



Sustainable Design Report
Wallace Wurth
Redevelopment
University of New South
Wales

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1. Executive Summary

The Wallace Wurth Redevelopment project is an example of re-living an existing building through appropriate additions and consideration of sustainability principles. The project will incorporate sustainable design initiatives that will result in improved energy efficiency, materials minimisation, waste management, water efficiency, reduced operational emissions and improved indoor comfort. The proposed works will add around 8,000m² of new teaching and laboratory spaces to cater for the additional needs of The University of New South Wales.

Sustainability Targets

The University of New South Wales 2020 Development Control Plan (DCP) contains detailed planning provisions for sustainability objectives that are to be met for all new capital works projects that relate to:

- Ensuring sustainability is a fundamental driver of all work which shapes the campus, its physical form, activities and functions, particularly planning and design activities
- Ensuring that sustainability is a fundamental aspect of the objectives and provisions within the other principles which make up the Campus Experience
- Ensuring that the campus is a showcase for sustainability innovation, with interaction between the research and teaching functions of the University and campus capital works design, delivery and management practices
- Achieving Green Star ratings on all new and refurbished projects

The Green Star Education v1 tool developed by Green Building Council of Australia has been adopted for the project to assess the existing state of the building and develop an appropriate list of initiatives for the new extension and refurbishment works.

Sustainability Initiatives

Sustainability initiatives for the project have been developed based on the following analysis:

- Review of industry green building standards and studies
- Establishment of relevant sustainability goals for refurbishment projects

The list of initiatives to be implemented in the project are highlighted in Section 4 of this report which cover energy and water efficiency, materials, operational and commissioning management, waste management and improved indoor comfort. An assessment against the Green Star Education tool is provided in Section 5. The Education tool is considered to be the most appropriate Green Star tool for Wallace Wurth redevelopment based on the proposed uses and building classification.

Sustainability Measures & Performance

The current building has been assessed to have a 2 star Green Star Education equivalent rating. Given the extent of works proposed to the building, a 4 star rating has been set as an ideal benchmark and is considered a significant improvement on the existing building environmental performance.

The project is committed to 4 star Green Star Education v1 rating in (design only) for the initiatives as identified in this report. The project team will provide a submission to the University of New South Wales relating to each of the initiatives on completion of the design stage of the project. Through this commitment the project is considered to meet the objectives of The University of New South Wales DCP 2020 Plan.

2. Introduction

2.1 Purpose of Report

This report has been prepared to demonstrate a commitment to sustainability for the proposed redevelopment of the Wallace Wurth building at The University of New South Wales Kensington campus, in accordance with relevant planning standards and policies. The project will convert an existing University building into an effective teaching building that is able to cater for additional activities of the University staff and students.

The sustainability objectives to be met for the project have considered the limitations and opportunities of the existing structure and services, environmental amenity of the site and relevant planning policies. This report has been prepared on behalf of Bovis Lend Lease for submission with the Part 3A Project.

2.2 Project Description

The redevelopment of the Wallace Wurth building includes the establishment of new teaching and research spaces along the east portion of the building. An atrium / void space has been created between the existing and new floor plates to promote natural daylighting. The project will add around 8,000 sqm of additional laboratory spaces that will support existing facilities of The University. The redevelopment will also include refurbishment of the existing building noting that there are constraints associated with the existing structure and mechanical services.

The project works involve redefining internal layouts and functional spaces, the addition of a new central atrium, façade upgrades and services additions / upgrades. These works will ensure a new life for the building is created that meets the new demands of the University.

3. Sustainable Design

3.1 Refurbishments & Re-living

Buildings tend to outlive their original intended use and require major refurbishments to ensure an extended or new life. Re-living can cater for these needs and these types of projects can be defined as development that revitalises buildings so they meet the changing needs of tenants.

To achieve desirable outcomes for the Wallace Wurth redevelopment, consideration of the following elements will be considered:

- Current energy use and future energy conservation / efficiency
- Existing building elements to be conserved
- Adaptable layout design
- Comfortable and appropriate spaces for occupants
- Onsite water management with some reuse where feasible
- Building code evaluations
- Environmental emissions
- Support facilities such as transport networks and facilities for future occupants

3.2 Industry Environmental Rating Tools

There are a number of environmental rating tools that have been developed on the international market for building design that can be applied to assess a project's Sustainability Measure. This project has considered the sustainable design initiatives associated with the Green Star suite of tools developed by the Green Building Council of Australia, UNSW Development Control Plan (DCP) 2020 and Cooperative Research Centre (CRC) Innovations studies / research on re-living buildings.

Green Star

Green Star is an environmental design rating tool that has been tailored for the Australian climate and environmental issues. The tool was developed based on LEED and BREEAM International tools. The tool focuses on a range of elements that encompass leading design in energy and water efficiency, materials, emissions, transport systems, management and indoor environment. Operational since 2002, the tool has been tailored to cover many different building types, including Education & Health / Laboratory facilities.

The Green Star Education tool has been developed for new and existing facilities that include major refurbishment works. The project has adopted the Green Star Education tool as the most appropriate tool for a building of this classification type and proposed use. Preliminary assessment of the project is provided in Section 5 of this document.

University of New South Wales (UNSW) DCP 2020

The UNSW Development Control Plan (DCP) contains detailed planning provisions for sustainability objectives that are to be met for all new capital works projects that relate to:

- All new buildings and refurbished buildings are to target a 5 star Green Star rating
- Ensuring sustainability is a fundamental driver of, and an explicit part of, all work which shapes the campus, its physical form, activities and functions, particularly planning and design activities.
- Ensuring that sustainability is a fundamental aspect of the objectives and provisions within the other principles which make up the Campus Experience.

These requirements are to be considered in relation to the existing constraints of the building.

Cooperative Research Centre (CRC) for Construction and Innovation Studies

The Cooperative Research Centre (CRC) for Construction Innovation is a national research, development and implementation centre focused on the needs of the property, design, construction and facility management sectors that operated between 2001 until end of 2009. Headquartered at Queensland University of Technology as an unincorporated joint venture under the Australian Government's Cooperative Research Program, Construction Innovation is developed key technologies, tools and management systems to improve the effectiveness of the construction industry in many fields and specifically sustainability.

Studies completed by the CRC Innovation and Design have set a framework for responding to the delivery of refurbishments and re-living of existing buildings. The following ten factors have been identified by the CRC as significant items that need to be considered in the redevelopment of existing buildings. Some of the factors are economic, whilst others relate to social and environmental issues. Each factor has been addressed for the Wallace Wurth development to identify the limitations / opportunities of the existing building and assist in the identification of appropriate sustainable design initiatives for Wallace Wurth.

CRC Re-living Consideration Factor	Wallace Wurth Design Considerations
1. Functional obsolescence of the building	The Wallace Wurth Redevelopment project is ensuring that future demands of the University can be met
2. Current state of degradation/performance	Preliminary investigations of the main structure and fabric have ensured that the building is fit for relevant upgrades
3. Strategies for optimising floor space for the proposed use	Services and interior layouