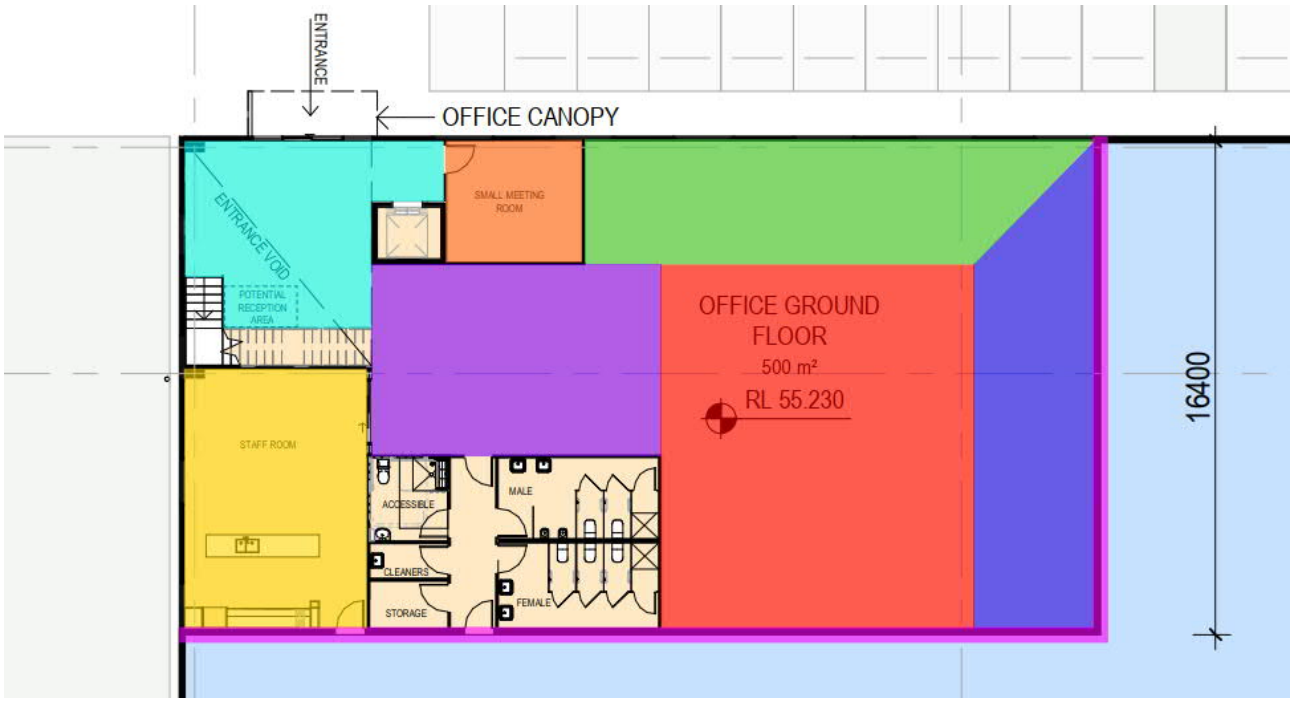


Figure 6: HVAC zones & thermal envelope for 1500 Centre Road Ground Floor

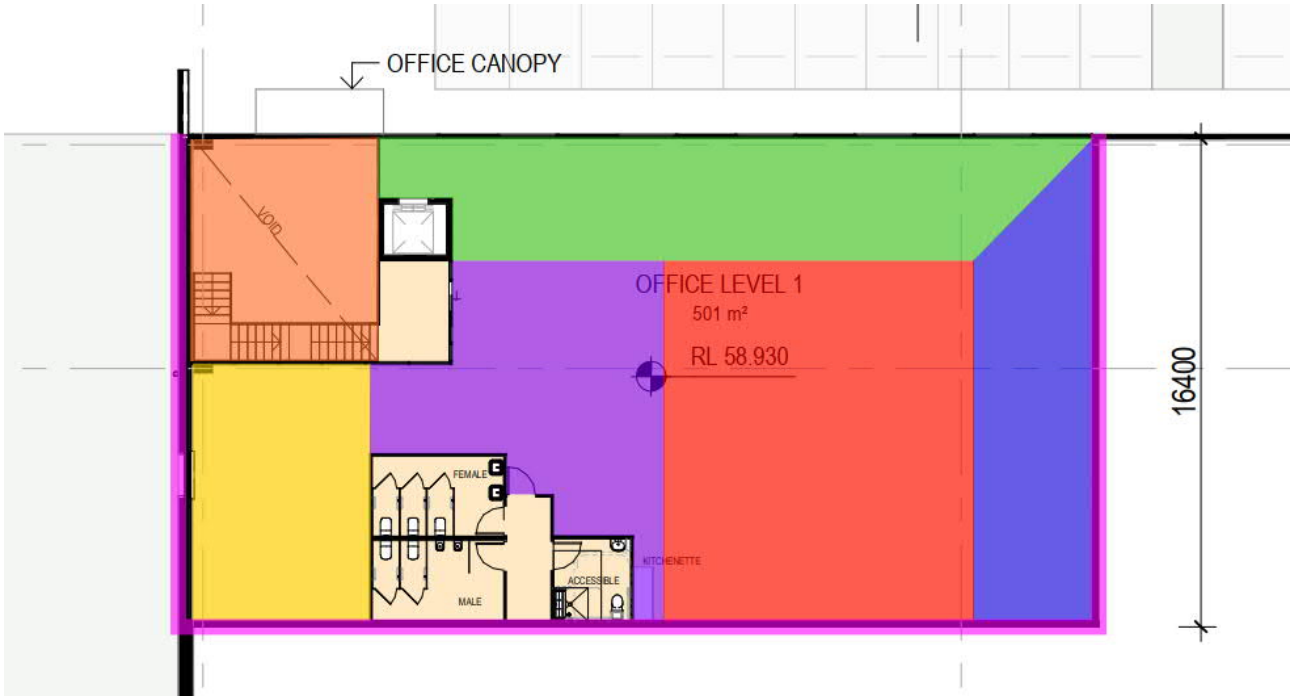


Figure 7: HVAC zones & thermal envelope for 1500 Centre Road First Floor

Figure 8: HVAC zones & thermal envelope for 1490 Centre Road Ground Floor

Figure 9: HVAC zones & thermal envelope for 1490 Centre Road First Floor

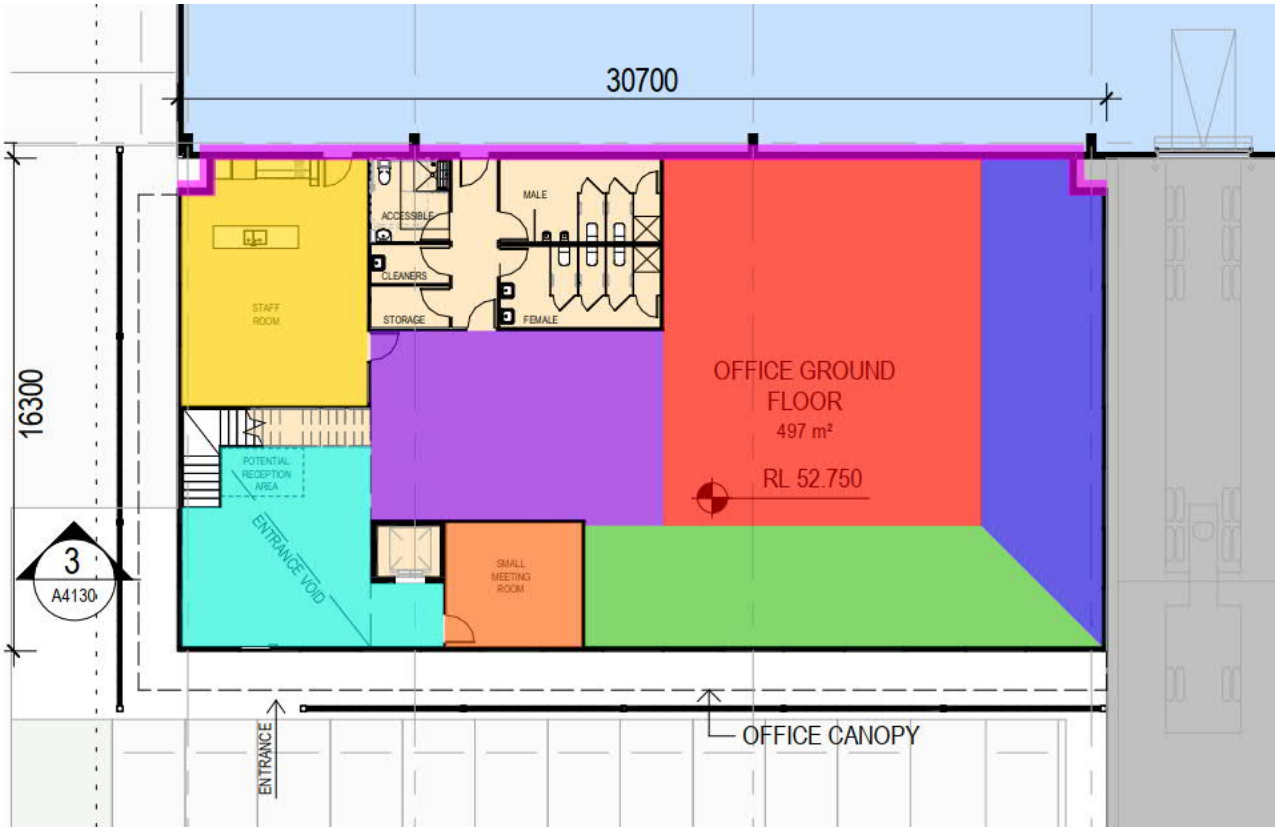


Figure 10: HVAC zones & thermal envelope for 5 McLaren Drive Ground Floor

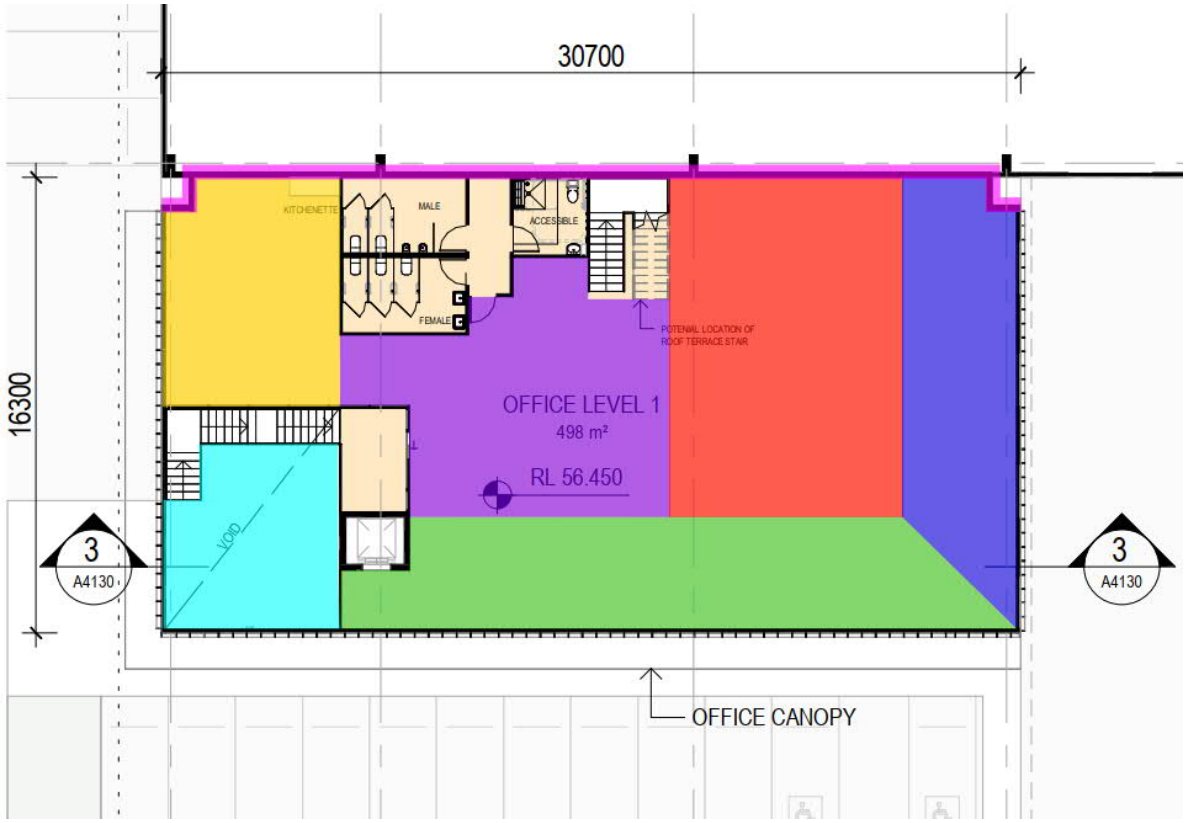


Figure 11: HVAC zones & thermal envelope for 5 McLaren Drive First Floor

Figure 12: HVAC zones & thermal envelope for 12 McLaren Drive Ground Floor (Left) and First Floor (Right)

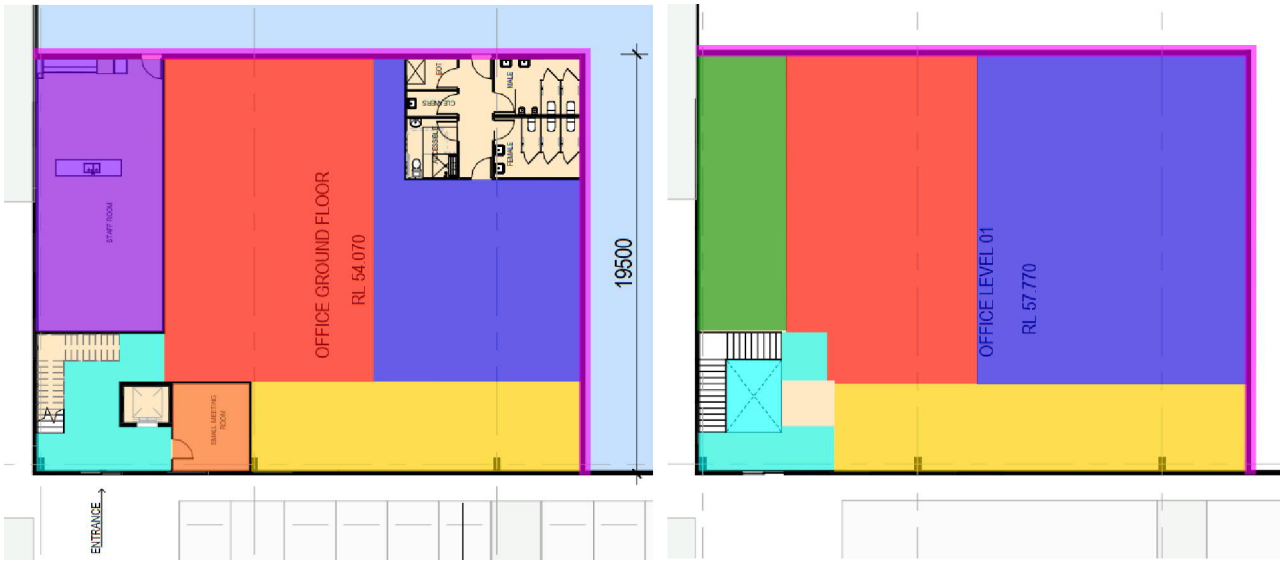


Figure 13: HVAC zones & thermal envelope for 16 McLaren Drive Ground Floor (Left) and First Floor (Right)

Figure 14: HVAC zones & thermal envelope for 3 Senator Drive Ground Floor (Left) and First Floor (Right)

Figure 15: HVAC zones & thermal envelope for 1 Senator Drive Ground Floor (Left) and First Floor (Right)

Figure 16: HVAC zones & thermal envelope for 10 McLaren Drive Ground Floor

Figure 17: HVAC zones & thermal envelope for 10 McLaren Drive First Floor

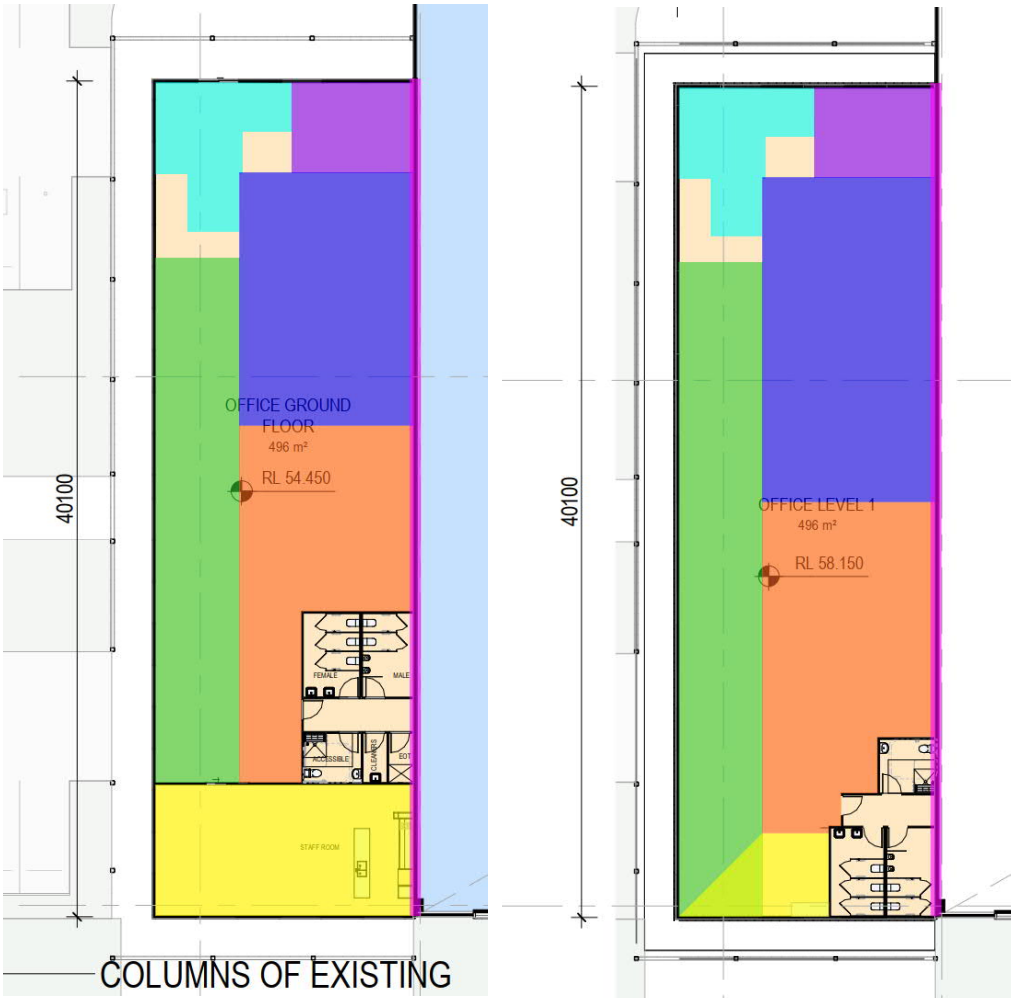


Figure 18: HVAC zones & thermal envelope for 1550 Centre Road Ground Floor (Left) and First Floor (Right)

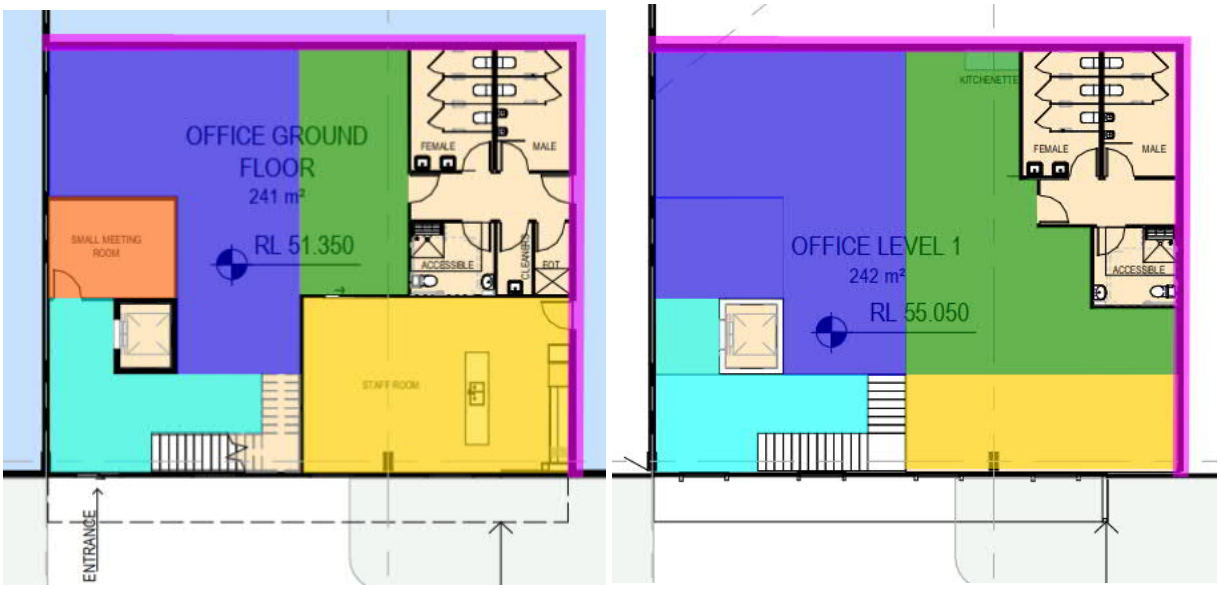


Figure 19: HVAC zones & thermal envelope for 10 Nursery Ave Ground Floor (Left) and First Floor (Right)

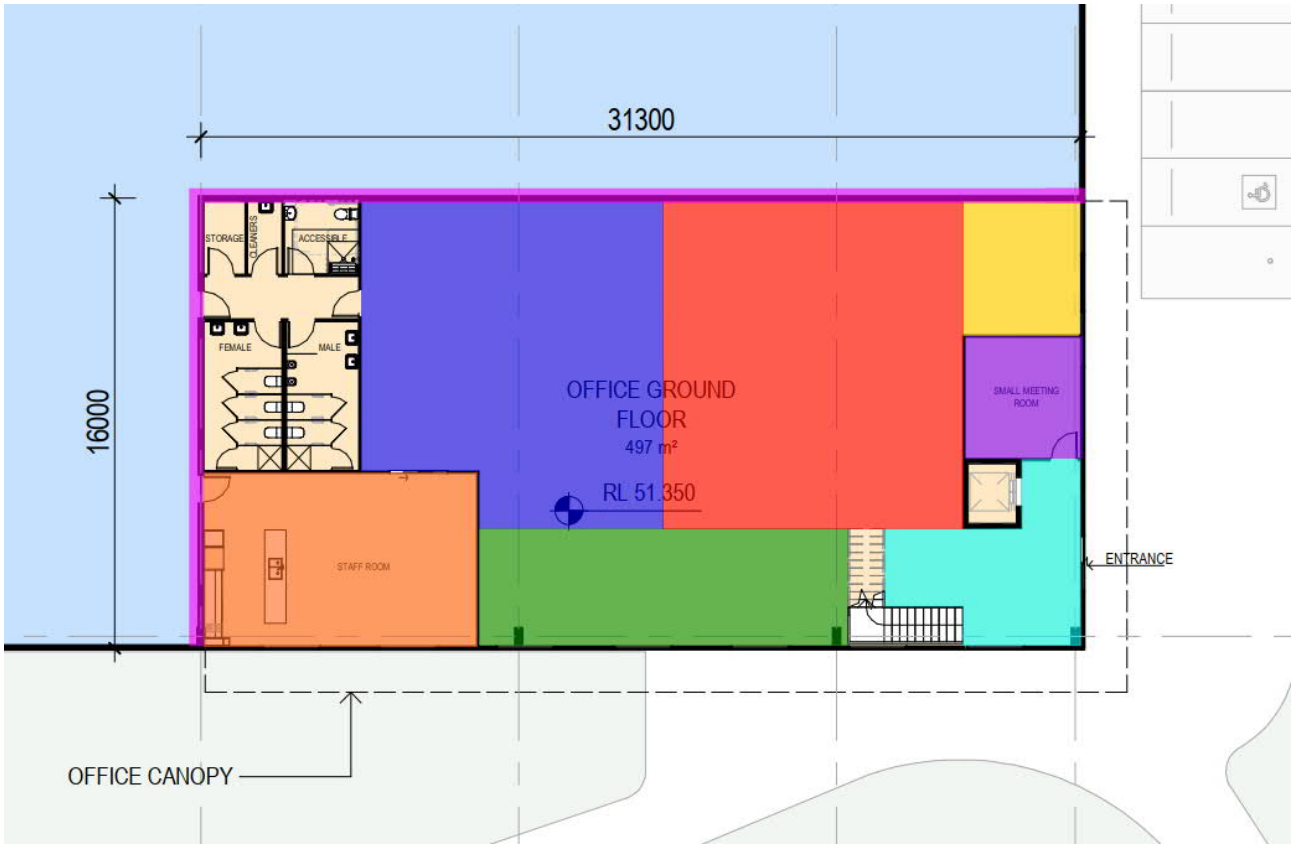


Figure 20: HVAC zones & thermal envelope for 8 Nursery Ave Ground Floor

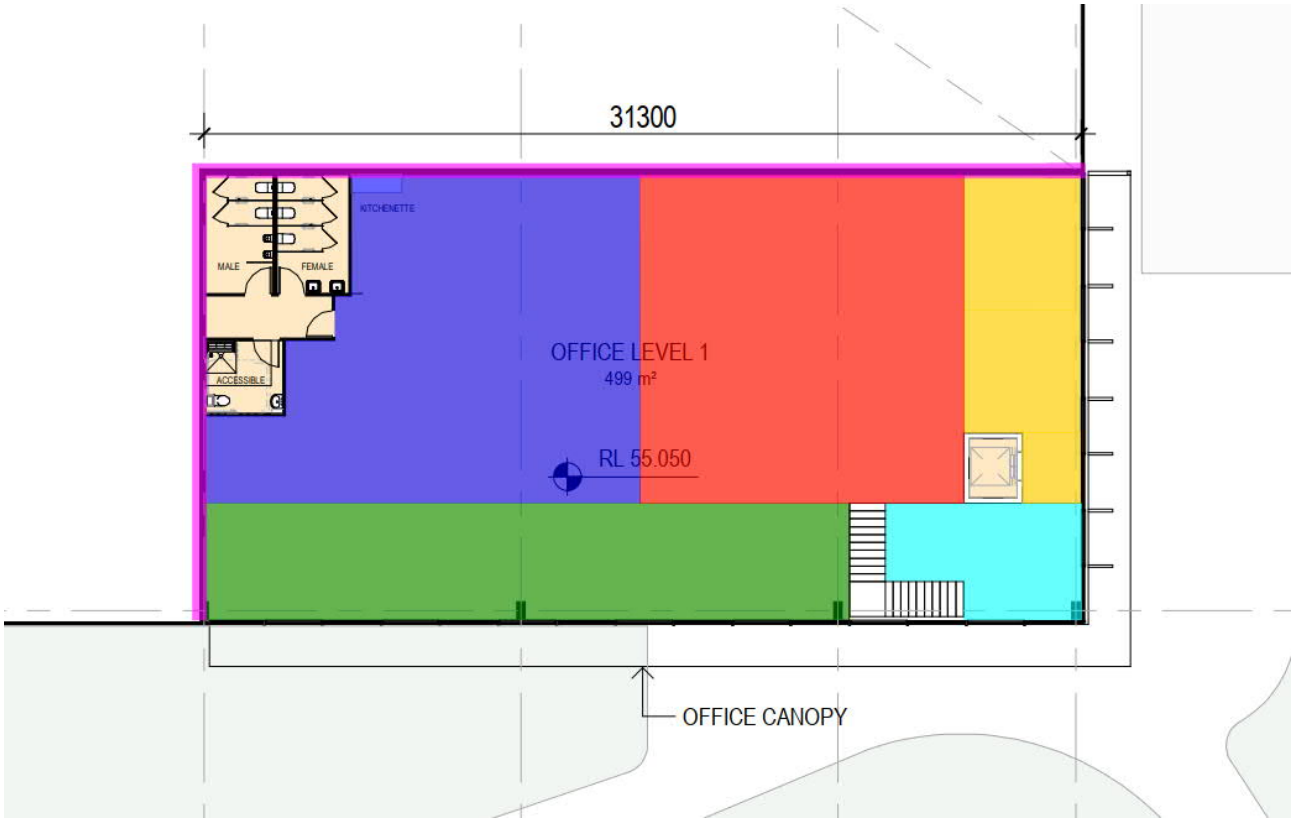


Figure 21: HVAC zones & thermal envelope for 8 Nursery Ave First Floor

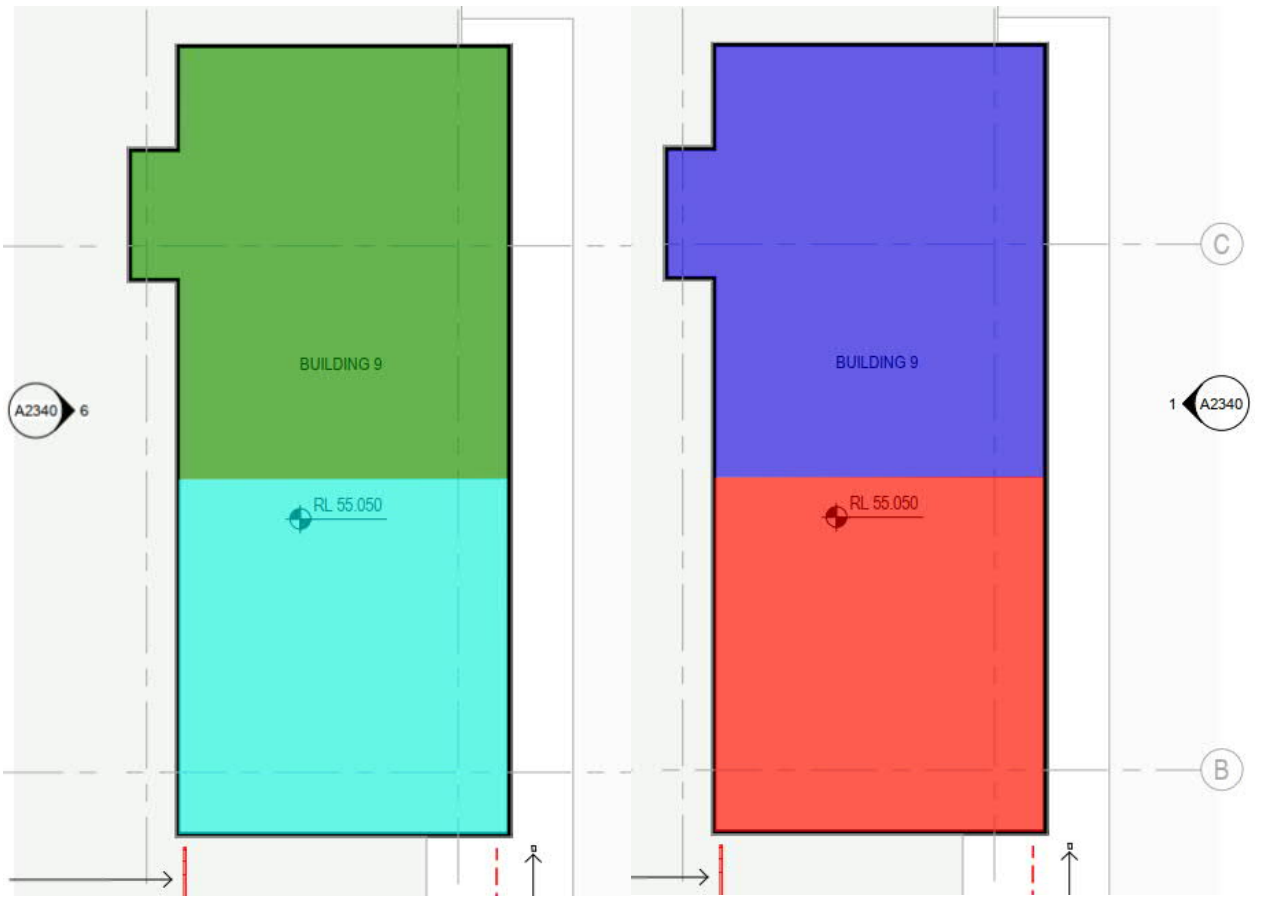


Figure 22: HVAC zones & thermal envelope for Building 9 Ground Floor (Left) and assumed First Floor (Right)

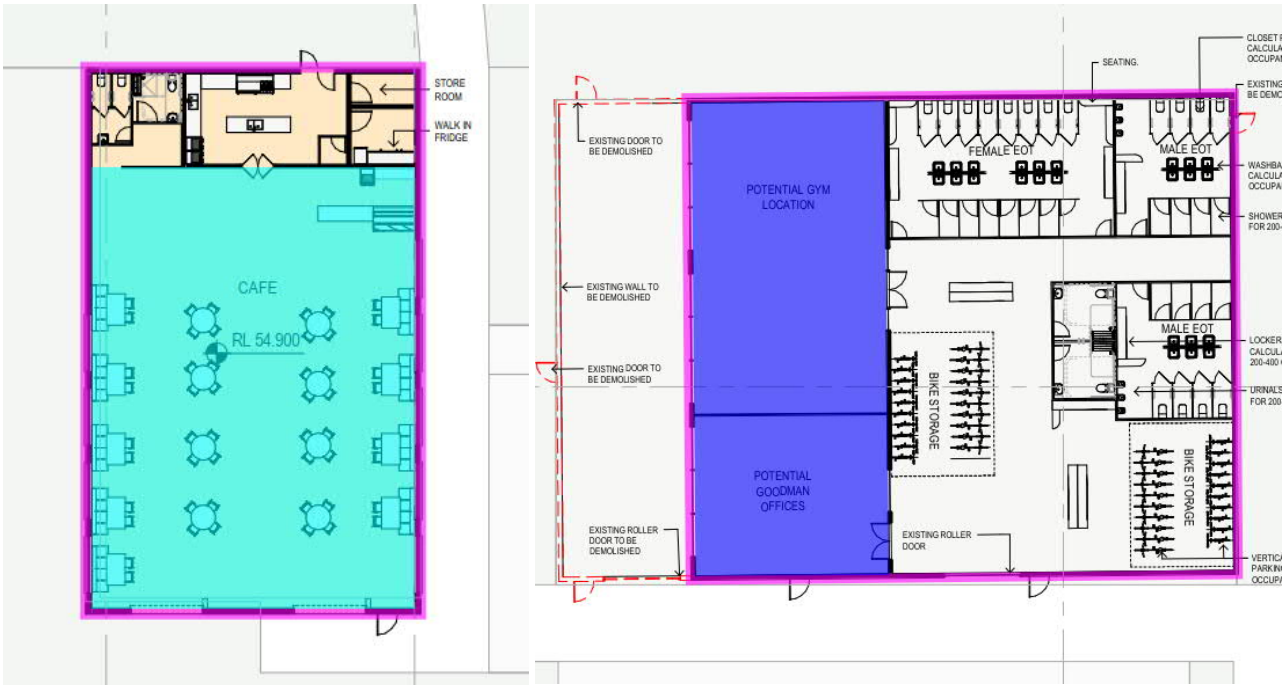


Figure 23: HVAC zones & thermal envelope for the Café (relocated Building 15) (Left) and Building 28 (Right)

Figure 24: HVAC zones & thermal envelope for 2 McLaren Drive Ground Floor (Left) and First Floor (Right)

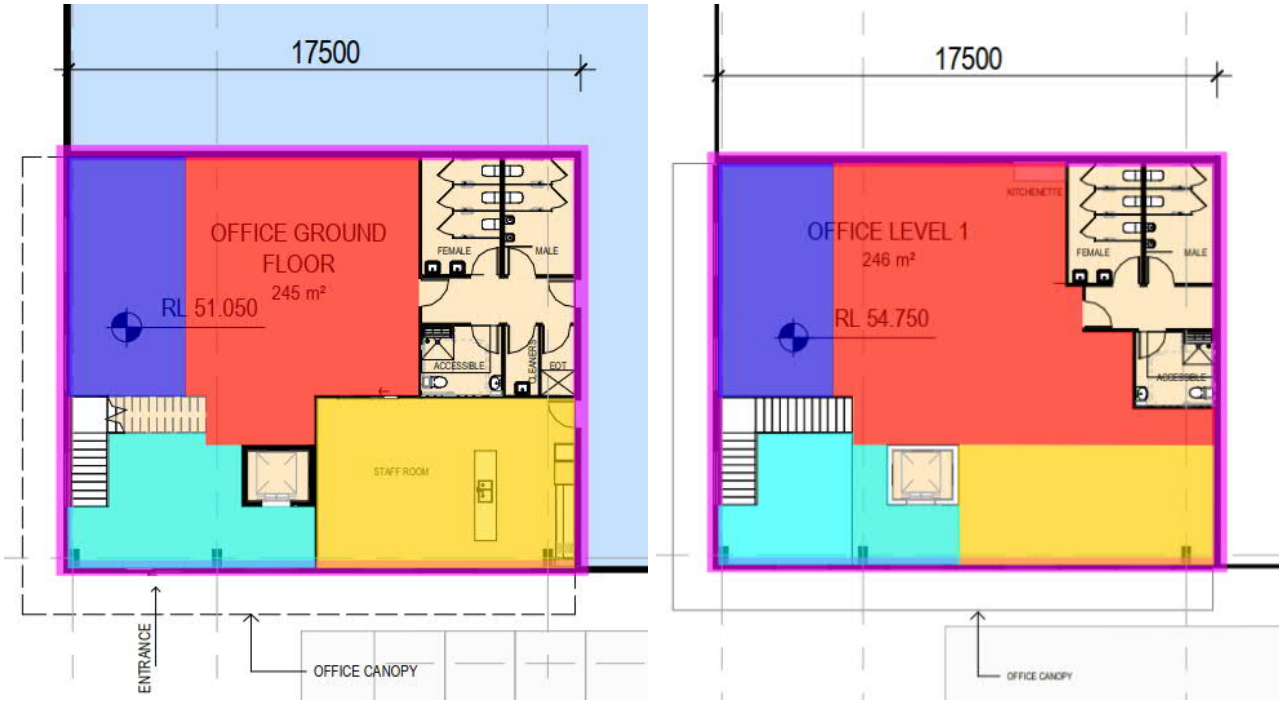


Figure 25: HVAC zones & thermal envelope for 8 McLaren Drive Ground Floor (Left) and First Floor (Right)

Figure 26: HVAC zones & thermal envelope for 4 McLaren Drive Ground Floor (Left) and First Floor (Right)

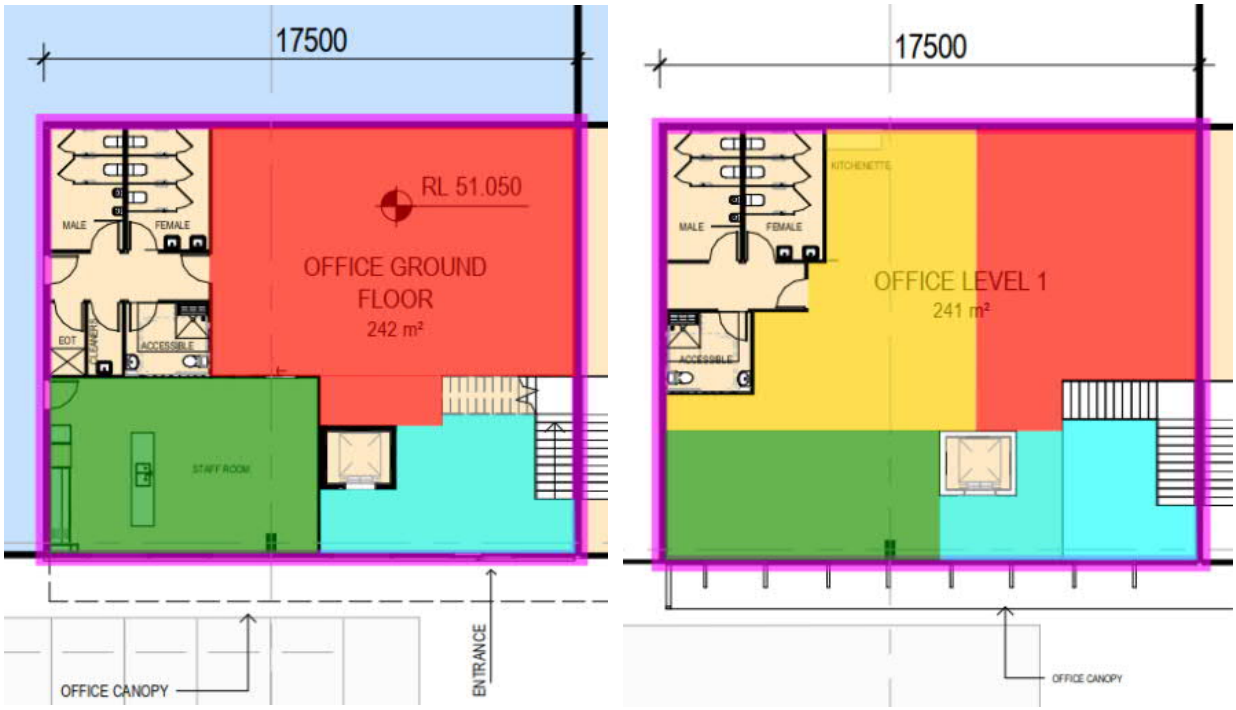


Figure 27: HVAC zones and thermal envelope for 6 McLaren Drive Ground Floor (Left) and First Floor (Right)

Figure 28: HVAC zones and thermal envelope for 1 Nursery Ave Ground Floor (Left) and First Floor (Right)

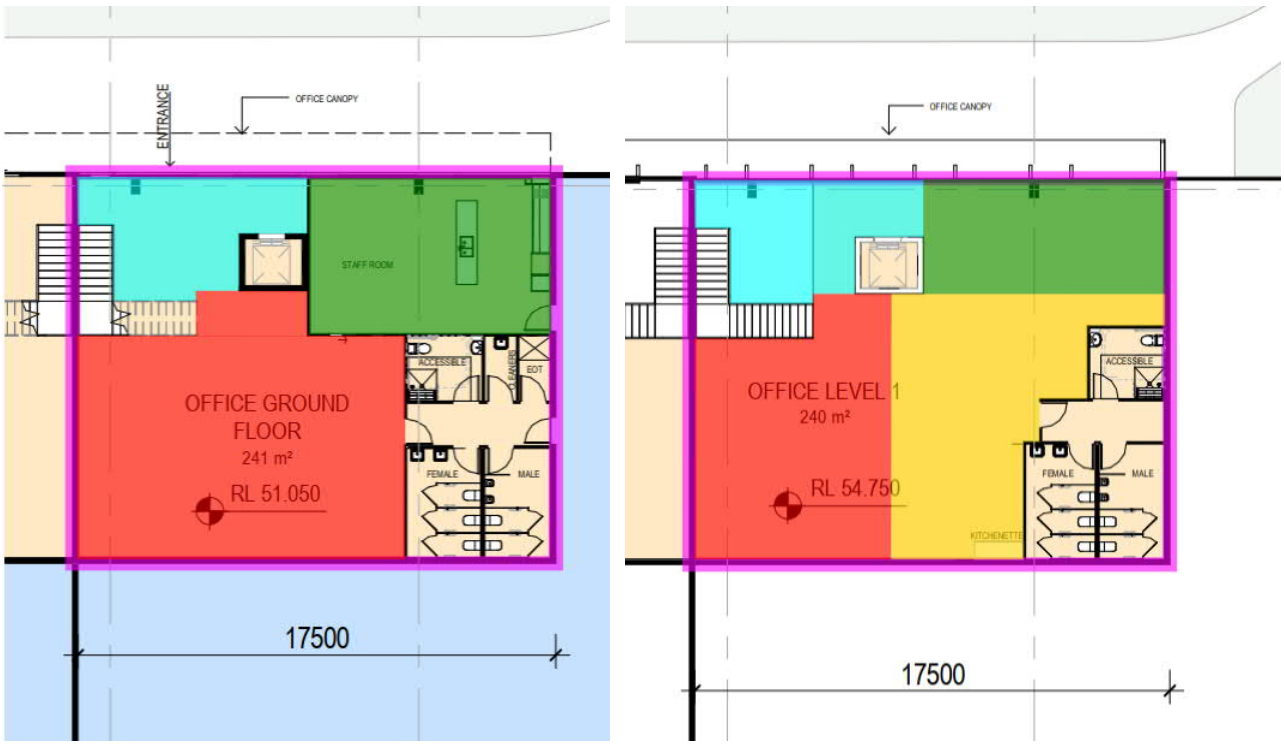


Figure 29: HVAC zones and thermal envelope for 3 Nursery Ave Ground Floor (Left) and First Floor (Right)

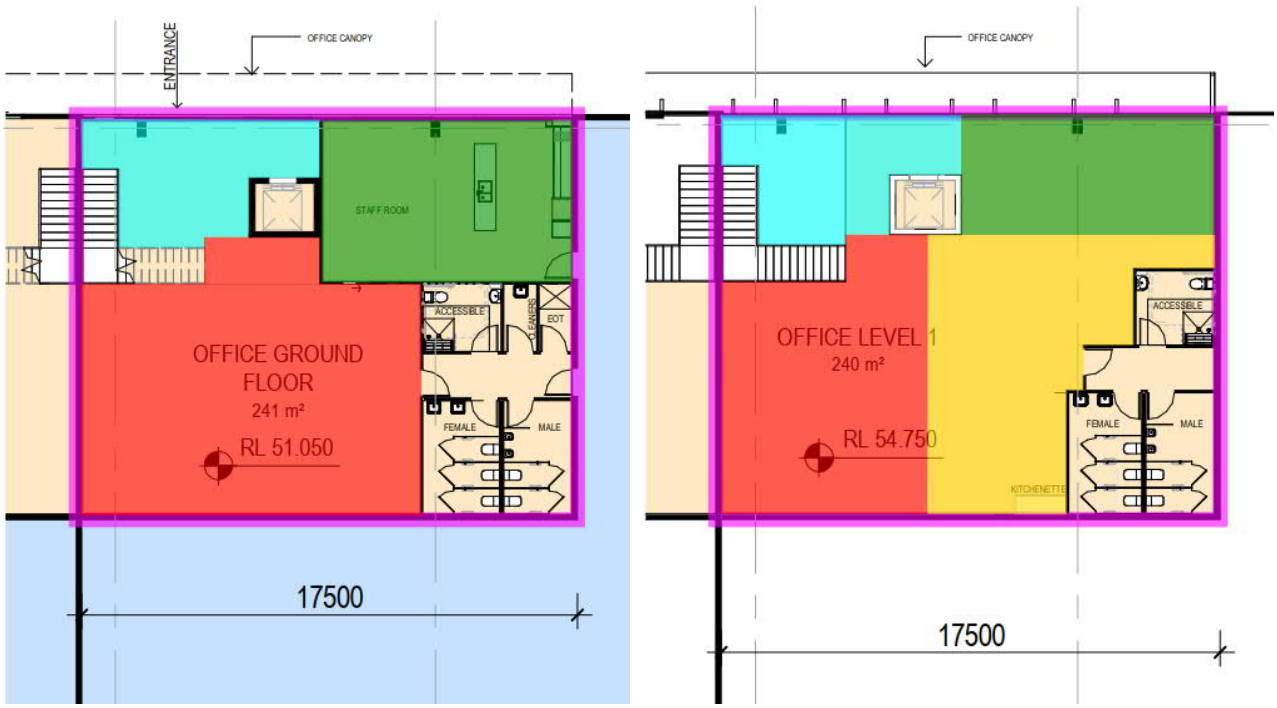


Figure 30: HVAC zones and thermal envelope for 9 Nursery Ave Ground Floor (Left) and First Floor (Right)

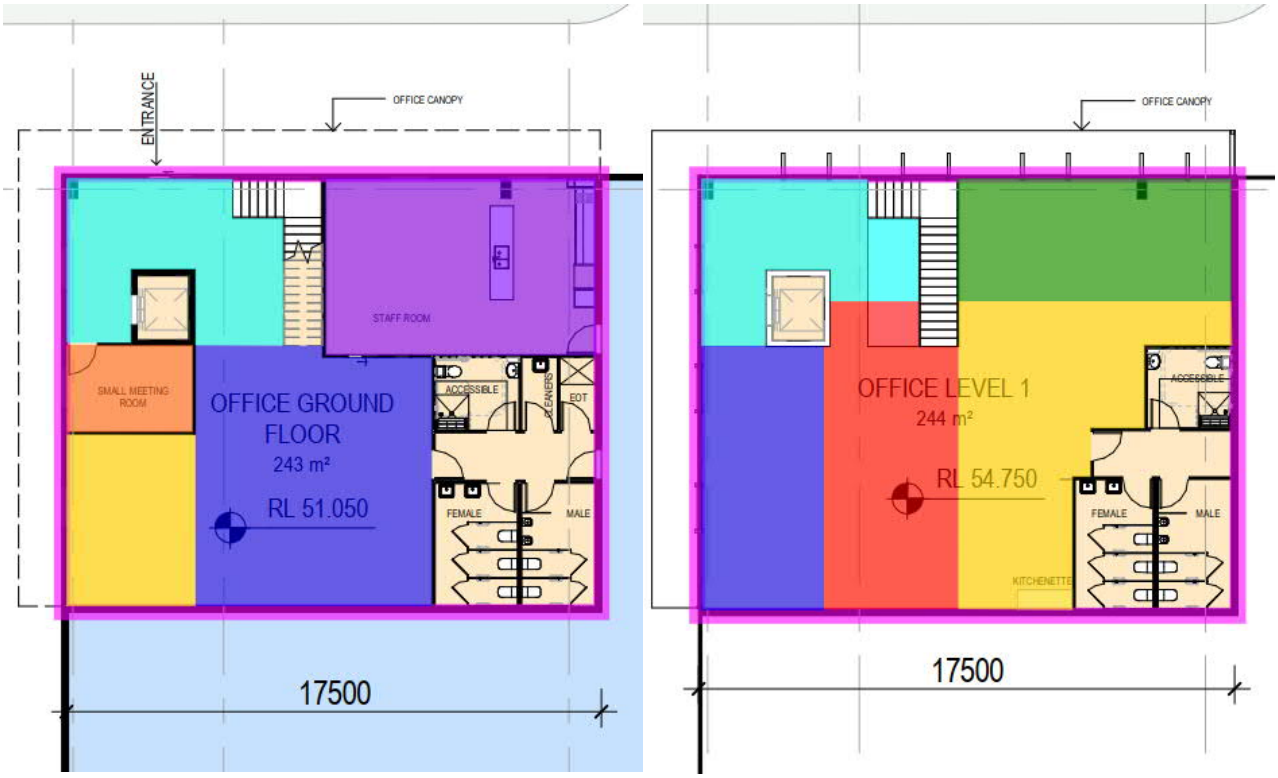


Figure 31: HVAC zones and thermal envelope for 2 Senator Drive Ground Floor (Left) and First Floor (Right)

Other Building Fabric Requirements

Building fabrics that form part of the buildings thermal envelope are required to be insulated as per the mark ups below.

Floor Insulation

The markups in the images below indicate where additional insulation is required for suspended floor sections. It is assumed that the external wall insulation will form a continous envelope with the floor & roof insulation.

	Floor area requiring insulation to achieve total system value R-Value of 2.0.

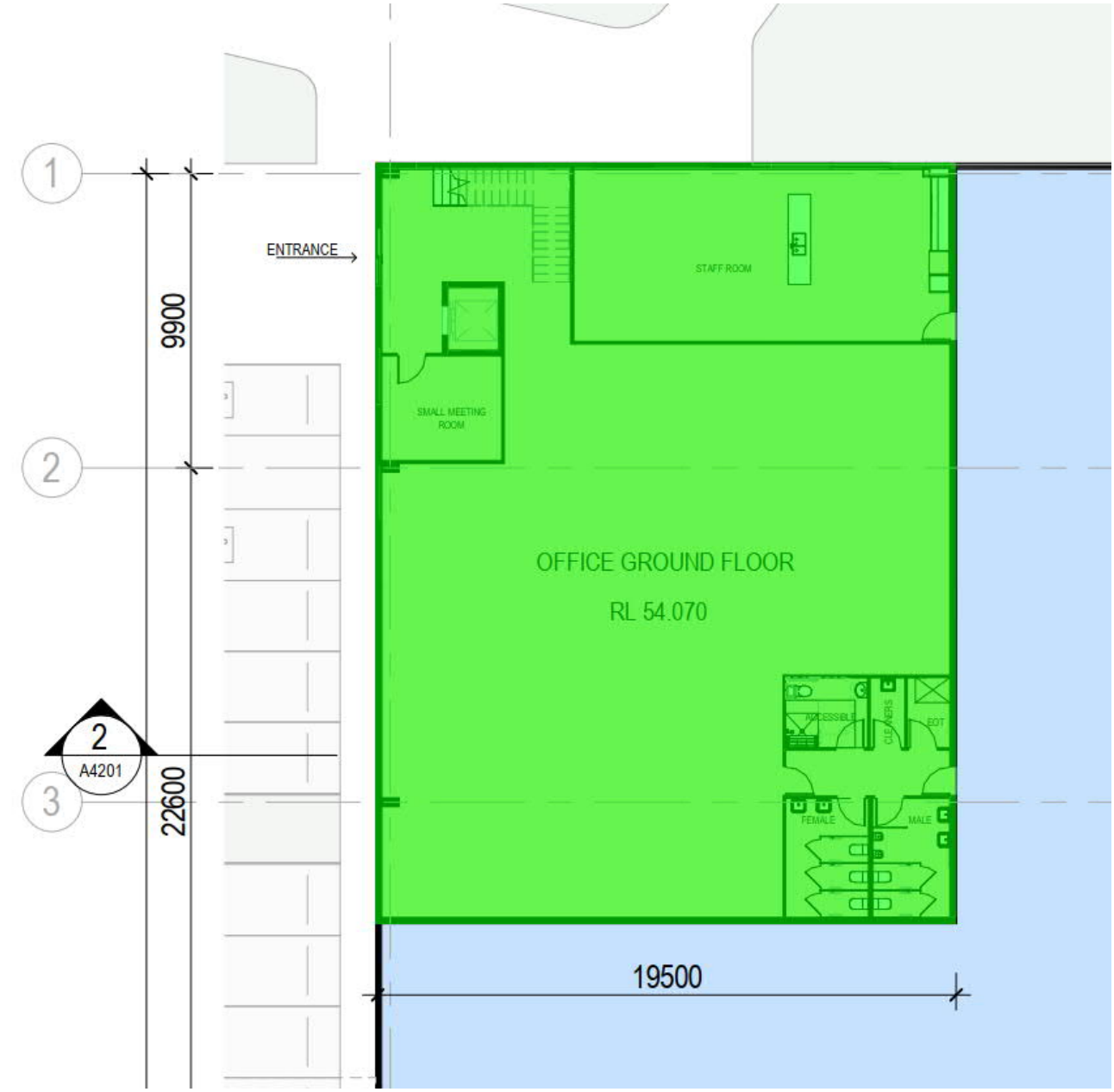


Figure 32: Underfloor insulation requirements for 16 McLaren Drive Ground Floor above Warehouse Undercroft

Wall Insulation Calculations

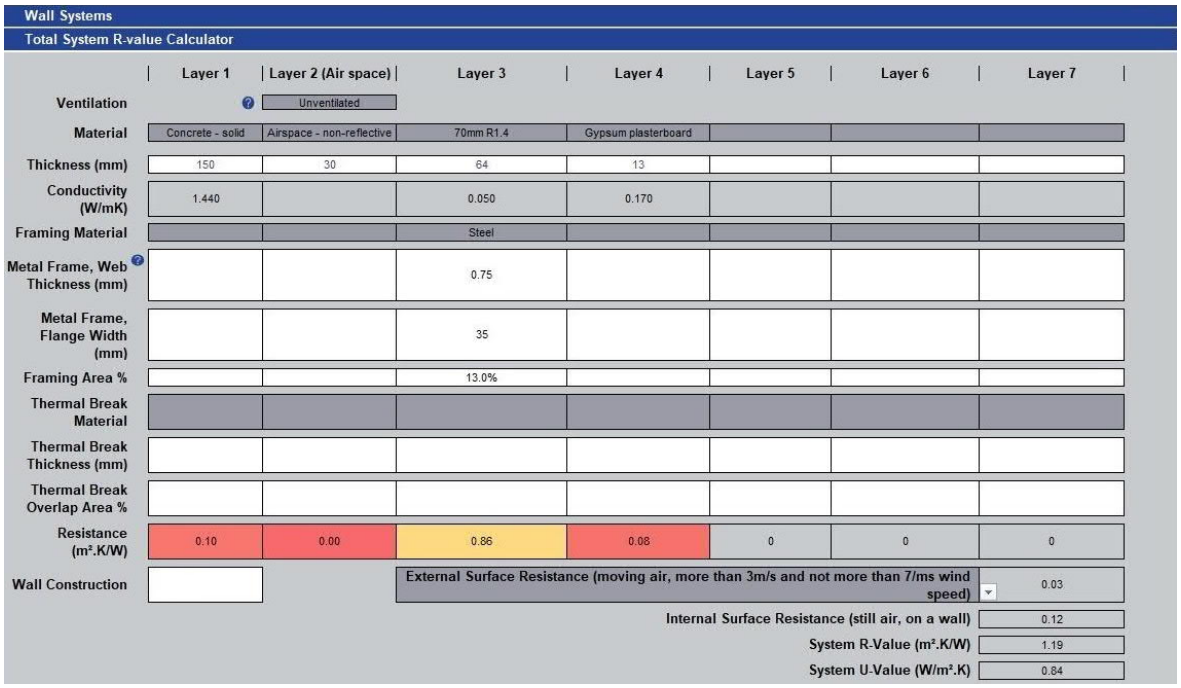
The total wall system R-value for each wall type used in the proposed building model are calculated from the NCC 2019 Façade Calculator.

If alternative wall specifications are proposed, please notify SDC of the proposed specification types and layers so that the calculations can be revised and confirm that the building fabric advice provided is still relevant.

Note: The wall structure and insulation types specified for the development must, as a minimum, meet the thermal performance values detailed here for this design advice to hold true.

The following calculations were input for non-spandrel walls forming the thermal envelope in the NCC 2019 Façade Calculator:

Precast Concrete Wall

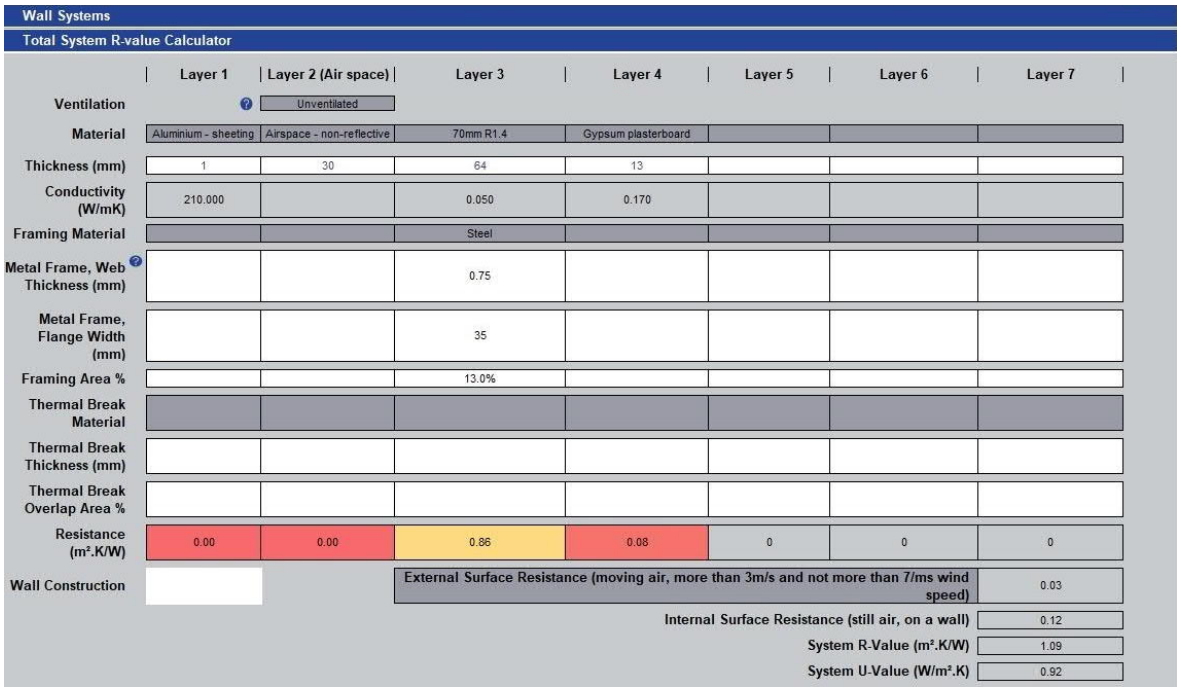


Wall Systems

Total System R-value Calculator

	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation		Unventilated					
Material	Concrete - solid	Airspace - non-reflective	70mm R1.4	Gypsum plasterboard			
Thickness (mm)	150	30	64	13			
Conductivity (W/mK)	1.440		0.050	0.170			
Framing Material			Steel				
Metal Frame, Web Thickness (mm)			0.75				
Metal Frame, Flange Width (mm)			35				
Framing Area %			13.0%				
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.10	0.00	0.86	0.08	0	0	0
Wall Construction		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)					0.03
						Internal Surface Resistance (still air, on a wall)	0.12
						System R-Value (m².K/W)	1.19
						System U-Value (W/m².K)	0.84

Metal Clad Wall



Wall Systems

Total System R-value Calculator

	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation		Unventilated					
Material	Aluminium - sheeting	Airspace - non-reflective	70mm R1.4	Gypsum plasterboard			
Thickness (mm)	1	30	64	13			
Conductivity (W/mK)	210.000		0.050	0.170			
Framing Material			Steel				
Metal Frame, Web Thickness (mm)			0.75				
Metal Frame, Flange Width (mm)			35				
Framing Area %			13.0%				
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.00	0.00	0.86	0.08	0	0	0
Wall Construction		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)					0.03
						Internal Surface Resistance (still air, on a wall)	0.12
						System R-Value (m².K/W)	1.09
						System U-Value (W/m².K)	0.92

Energy Modelling Results

The results of the preliminary JV3 assessment are shown in the table below.

Compliance with the 2019 NCC JV3 verification method is achieved if the total predicted energy use of Alternative 2 (Proposed Building Fabric with DTS services) is less than Alternative 1 (Reference Building), also, PMV levels between -1 and +1 across 95% of the floor area of all occupied zones for over 98% of the year in the proposed building.

The ability of the proposed design to meet these conditions has been demonstrated, as shown below.

Table 2: Summary and comparison of energy use and total greenhouse gas emissions for reference and proposed buildings.

Energy Consumption (kWh/year)	Alternative 1 Reference Building DTS Services	Alternative 2 Proposed Fabric DTS Services	Alternative 3 Proposed Fabric & Services
Heating	72,752	79,397	94,870
Cooling	63,549	43,379	40,185
HVAC Fans	12,361	10,861	11,238
HVAC Total (Heating + Cooling + HVAC Fans)	148,661	133,637	146,293
Interior Lighting	2,428,011	2,428,011	2,428,011
Solar PV System (2.9MW)	-	-	-3,430,696
Total (kWh/yr)	2,576,672	2,561,647	0
Total ($kgCO_2$-e /yr)	**3,014,706**	**2,997,127**	**0**

Table 3: Comparison of Precinct 1 energy use and total greenhouse gas emissions for reference and proposed buildings

Energy Consumption (kWh/year)	Alternative 1 Reference Building DTS Services	Alternative 2 Proposed Fabric DTS Services	Alternative 3 Proposed Fabric & Services
Heating	12,310	15,181	15,841
Cooling	12,306	8,915	8,279
HVAC Fans	2,071	1,835	1,877
HVAC Total (Heating + Cooling + HVAC Fans)	26,688	25,931	25997
Interior Lighting	611,186	611,186	611,186
Solar PV System	-	-	-890,164
Total (kWh/yr)	637,874	637,117	0
Total ($kgCO_2$-e /yr)	746,312	745,427	**0**

Table 4: Comparison of Precinct 2 energy use and total greenhouse gas emissions for reference and proposed buildings

Energy Consumption (kWh/year)	Alternative 1 Reference Building DTS Services	Alternative 2 Proposed Fabric DTS Services	Alternative 3 Proposed Fabric & Services
Heating	11,549	12,422	13,117
Cooling	12,601	9,313	8,591

HVAC Fans	2,624	2,378	2,416
HVAC Total (Heating + Cooling + HVAC Fans)	26,773	24,112	24,123
Interior Lighting	654,249	654,249	654,249
Solar PV System	-	-	-910,043
Total (kWh/yr)	681,022	678,361	0
Total ($kgCO_2$-e /yr)	796,796	793,683	**0**

Table 5: Comparison of Precinct 3 energy use and total greenhouse gas emissions for reference and proposed buildings

Energy Consumption (kWh/year)	Alternative 1 Reference Building DTS Services	Alternative 2 Proposed Fabric DTS Services	Alternative 3 Proposed Fabric & Services
Heating	30,738	34,052	47,141
Cooling	29,387	19,395	17,872
HVAC Fans	3,728	3,050	3,291
HVAC Total (Heating + Cooling + HVAC Fans)	63,853	56,496	68,305
Interior Lighting	563,267	563,267	563,267
Solar PV System	-	-	-790,172
Total (kWh/yr)	627,120	619,763	0
Total ($kgCO_2$-e /yr)	733,730	725,123	**0**

Table 6: Comparison of Precinct 4 energy use and total greenhouse gas emissions for reference and proposed buildings

Energy Consumption (kWh/year)	Alternative 1 Reference Building DTS Services	Alternative 2 Proposed Fabric DTS Services	Alternative 3 Proposed Fabric & Services
Heating	18,155	17,743	18,770
Cooling	9,254	5,756	5,443
HVAC Fans	3,938	3,598	3,654
HVAC Total (Heating + Cooling + HVAC Fans)	31,347	27,097	27,868
Interior Lighting	599,309	599,309	599,309
Solar PV System	-	-	-840,317
Total (kWh/yr)	630,657	626,406	0
Total ($kgCO_2$-e /yr)	737,868	732,895	**0**

Thermal Comfort Assessment

For thermal comfort, the below calculation is based on occupancy equating to 2,313 hours per year per space. As such, it is confirmed that the project will comply with the NCC 2019 JV3 requirement to maintain PMV levels between -1 and +1 across 95% of the floor area of all occupied zones for over 98% of the year in each space.

Table 7: Summary of thermal comfort analysis results by zone

Floor	Zone	No. of Occupied Hours	No. of Occupied Hours achieving PMV -1 to +1	Percentage compliance (%)
Precinct 1				
1490 Centre Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office N	2313	2313	100
	Open Office S	2313	2313	100
	Open Office W	2313	2312.5	99.98
	Staff Room	2313	2313	100
	Staff Room N	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office N	2313	2313	100
	Open Office S	2313	2313	100
	Open Office W	2313	2313	100
1500 Centre Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office S	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office1	2313	2313	100
	Openoffice2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
	Open Office S	2313	2313	100
5 McLaren Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
	Open Office S	2313	2313	100
Precinct 2				

Floor	Zone	No. of Occupied Hours	No. of Occupied Hours achieving PMV -1 to +1	Percentage compliance (%)
10 McLaren Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office S	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Open Office S	2313	2313	100
12 McLaren Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office N E	2313	2313	100
	Open Office N W	2313	2313	100
	Open Office W	2313	2313	100
16 McLaren Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
1 Senator Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office S	2313	2313	100
3 Senator Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100

Floor	Zone	No. of Occupied Hours	No. of Occupied Hours achieving PMV -1 to +1	Percentage compliance (%)
	Open Office S	2313	2313	100
Precinct 3				
10 Nursery Ave				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office W	2313	2313	100
1550 Centre Road				
GF	Open Office1	2313	2313	100
	Open Office2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
	Open Office N	2313	2313	100
	Open Office W	2313	2313	100
8 Nursery Ave				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office S	2313	2313	100
	Open Office W	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office S	2313	2313	100
	Open Office W	2313	2313	100
Building 9				
GF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
Building 15 Cafe				
	Cafe	3240	3061.5	94.49
Building 28				
	Gym	2313	2313	100

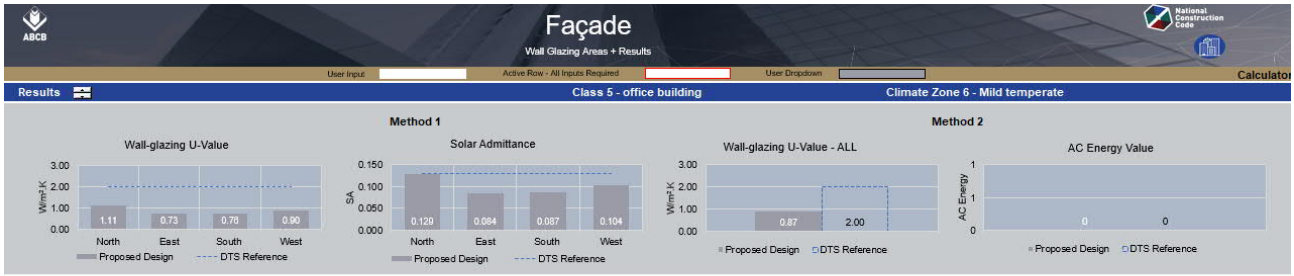
Floor	Zone	No. of Occupied Hours	No. of Occupied Hours achieving PMV -1 to +1	Percentage compliance (%)
	Office	2313	2313	100
Precinct 4				
1 Nursery Ave				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office S	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office E	2313	2313	100
	Open Office S	2313	2313	100
2 McLaren Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office W	2313	2313	100
	Staffroom 1	2313	2313	100
	Staffrooms	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office S	2313	2313	100
	Open Office W	2313	2313	100
2 Senator Drive				
GF	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Open Office SE	2313	2313	100
	Meeting Room	2313	2313	100
	Open Office 1	2313	2313	100
3 Nursery Ave				
GF	Open Office	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100
4 McLaren Drive				
GF	Open Office 1	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100

Floor	Zone	No. of Occupied Hours	No. of Occupied Hours achieving PMV -1 to +1	Percentage compliance (%)
	Open Office 2	2313	2313	100
	Open Office W	2313	2313	100
6 McLaren Drive				
GF	Open Office 1	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office W	2313	2313	100
8 McLaren Drive				
GF	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office N	2313	2313	100
	Open Office W	2313	2313	100
9 Nursery Ave				
GF	Open Office	2313	2313	100
	Staff Room	2313	2313	100
FF	Open Office 1	2313	2313	100
	Open Office 2	2313	2313	100
	Open Office E	2313	2313	100

The thermal comfort assessment result indicates that 99% of the nominated zones floor area was able to meet the thermal comfort requirement. Therefore, the proposed development is deemed compliant with the 2019 BCA thermal comfort requirement.

Preliminary NCC 2019 Façade Calculator

Preliminary NCC 2019 Façade Calculator (used to prepare the reference building for the JV3 assessment) is provided below. Please note that the most likely building fabric for the proposed development is provided in the JV3 modelling advice above, the below is for comparison purposes only.



Wall Glazing Area

Compliant Solution =
Non-Compliant Solution =

North	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)	Internal
1	GL1			567.83		Wall	2392.81	2960.64	
2									
3									
4									
5									
6									

	Result	Target				
Wall-glazing U-Value (W/m².K)	1.11	2.00	Glazing Area (m²)	567.83	Average Glazing U-Value (W/m².K)	5.80
Solar Admittance	0.129	0.130	Wall Area (m²)	2392.81	Average Glazing SHGC	0.67
			Glazing to Façade Ratio	19%	Average Wall R-Value (m².K/W)	

East	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)	Internal
1	GL1			389.03		Wall	2720.59	3109.62	
2									
3									
4									
5									
6									

	Result	Target				
Wall-glazing U-Value (W/m².K)	0.73	2.00	Glazing Area (m²)	389.03	Average Glazing U-Value (W/m².K)	5.80
Solar Admittance	0.084	0.130	Wall Area (m²)	2720.59	Average Glazing SHGC	0.67
			Glazing to Façade Ratio	13%	Average Wall R-Value (m².K/W)	

South	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)	Internal
1	GL1			385.77		Wall	2570.87	2956.64	
2									
3									
4									
5									
6									

	Result	Target				
Wall-glazing U-Value (W/m².K)	0.76	2.00	Glazing Area (m²)	385.77	Average Glazing U-Value (W/m².K)	5.80
Solar Admittance	0.087	0.130	Wall Area (m²)	2570.87	Average Glazing SHGC	0.67
			Glazing to Façade Ratio	13%	Average Wall R-Value (m².K/W)	

West	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)	Internal
1	GL1			484.1		Wall	2627.7	3111.80	
2									
3									
4									
5									
6									

	Result	Target				
Wall-glazing U-Value (W/m².K)	0.90	2.00	Glazing Area (m²)	484.1	Average Glazing U-Value (W/m².K)	5.80
Solar Admittance	0.104	0.130	Wall Area (m²)	2627.7	Average Glazing SHGC	0.67
			Glazing to Façade Ratio	16%	Average Wall R-Value (m².K/W)	

Reference Building

Include shading? As Proposed

	Glazing to Façade Ratio	Method 1 Wall U-Value (W/m².K)	Method 1 Glazing U-Value (W/m².K)	Method 1 Shading Multiplier	Method 1 SHGC	Method 2 Wall U-Value (W/m².K)	Method 2 Glazing U-Value (W/m².K)	Method 2 SHGC
North	19%	0.71	5.80	1.000	0.68	0.71	5.80	
East	13%	0.71	5.80	1.000	0.81			
South	13%	0.71	5.80	1.000	0.81			
West	16%	0.71	5.80	1.000	0.81			

Appendix 3 – Preliminary Daylight Modelling

Sustainable Development Consultants (SDC) have reviewed the design for the proposed building and provided advice regarding the predicted level of internal daylight within the regularly occupied spaces. This assessment is based on daylight modelling using the proposed glazing and building fabric outlined in the following section.

Below are 3D images of the rendered view of the daylight model for the proposed development. Note that the colour is for display purposes only.

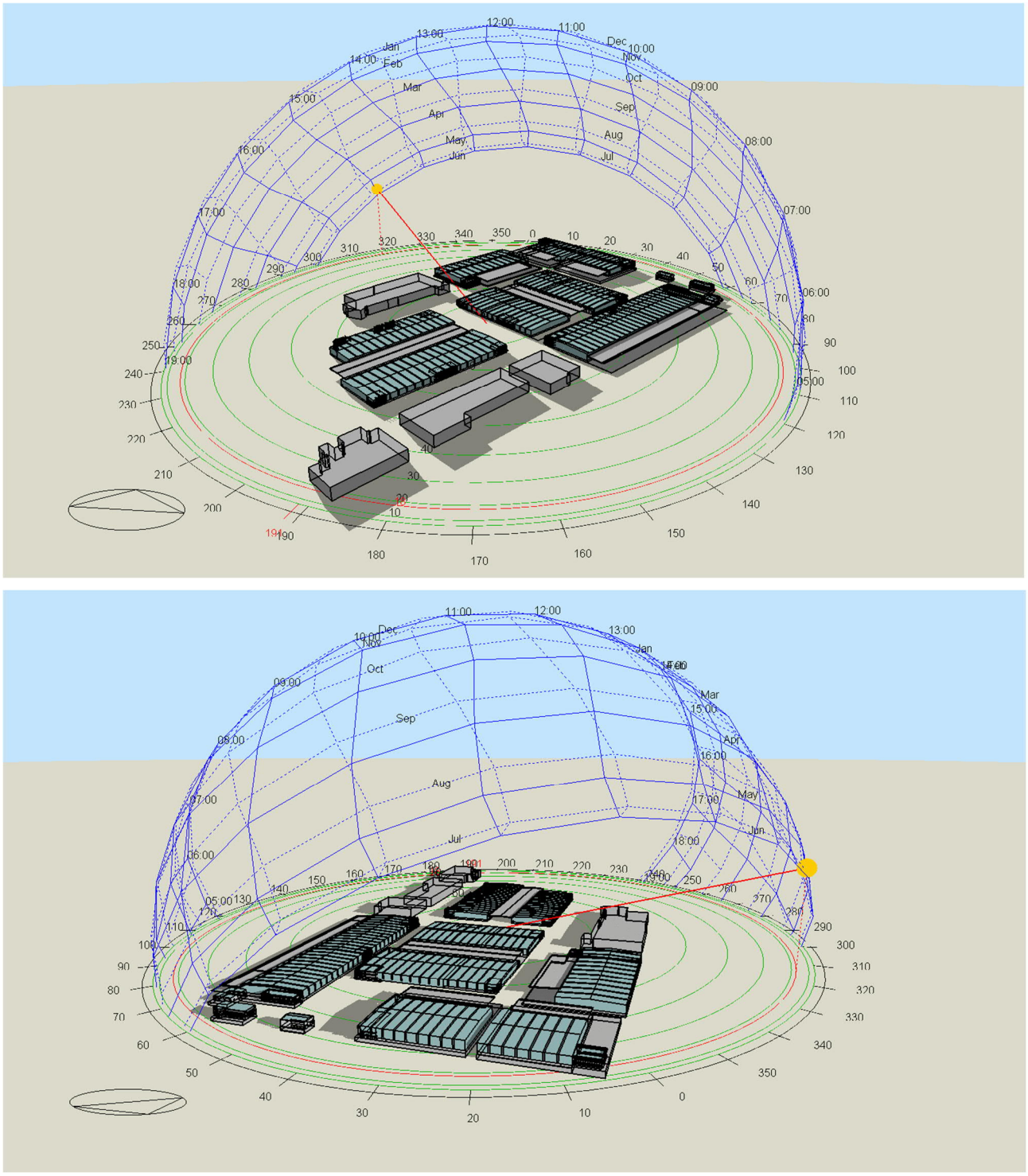


Figure 33: Renders of daylight model for the proposed development showing the sun-path at 3pm on 15th July

Daylight Modelling Methodology

The program DesignBuilder is a comprehensive analysis software package which uses the accurate physics-based Radiance simulation engine that utilise material types and finishes, glazing properties, reflectance off internal and external surfaces as well as local weather, latitude and longitude coordinates for the proposed site.

The analysis grid points are determined at floor surface level. Results are presented using Daylight Factor (DF) which is the percentage (%) of the available daylight under a design sky. The simulation was undertaken using the Uniform Cloudy Sky for Melbourne.

All building fabric which may overshadow the internal areas of the proposed development, such as screens, overhangs, balustrades and neighbouring buildings have been built in the model to provide an accurate simulation of the available light under the current proposed conditions.

Regular use spaces, such as the offices and warehouses have been included in this daylight assessment. Additional spaces within the building such as bathrooms and amenities, corridors and service areas are not deemed primary occupied spaces and have been excluded from the assessment.

Design and Performance

The daylight assessment was carried out with the same inputs as the thermal performance modelling, including the building geometry and orientation, and the following reflectivity (building fabric) / visible light transmittance (fenestration):

External glazing for the proposed development was modelled with the following Visible Light Transmittance (VLT) values, based on clear double glazing in aluminium framing:

	VLT
Fixed Windows (External)	0.26
Hinged Doors (External)	0.19
Sliding Doors (External)	0.22
Translucent Wall Sheeting	0.16
Sliding Windows (Internal)	0.60
Translucent Roof Sheeting	0.72

Alternative glazing options may be chosen during detailed design, however Office and Warehouse spaces must achieve the minimum percentage area over 2% daylight factor, as dictated below.

Other building fabric elements were modelled with the following reflectivity:

Building Fabric Element	Reflectivity
Precast Concrete	0.25
Metal Cladding	0.35
Spandrel	0.40
Plasterboard Lining	0.80
Ceiling Tiles	0.70
Carpet	0.10
Tiles	0.20
Vinyl	0.20
Bare Concrete	0.25
Ground	0.20

Results

The images in this section are lux/daylight factor maps exported from the modelling program DesignBuilder which were produced by the Radiance simulation engine. Please note that they are graphical representation of the results only, for accurate results please refer to the summaries in the following Tables.

Table 8: Summary of daylight analysis results

	Daylight Factor	Total Floor Area (m^2)	Floor Area Above Threshold (m^2)	Floor Area Above Threshold (%)
Offices	**2%**	36,464.7	968.8	2.7
Café	**2%**	347.1	82.4	23.7
Warehouses	**2%**	101,999.5	101,220.3	99.2
Development	**2%**	138,811.3	102,271.5	73.7

The table below presents a breakdown of the predicted daylight factors achieved in each space.

Table 9: Summary of daylight analysis results by zone

Floor	Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
Precinct 1				
1490 Centre Drive				
GF	Meeting Room	17.5	1.4	8.2
	Open Office	311.8	10.1	3.3
	Staff Room	54.5	0.5	1.0
FF	Open Office	396.0	59.6	15.0
WH	Warehouse	6,627.7	6,563.6	99.0
1500 Centre Drive				
GF	Meeting Room	17.9	17.1	95.5
	Open Office	306.2	41.1	13.4
	Staff Room	52.0	18.1	34.8
FF	Open Office	389.8	60.2	15.4
WH	Warehouse	12,780.6	12,663.6	99.1
5 McLaren Drive				
GF	Meeting Room	18.3	1.8	10.0
	Open Office	304.0	3.5	1.1
	Staff Room	49.0	0.0	0.0
FF	Open Office	371.0	31.6	8.5
WH	Warehouse	7,616.1	7,603.1	99.8
Precinct 2				
10 McLaren Drive				
GF	Meeting Room	17.9	11.1	61.8
	Open Office 1	80.1	4.0	4.9
	Staff Room	57.3	10.2	17.9

Floor	Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
FF	Open Office 1	172.1	19.5	11.3
WH	Warehouse	5,210.0	5,195.8	99.7
12 McLaren Drive				
GF	Meeting Room	12.6	7.6	60.0
	Open Office	85.1	5.9	7.0
	Staff Room	52.5	14.0	26.7
FF	Open Office	183.3	8.8	4.8
WH	Warehouse	5,212.7	5,205.1	99.9
16 McLaren Drive				
GF	Meeting Room	14.4	4.1	28.8
	Open Office	313.2	2.7	0.9
	Staff Room	75.2	7.6	10.1
FF	Open Office	453.2	14.8	3.3
WH	Undercroft	494.3	34.8	7.0
	Warehouse	9,058.6	9,050.2	99.9
1 Senator Drive				
GF	Meeting Room	12.2	1.4	11.7
	Open Office	103.4	0.0	0.0
	Staff Room	47.0	11.6	24.7
FF	Open Office	171.9	3.2	1.9
WH	Warehouse	3,601.5	3,601.5	100.0
3 Senator Drive				
GF	Meeting Room	12.2	0.8	6.7
	Open Office	103.4	0.0	0.0
	Staff Room	47.0	10.7	22.8
FF	Open Office	171.8	1.8	1.0
WH	Warehouse	4,589.4	4,578.1	99.8
Precinct 3				
10 Nursery Ave				
GF	Meeting Room	13.4	0.0	0.0
	Open Office	95.0	0.0	0.0
	Staff Room	51.4	0.0	0.0
FF	Open Office	173.2	2.9	1.7
WH	Warehouse	5,813.9	5,808.8	99.9
1550 Centre Road				
GF	Open Office	329.2	7.0	2.1
	Staff Room	77.9	9.2	11.8
FF	Open Office	415.6	31.7	7.6
WH	Warehouse	10,365.1	10,365.1	100.0
8 Nursery Ave				

Floor	Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
GF	Meeting Room	17.5	0.3	1.8
	Open Office	318.8	3.0	0.9
	Staff Room	60.3	0.7	1.2
FF	Open Office	421.6	35.9	8.5
WH	Warehouse	6,228.4	6,228.4	100.0
Building 9				
GF	Open Office	617.4	78.7	12.7
FF	Open Office	617.4	198.9	32.2
Building 15 Cafe				
	Cafe	126.9	85.4	67.3
Building 28				
	Gym	2313	2313	100
	Office	65.0	31.3	48.2
Precinct 4				
1 Nursery Ave				
GF	Meeting Room	13.6	0.6	4.3
	Open Office	92.5	0.5	0.5
	Staff Room	57.2	1.2	2.2
FF	Open Office	171.7	8.1	4.7
WH	Warehouse	4,303.1	4,293.5	99.8
2 McLaren Drive				
GF	Meeting Room	16.0	1.4	8.9
	Open Office	91.8	2.0	2.2
	Staffroom	60.2	0.5	0.8
FF	Open Office	173.2	11.5	6.6
WH	Warehouse	3,435.7	3,412.6	99.3
2 Senator Drive				
GF	Meeting Room	11.4	0.8	6.7
	Open Office	89.7	0.4	0.4
	Staff Room	51.5	1.5	2.9
FF	Open Office	162.7	17.7	10.9
WH	Warehouse	4,120.8	4,109.2	99.7
3 Nursery Ave				
GF	Open Office	106.2	0.0	0.0
	Staff Room	51.4	0.6	1.2
FF	Open Office	169.9	5.5	3.3
WH	Warehouse	3,017.7	3,017.7	100.0
4 McLaren Drive				
GF	Open Office	105.8	0.0	0.0
	Staff Room	51.7	1.9	3.6

Floor	Zone	Nominated Floor Area (m^2)	Floor Area Above Threshold (m^2)	Percentage of Floor Area Above Threshold (m^2)
FF	Open Office	163.8	10.2	6.2
WH	Warehouse	1,853.2	1,849.6	99.8
6 McLaren Drive				
GF	Open Office	105.8	0.0	0.0
	Staff Room	51.7	1.6	3.1
FF	Open Office	163.8	4.5	2.7
WH	Warehouse	1,853.2	1,849.4	99.8
8 McLaren Drive				
GF	Open Office	105.4	2.8	2.7
	Staff Room	51.7	1.6	3.1
FF	Open Office	163.5	19.1	11.7
WH	Warehouse	2,799.9	2,789.3	99.6
9 Nursery Ave				
GF	Open Office	106.2	0.0	0.0
	Staff Room	51.4	1.0	1.9
FF	Open Office	169.9	3.8	2.2
WH	Warehouse	3,017.7	3,000.9	99.4

Lux/Daylight Factor Map Legend

- Grey < 2.0% DF (non-compliant area)
- Blue to Red > 2.0% DF (compliant area)

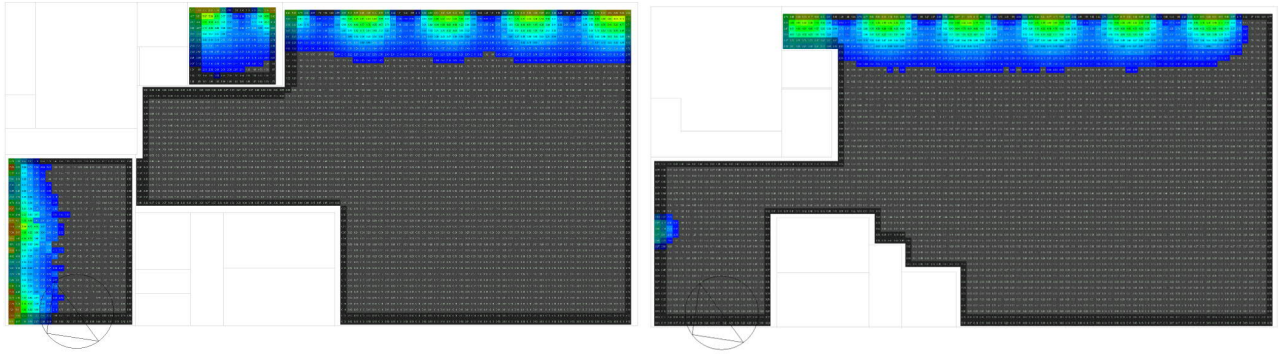


Figure 34: Daylight Factor Map for 1500 Centre Road Ground Floor (Left) and First Floor (Right)

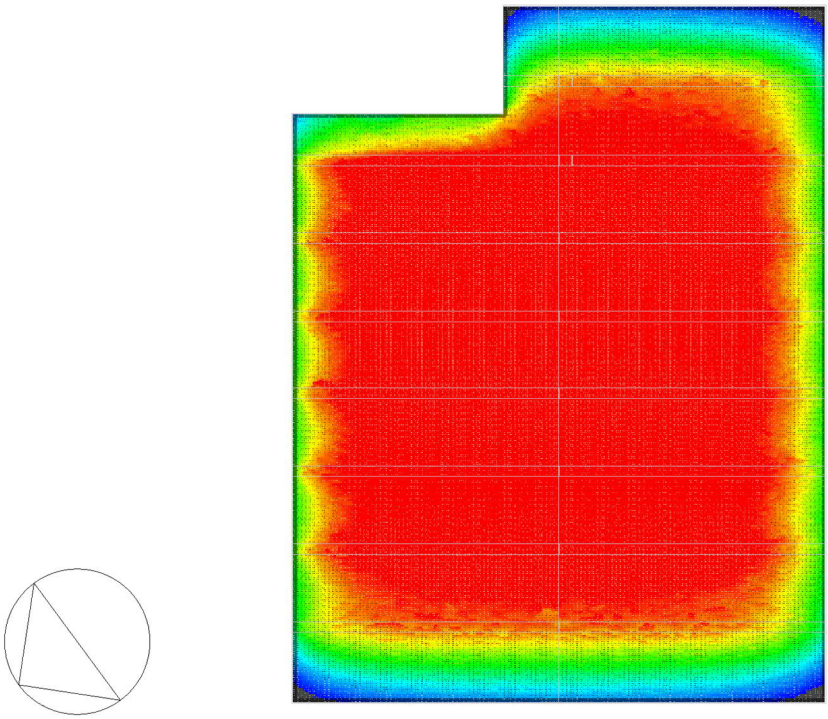


Figure 35: Daylight Factor Map for 1500 Centre Road Warehouse

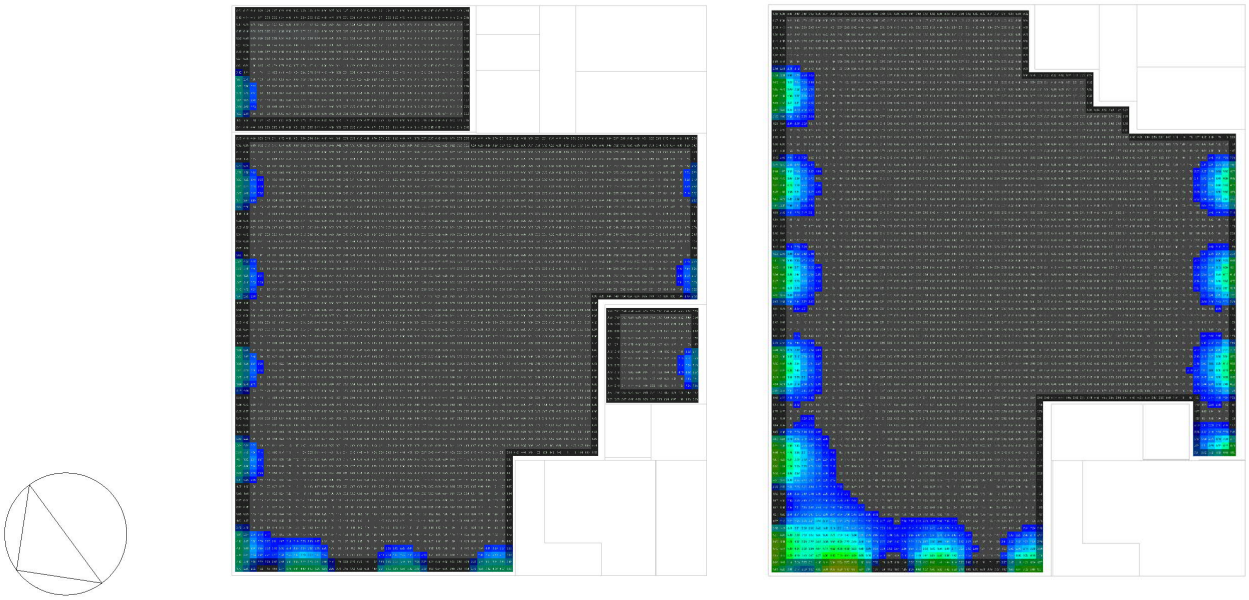


Figure 36: Daylight Factor Map for 1490 Centre Road Ground (Left) and First Floor (Right)

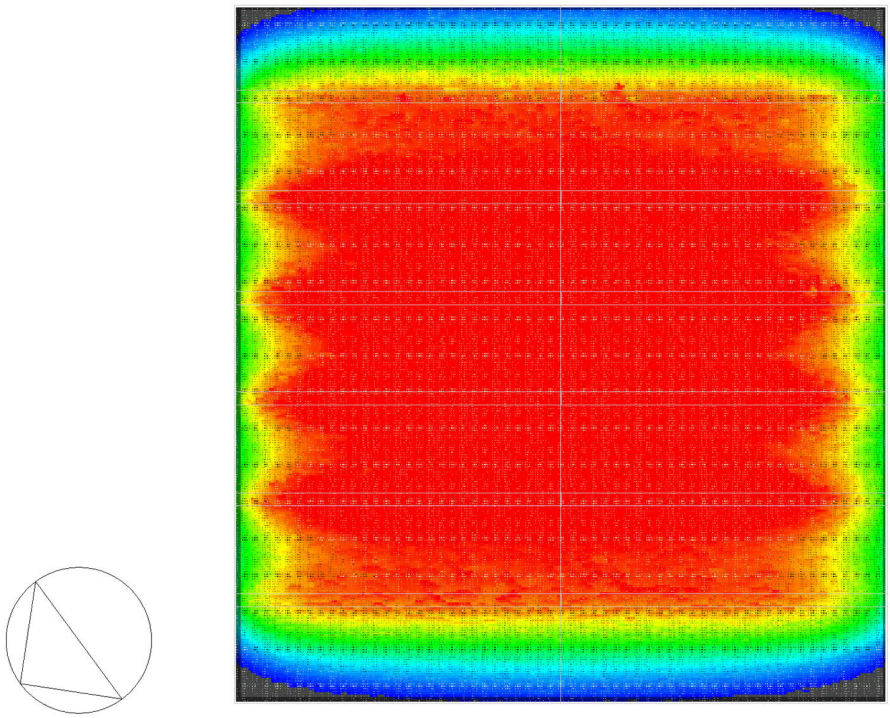


Figure 37: Daylight Factor Map for 1490 Centre Road Warehouse

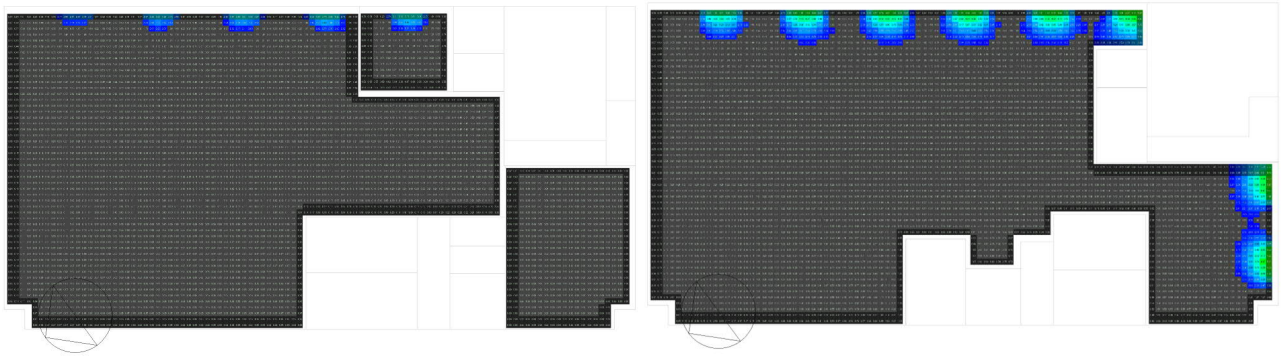


Figure 38: Daylight Factor Map for 5 McLaren Drive Ground Floor (Left) and First Floor (Right)

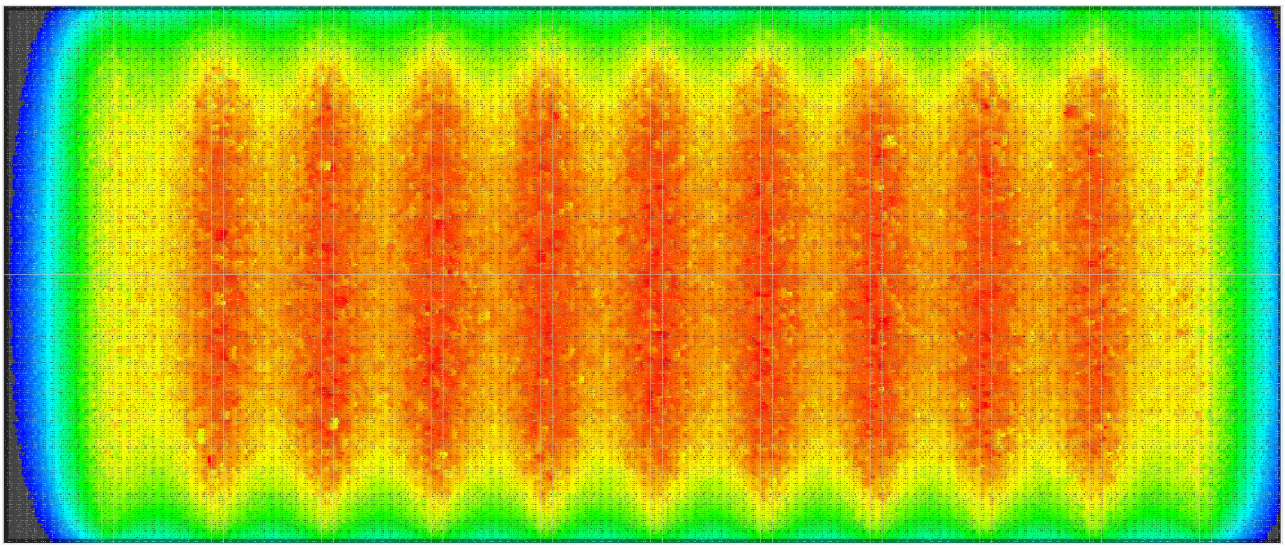


Figure 39: Daylight Factor Map for 5 McLaren Drive Warehouse

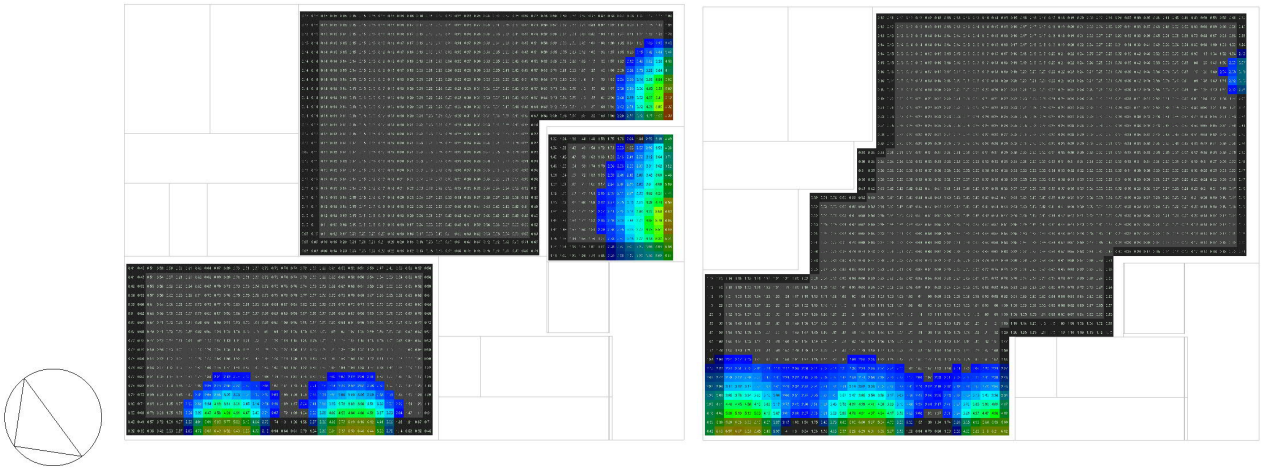


Figure 40: Daylight Factor Map for 10 McLaren Drive Ground Floor (Left) and First Floor (Right)

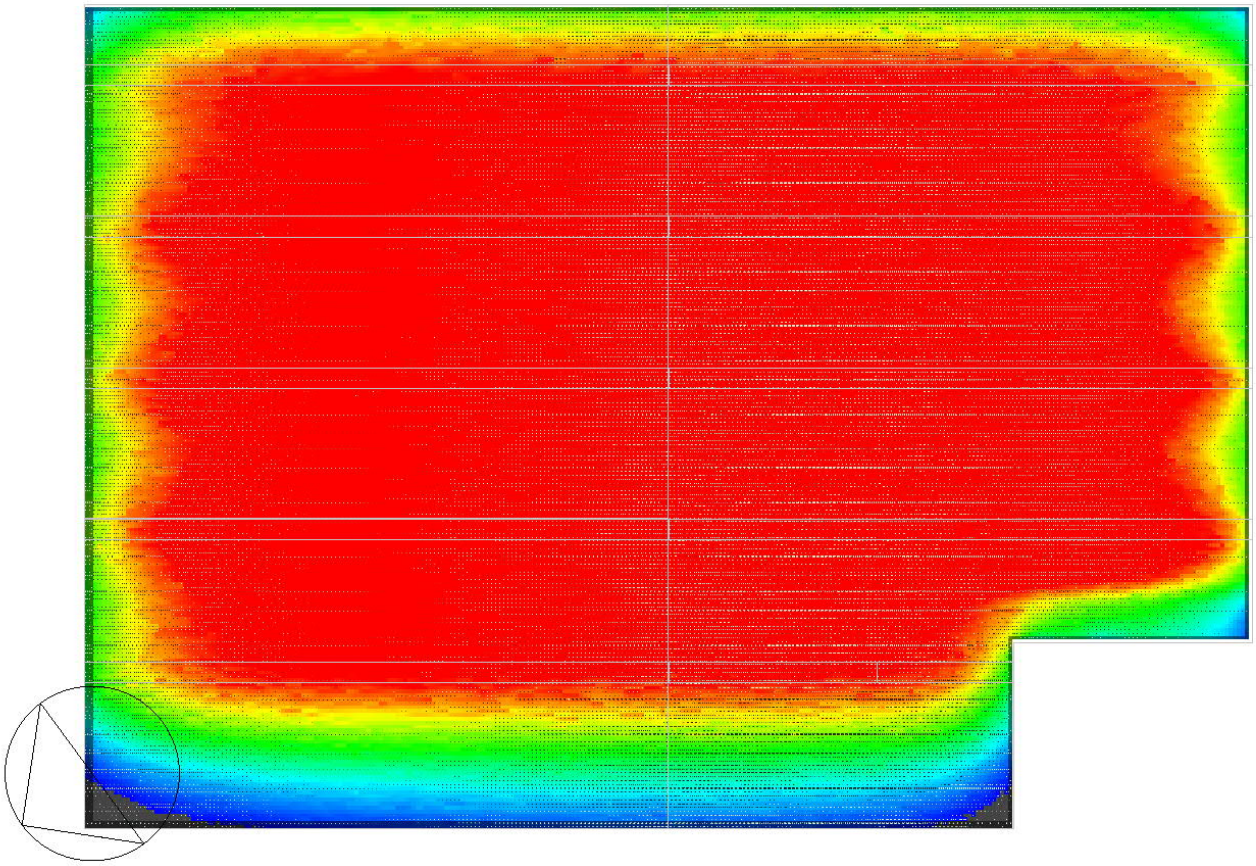


Figure 41: Daylight Factor Map for 10 McLaren Drive Warehouse

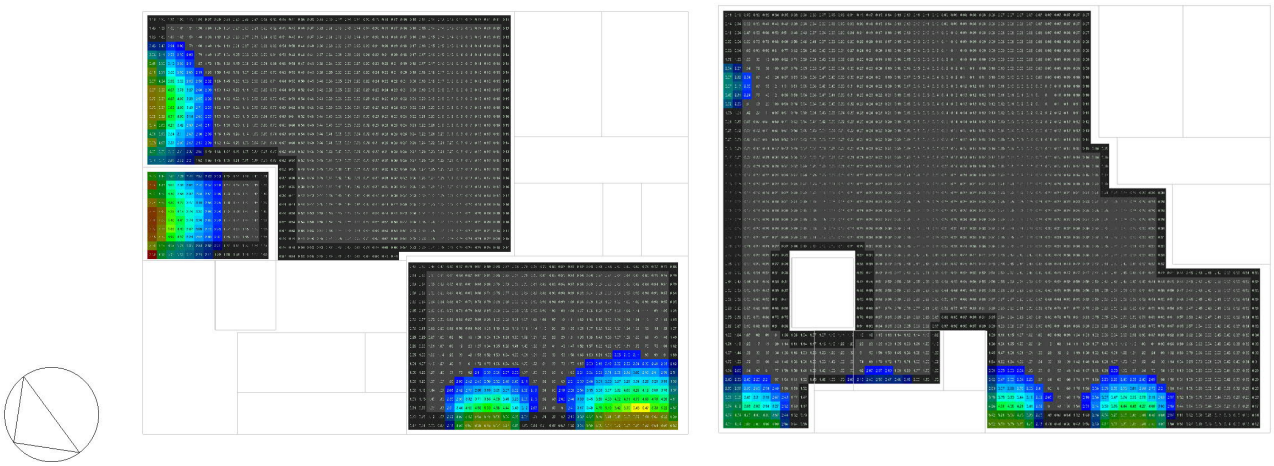


Figure 42: Daylight Factor Map for 12 McLaren Drive Ground Floor (Left) and First Floor (Right)

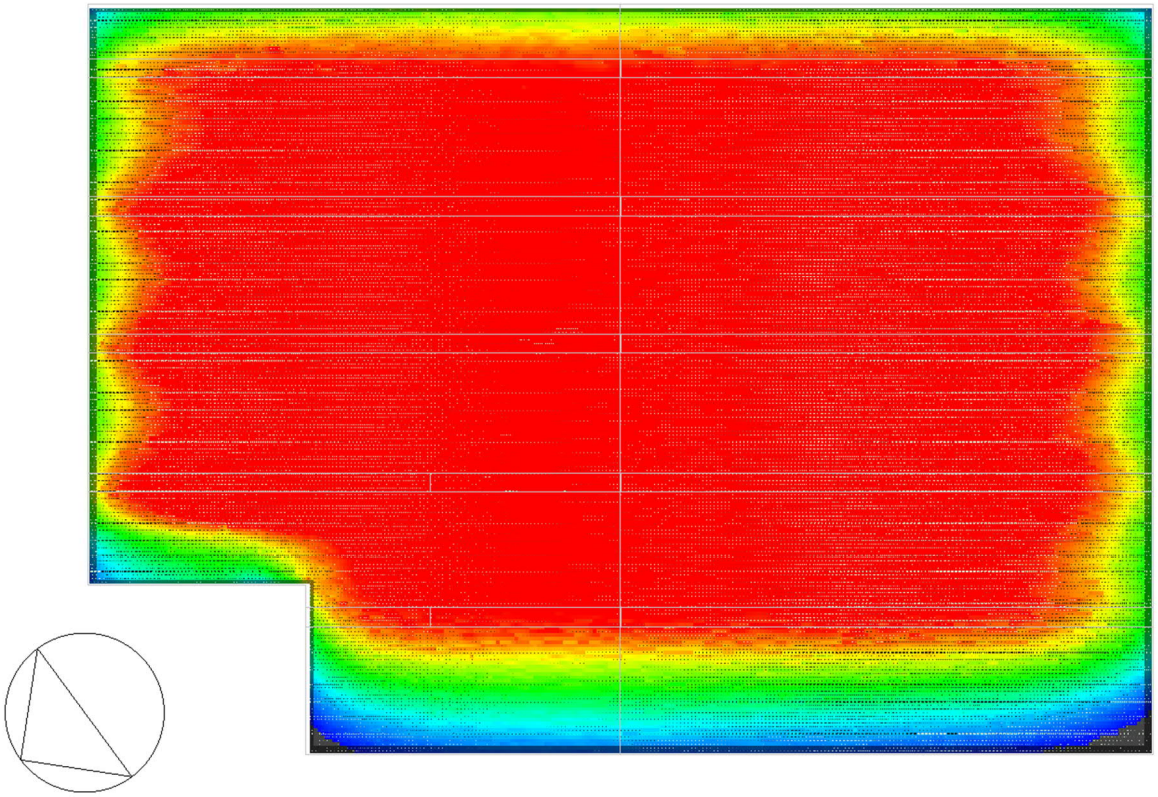


Figure 43: Daylight Factor Map for 12 McLaren Drive Warehouse

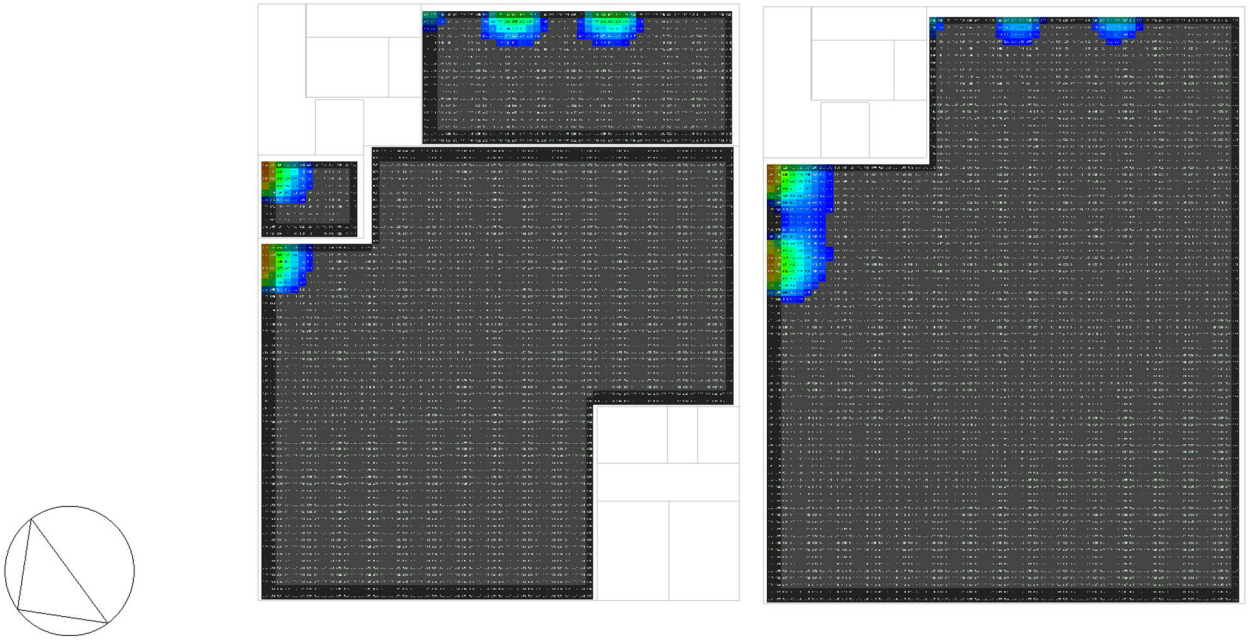


Figure 44: Daylight Factor Map for 16 McLaren Drive Ground Floor (Left) and First Floor (Right)

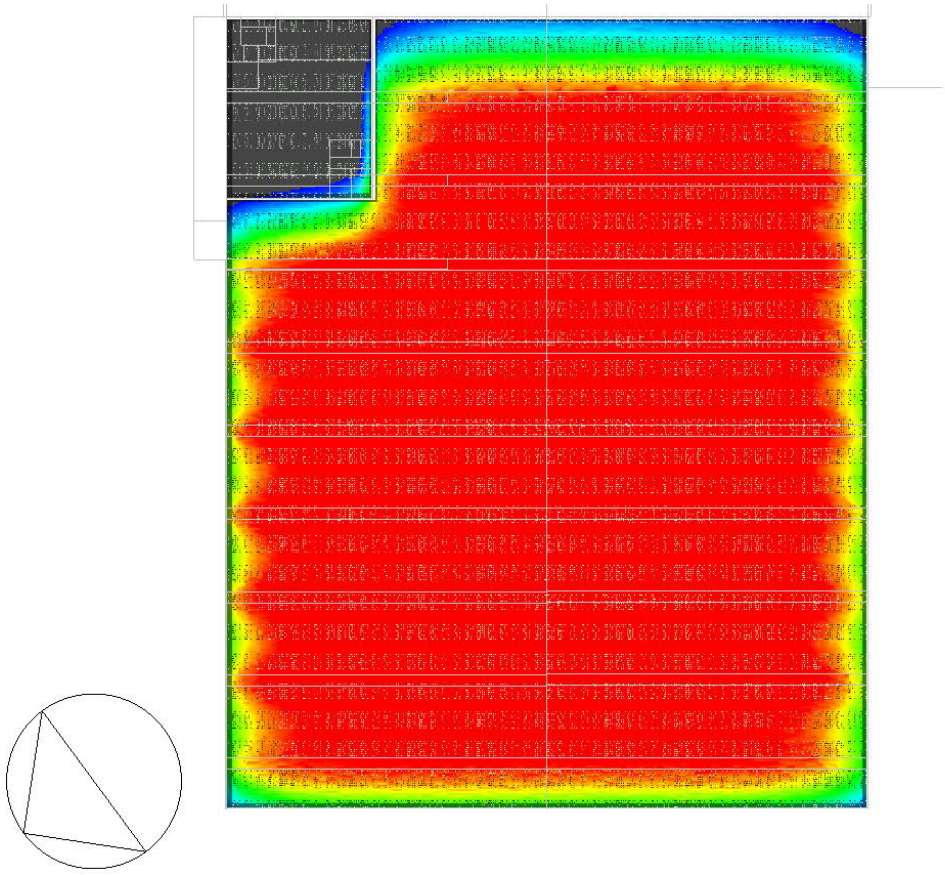


Figure 45: Daylight Factor Map for 16 McLaren Drive Warehouse

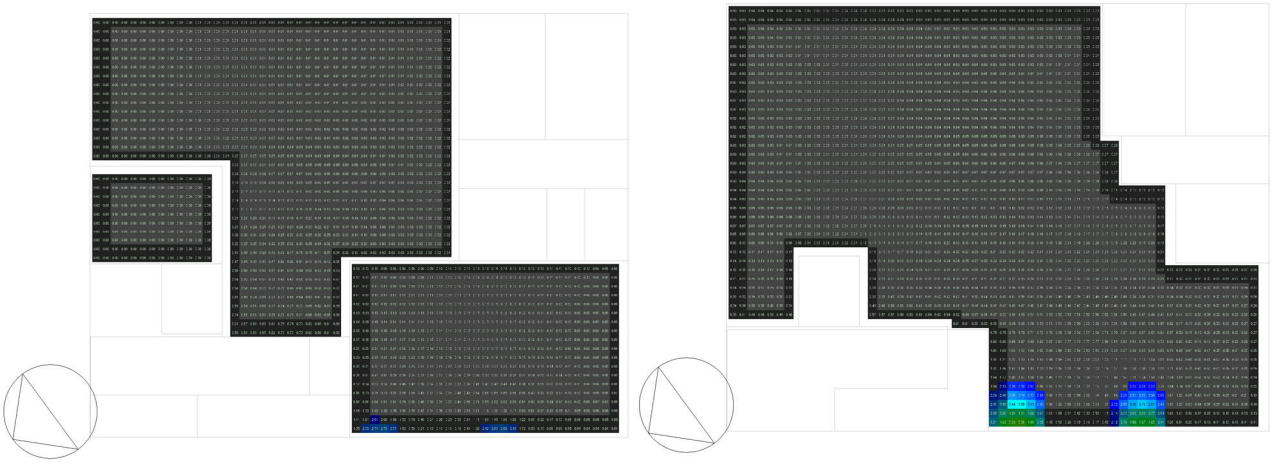


Figure 46: Daylight Factor Map for 10 Nursery Ave Ground Floor (Left) and First Floor (Right)

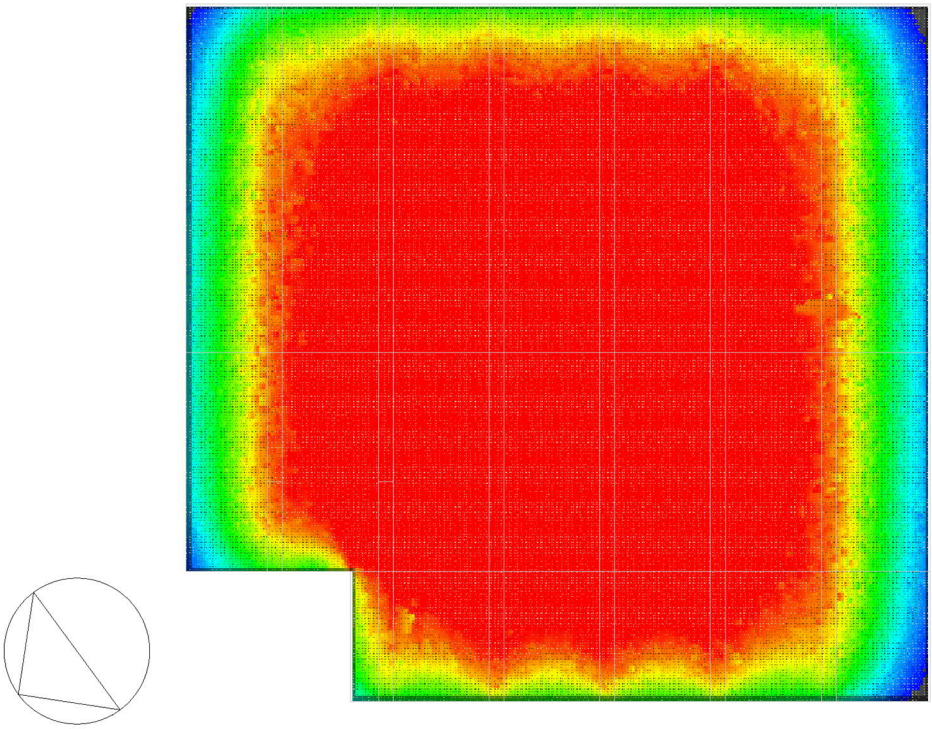


Figure 47: Daylight Factor Map for 10 Nursery Ave Warehouse

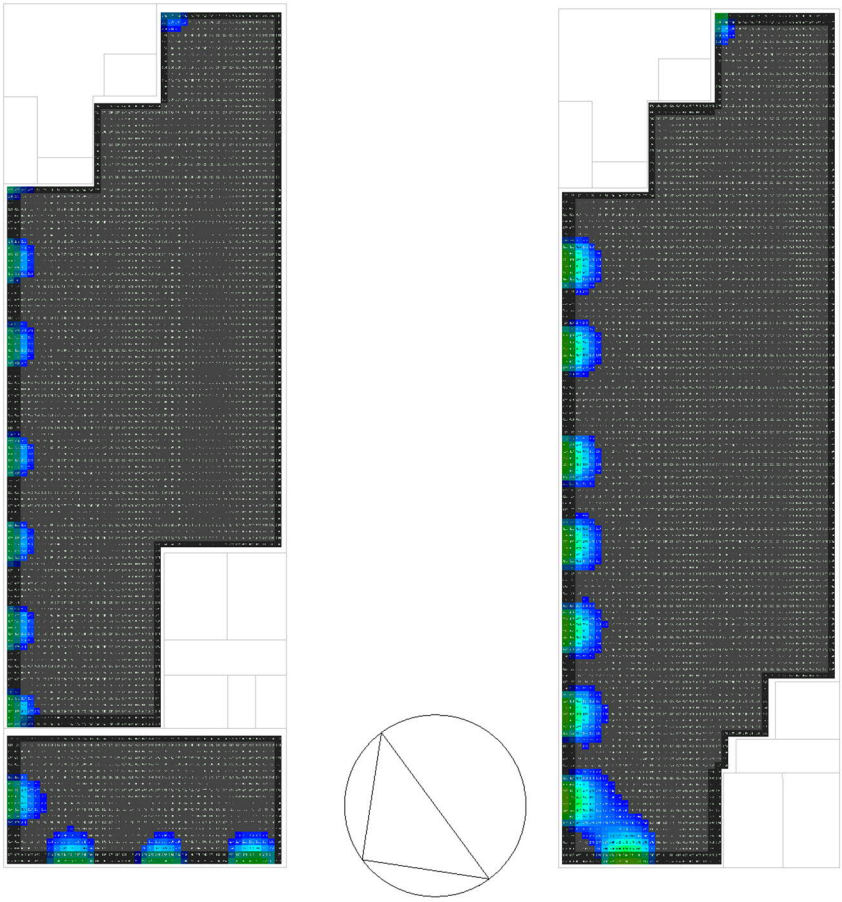


Figure 48: Daylight Factor Map for 1550 Centre Road Ground Floor (Left) and First Floor (Right)

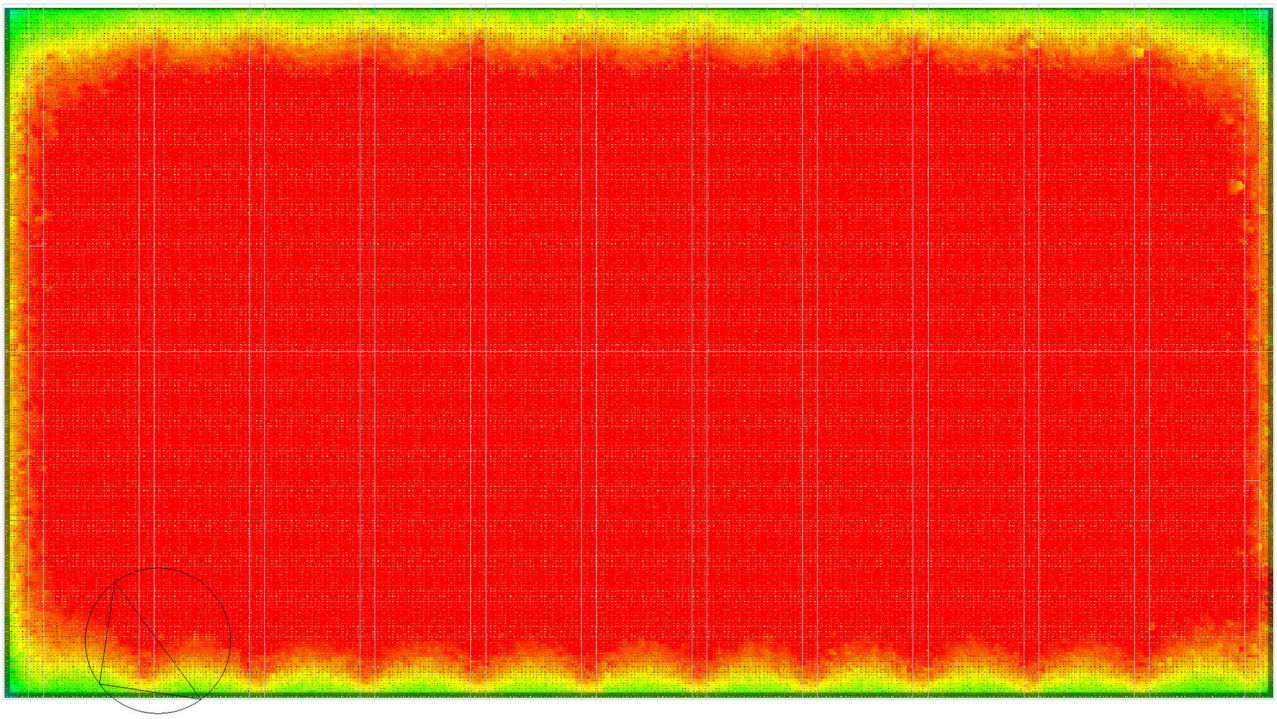


Figure 49: Daylight Factor Map for 1550 Centre Road Warehouse

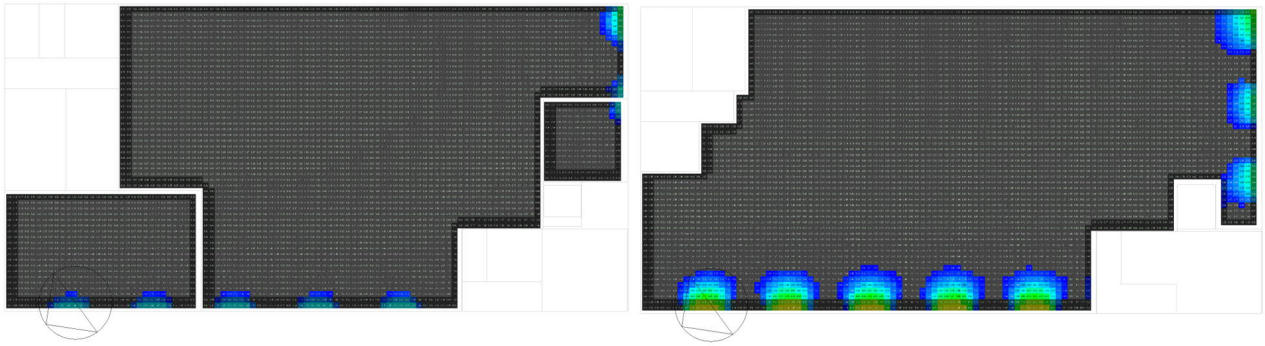


Figure 50: Daylight Factor Map for 8 Nursery Ave Ground Floor (Left) and First Floor (Right)

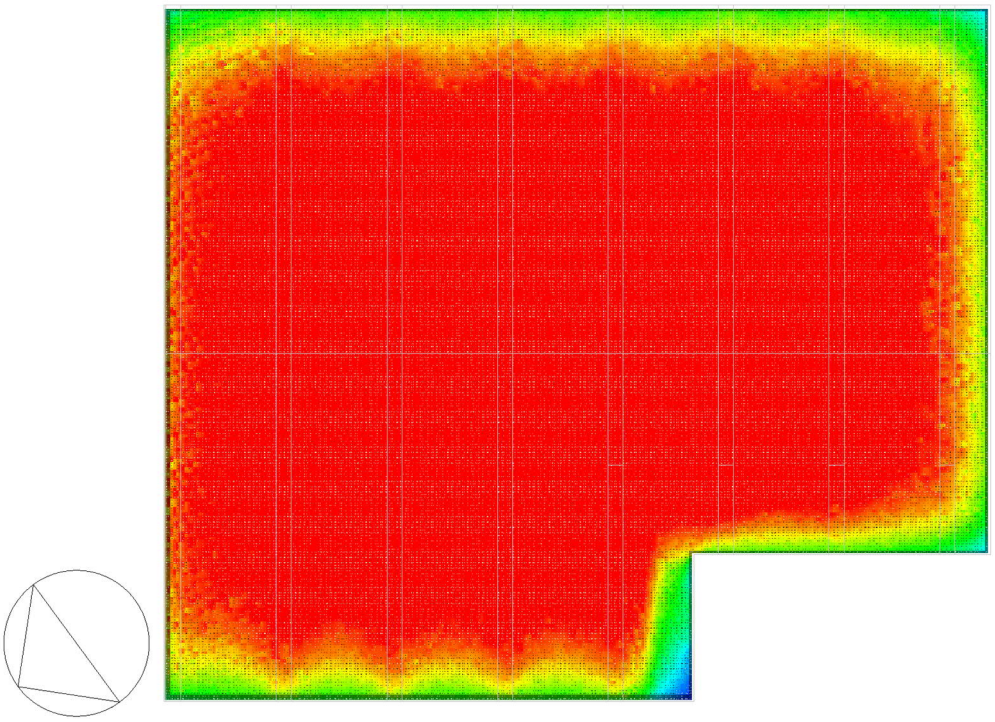


Figure 51: Daylight Factor Map for 8 Nursery Ave Warehouse

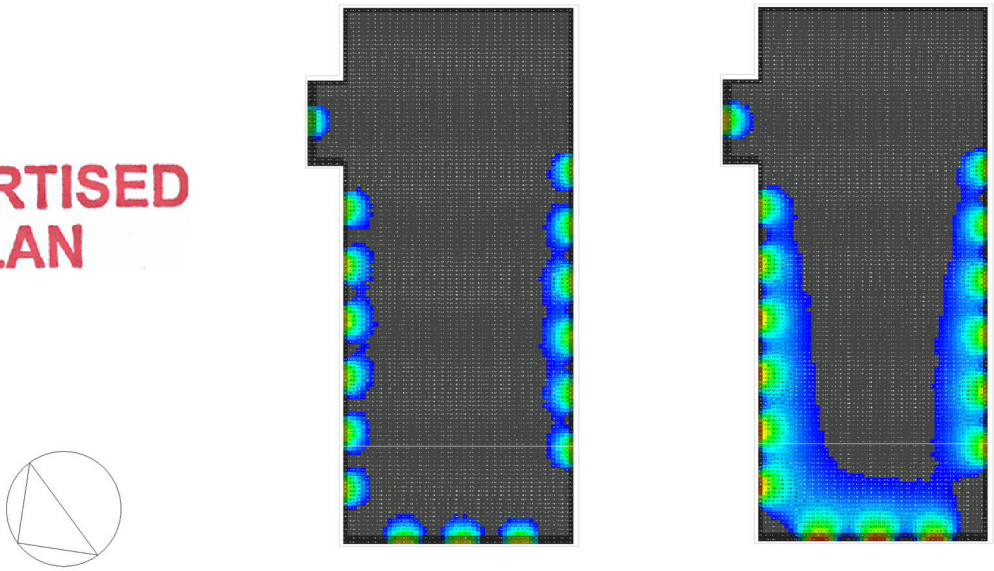


Figure 52: Daylight Factor Map for Building 9

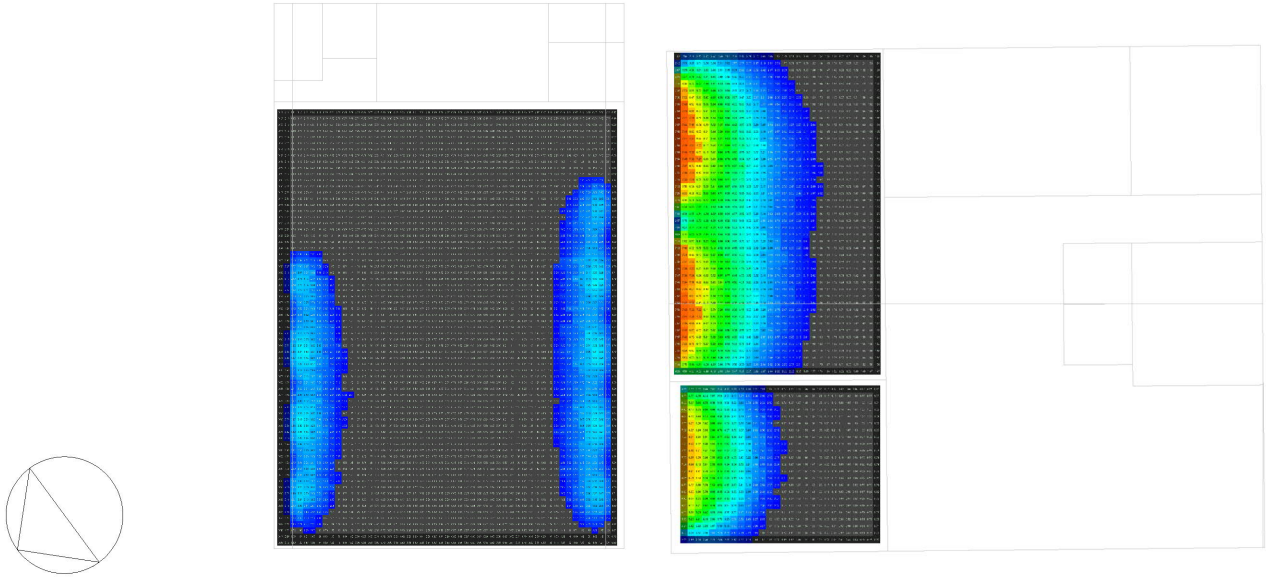


Figure 53: Daylight Factor Map for Building 15 Café (Left) and Building 28 (Right)

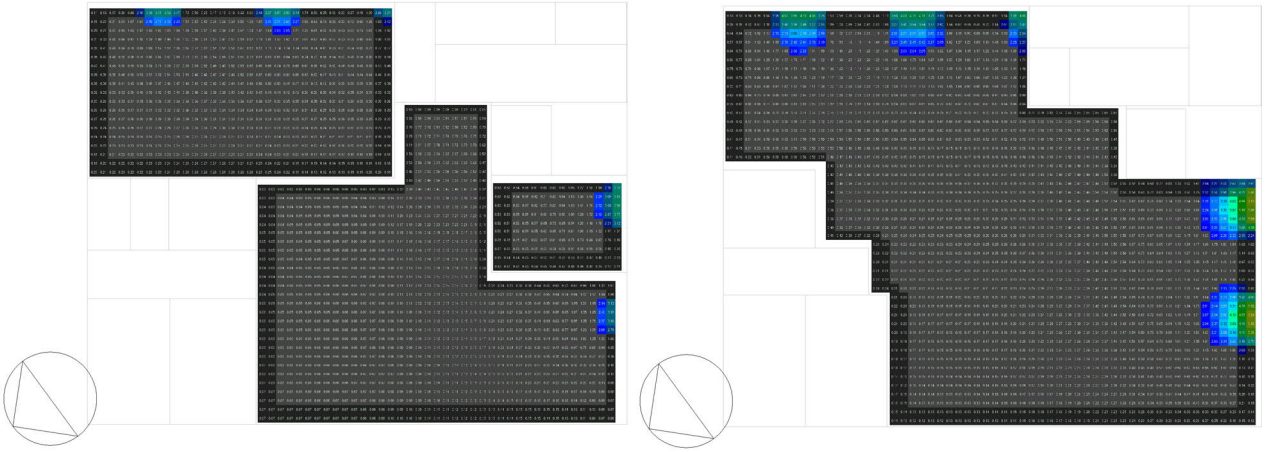


Figure 54: Daylight Factor Map for 1 Nursery Ave Ground Floor (Left) and First Floor (Right)

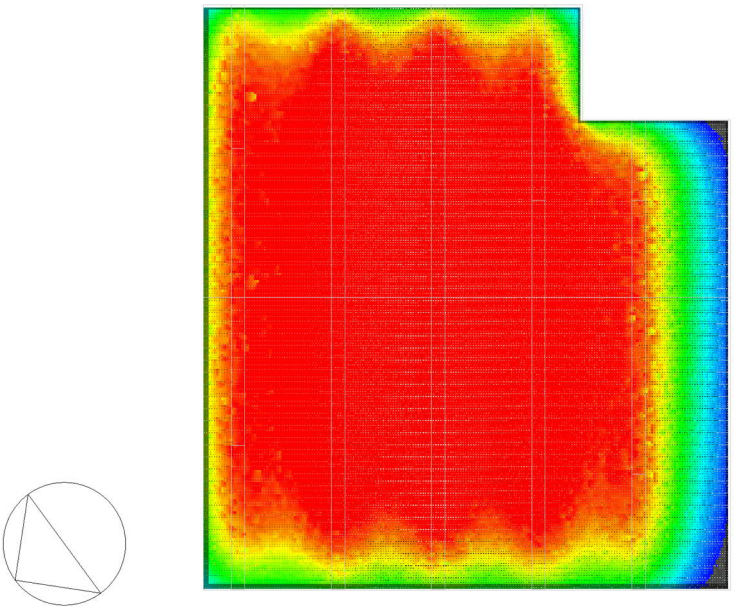


Figure 55: Daylight Factor Map for 1 Nursery Ave Warehouse

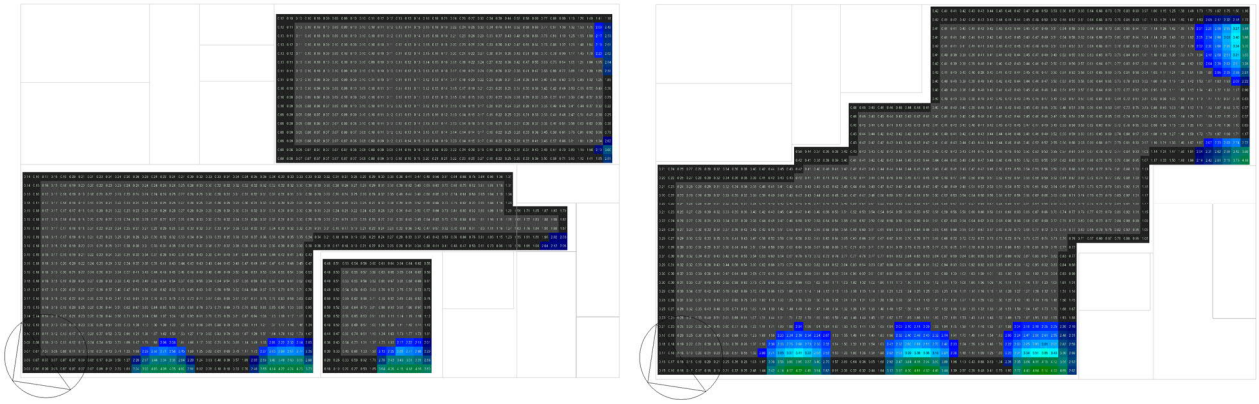


Figure 56: Daylight Factor Map for 2 McLaren Drive Ground Floor (Left) and First Floor (Right)

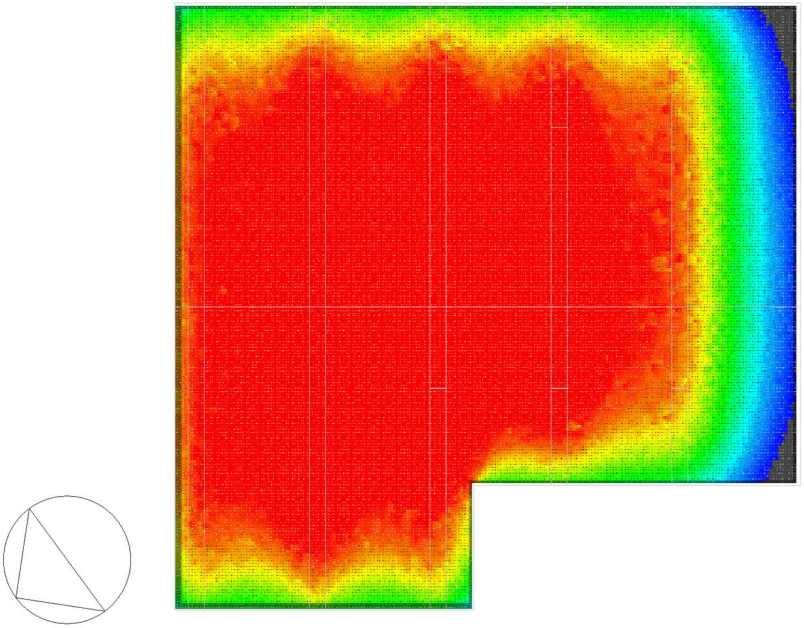


Figure 57: Daylight Factor Map for 2 McLaren Drive Warehouse

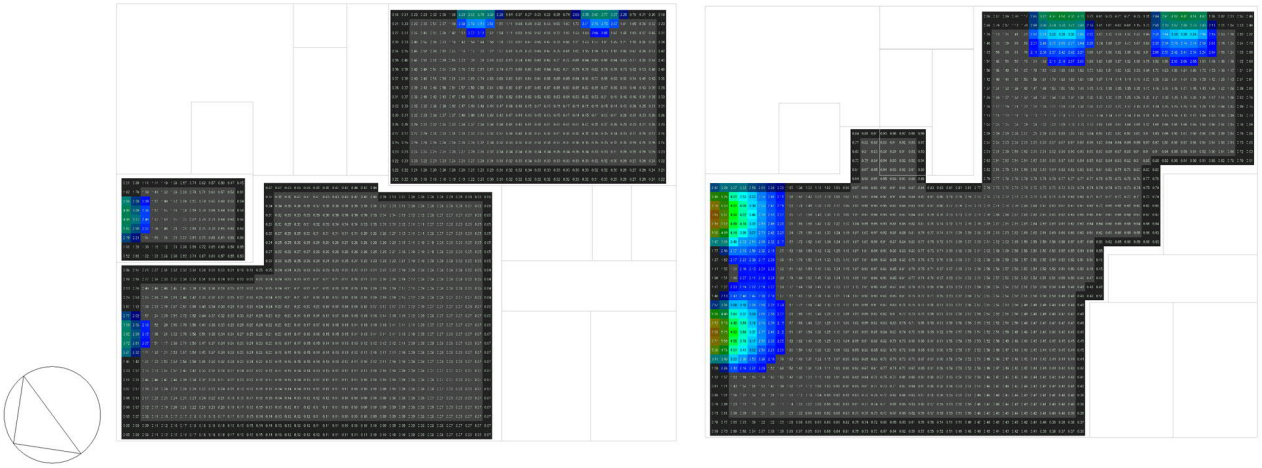


Figure 58: Daylight Factor Map for 2 Senator Drive Ground Floor (Left) and First Floor (Right)

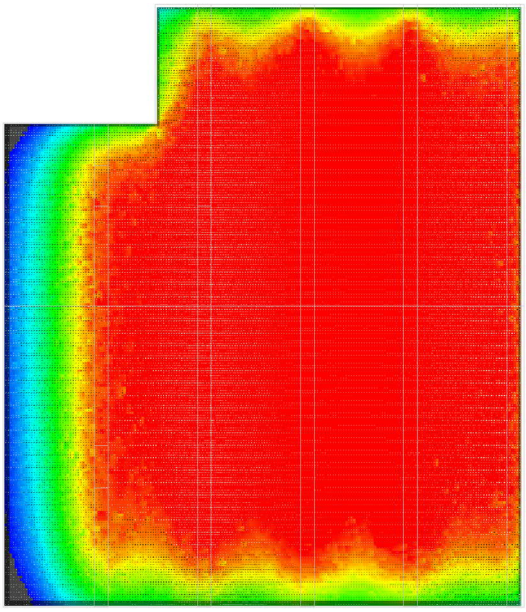


Figure 59: Daylight Factor Map for 2 Senator Drive Warehouse

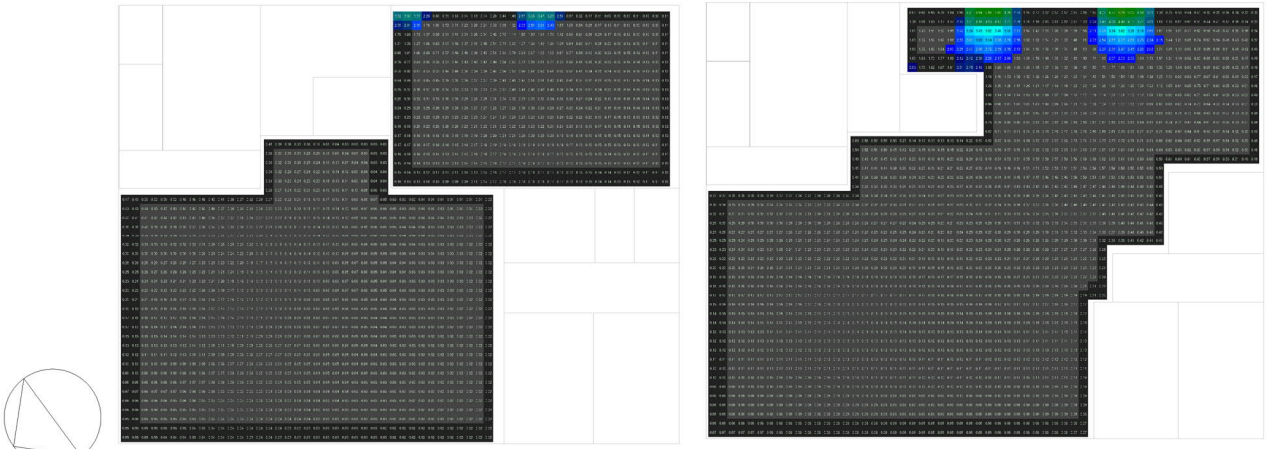


Figure 60: Daylight Factor Map for 3 Nursery Ave Ground Floor (Left) and First Floor (Right)

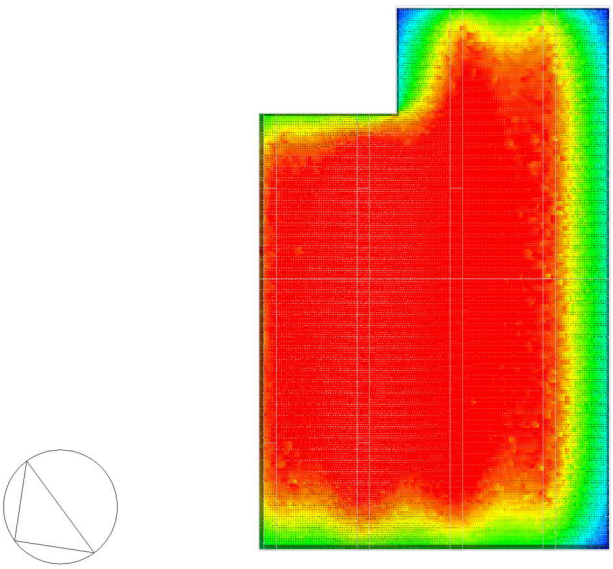


Figure 61: Daylight Factor Map for 3 Nursery Ave Warehouse

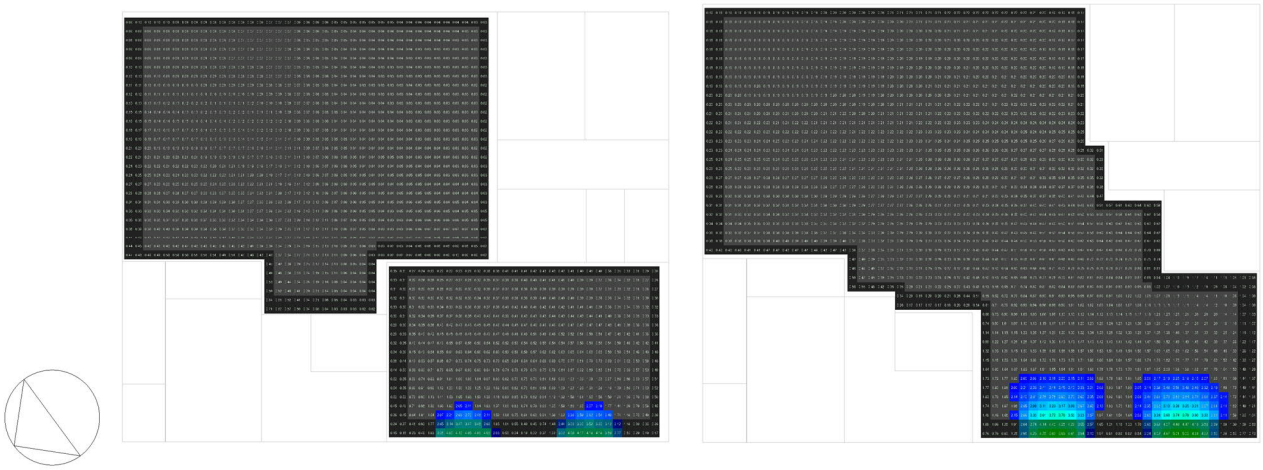


Figure 62: Daylight Factor Map for 4 McLaren Drive Ground Floor (Left) and First Floor (Right)

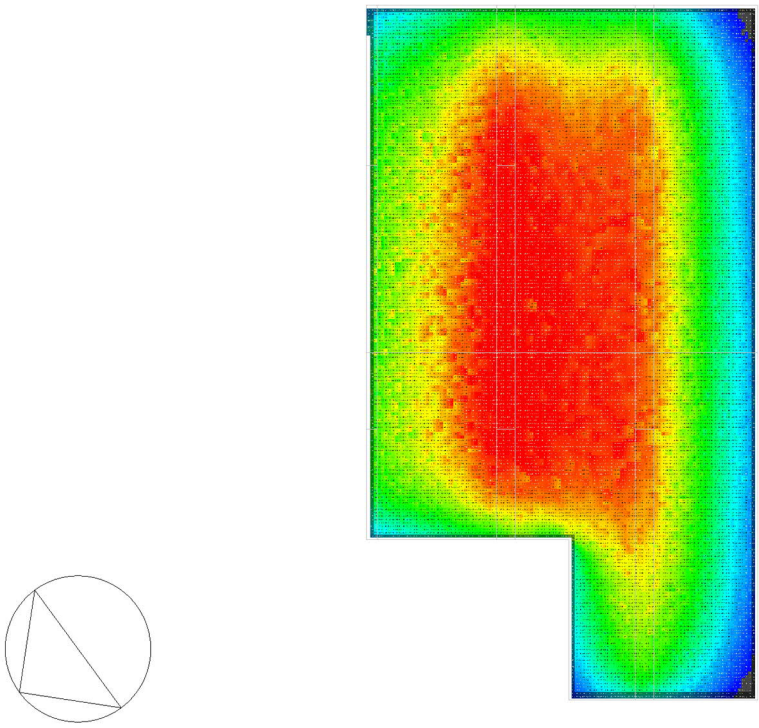


Figure 63: Daylight Factor Map for 4 McLaren Drive Warehouse

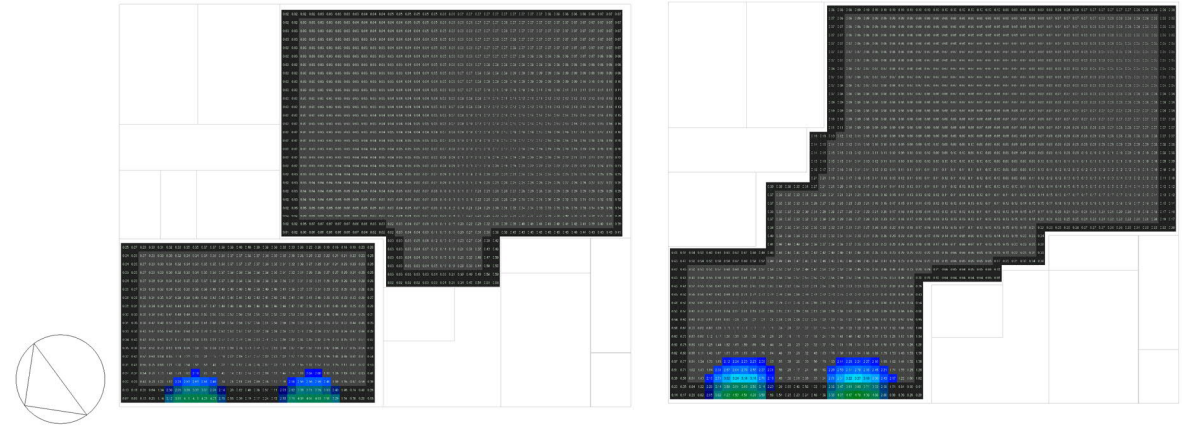


Figure 64: Daylight Factor Map for 6 McLaren Drive Ground Floor (Left) and First Floor (Right)

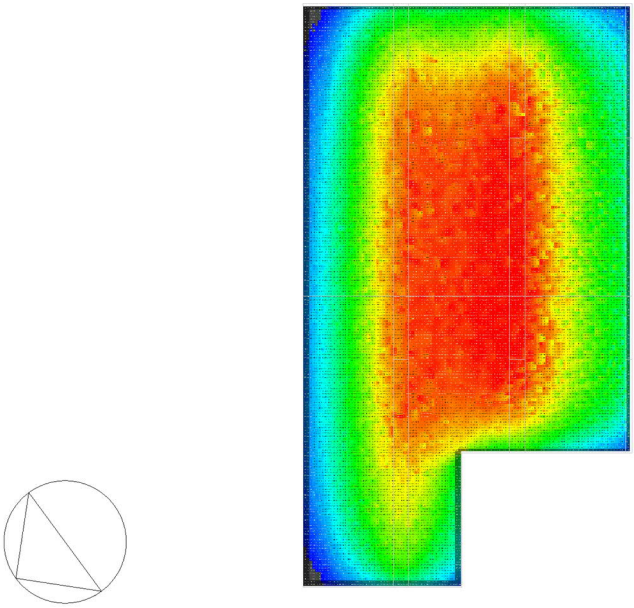


Figure 65: Daylight Factor Map for 6 McLaren Drive Warehouse

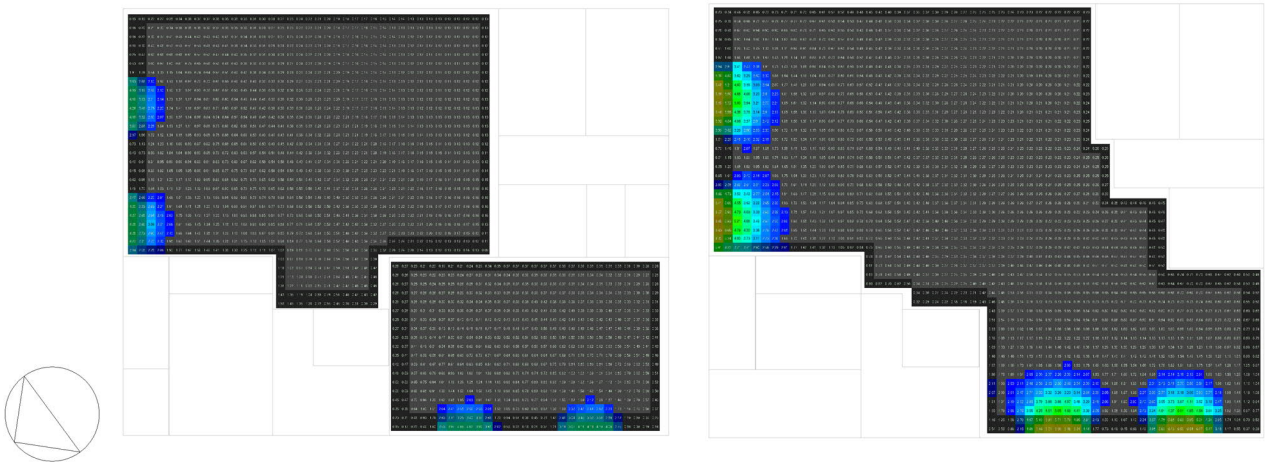


Figure 66: Daylight Factor Map for 8 McLaren Drive Ground Floor (Left) and First Floor (Right)

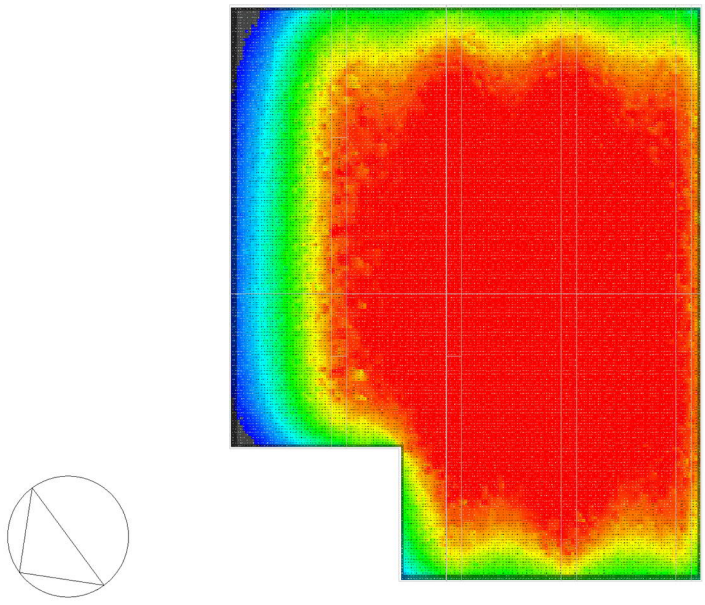


Figure 67: Daylight Factor Map for 8 McLaren Drive Warehouse

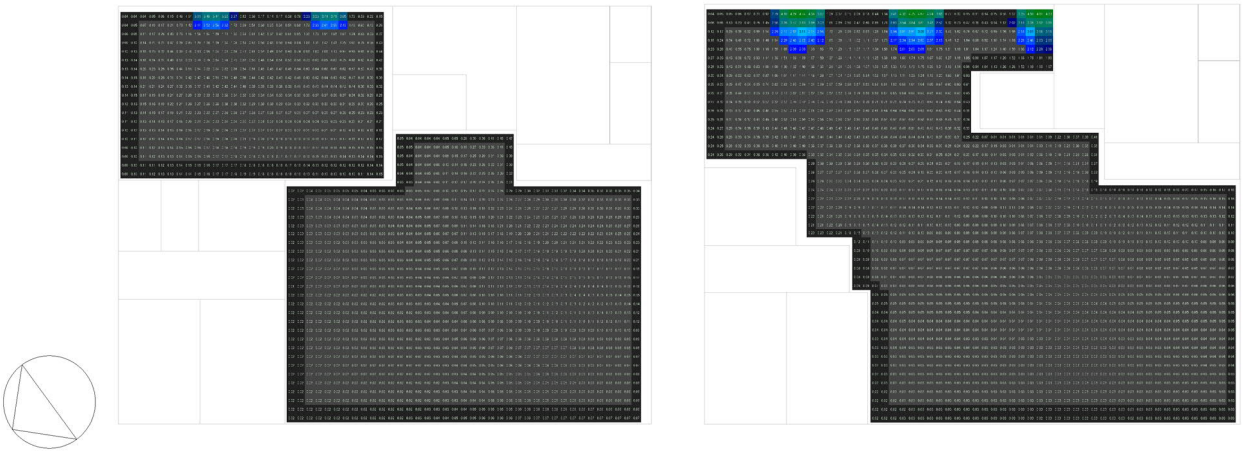


Figure 68: Daylight Factor Map for 9 Nursery Ave Ground Floor (Left) and First Floor (Right)

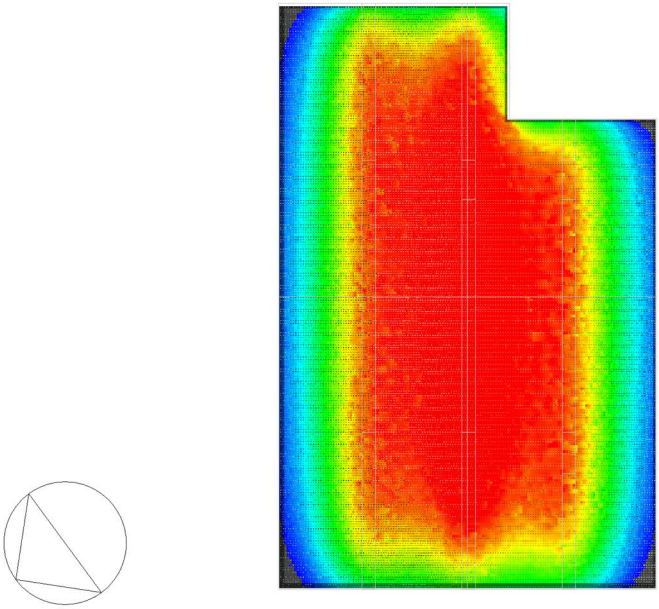


Figure 69: Daylight Factor Map for 9 Nursery Ave Warehouse

Appendix 4 – Water Sensitive Urban Design Report

Objectives

The quality and quantity of stormwater leaving a site can have a significant impact on the surrounding infrastructure and waterways. Impervious surfaces move water quickly and efficiently out of built-up areas straight into stormwater infrastructure, which in turn quickly moves the untreated water into natural watercourses. This process does not treat the stormwater and as the water flows into natural water courses, it causes erosion and pollution of those waterways with the rubbish, sediments, pathogens, and other pollutants that run off the impervious surfaces into the stormwater drains.

New developments in the City of Kingston must comply with *Clause 53.18* and the best practice performance targets for suspended solids, total phosphorous and total nitrogen, as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999. Currently, these water quality performance targets require:

- 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.

New developments must also incorporate infrastructure and landscaping measures that improve the quality of water and reduce flow of water discharged into waterways (such as collection and use of rainwater/stormwater on site) and encourage the use of measures to prevent litter being carried off-site in stormwater flows.

Stormwater Management Plan by Others

Spiire have prepared an Integrated Water Management plan as required under the Kingston City Council Planning Scheme requirements to best practice environmental management guidelines are met.

Stormwater Harvesting

In addition to meeting stormwater quality objectives, the development will also include measures for the retention and re-use of stormwater on-site. This will help to reduce both the amount of stormwater leaving the site and amount of potable water used on site.

Toilet & Urinals Flushing Demand: 1,821kL/year with 4-star WELS rated toilets & 6-star WELS rated urinals.

Rainwater tanks with a minimum total capacity of 135kL will be installed across the site in locations designed to minimise pumping energy and supply non-potable water to where it is most usable. Catchment into these tanks will be maximised to help ensure water supply to irrigation and toilets/urinals across the development.

Management and Maintenance Guidelines

Inspections and maintenance of the proposed stormwater treatment systems should occur regularly to ensure their ongoing performance. It is the responsibility of the facility maintenance to ensure the appropriate measures are undertaken for the rainwater tank maintenance. Some general maintenance requirements are provided in the table below. However, any specific maintenance requirements nominated by the product's manufacturer may also apply and would supersede those outlined below. The proposed system will be nominated at the detailed design stage.

Rainwater Tanks

Task	When?	Requirement
Inspect rainwater tanks	Every 6 months	- Check for any damage/compression - Check any blockage of first flush diverter - Correct operation of potable mains back up switch - Check that mesh covers have not deteriorated and intact. - Check that supporting base is free of cracks and movement. - Mosquito infestation
	Every 3-5 years	- Sludge Build up – if sludge build up occurs a vacuum tank needs to be called out to site
Inspect pumps	Every 2 years	- Serviced to prolong the pump life
Inspect roofs & gutters	Every 6 months	- Clean out of leaves / debris - Remove any overhanging branches onsite

Disposal of Waste Materials

The accumulated pollutants found in the stormwater treatment systems must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid waste.

Stormwater Runoff Treatment during the Construction Stage

Treatment – Various

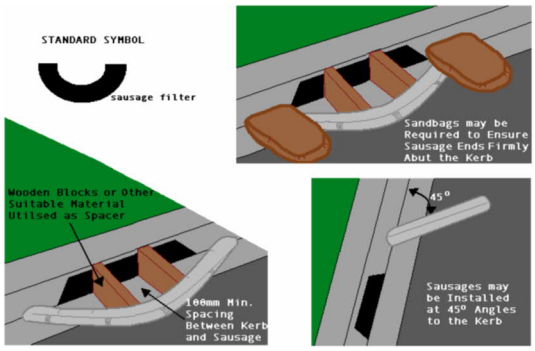
Stormwater management in the construction stage will include measures which will be put in place to minimise the likelihood of contaminating stormwater discharge from the site as well as reduce the velocity of the flows generated from the building as it is being constructed. This will mean ensuring buffer strips are in place, and the site will be kept clean from any loose rubbish. More information is available from "*Keeping Our Stormwater Clean – A Builder's Guide*" by Melbourne Water[1]. The diagram below is an illustration of the various objectives which assist in minimising the impacts of stormwater runoff typical during the construction phase. Typical pollutants that are generated from a construction site during a rainfall event include:

[1] For copies please contact Melbourne Water on 131 722.

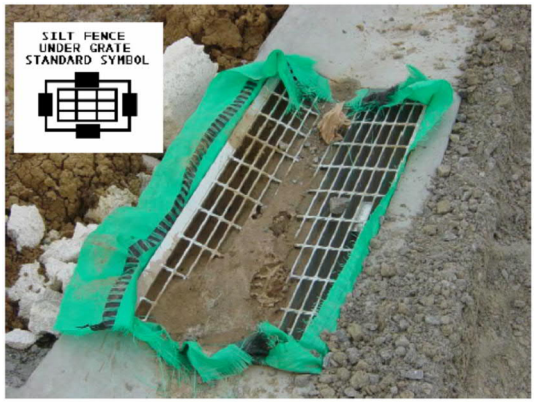
- Dust
- Silt
- Mud
- Gravel
- Stockpiled materials
- Spills/oils
- Debris/litter

To reduce the impacts and minimise the generation of these pollutants the following measures are proposed. The symbols embedded within each image are typically used for Construction Environmental Management Plans.

Gravel Sausage filters – to be placed at the entrance of pits/side stormwater inlets. These permeable sacks will filter the suspended soils and sediments and any other litter carried by the stormwater to prevent the pollutants entering the system.



Silt Fences Under Grates - Silt fence material may be placed under the grate of surface-entry inlets to prevent sediment from entering the stormwater system.



Temporary Rumble Grids – these are designed to open the tread on tires and vibrate mud and dirt off the vehicle (in particular the chassis). This will heavily minimise the amount of soil/dirt deposited on local roads where it can be washed (by rainfall or other means) into the stormwater drains.

Appendix 5 – Green Star VOC and Formaldehyde Limits

Table 10: Maximum Volatile Organic Compound Levels for construction materials (Source: Green Building Council Australia – Green Star Buildings Submission Guidelines Version 1, 2021)

Product Type/Sub Category	Max TVOC Content (g/L of ready-to-use-product)
Paints, Adhesives and Sealants	
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
Carpets	
Total VOC limit	0.5 mg/m² per hour
4-PC (4-Phenylcyclohexene)	0.05mg/m² per hour
ISO 16000 / EN 13419 - TVOC at three days	0.5 mg/m² per hour
ISO 10580 / ISO/TC 219 (Document N238) - TVOC at 24 hours	0.5 mg/m² per hour

Table 11: Maximum Formaldehyde levels for processed wood products. (Source: Green Building Council Australia – Green Star Buildings Submission Guidelines Version 1, 2021)

Formaldehyde emission limit values for different testing methods	
Test Method	**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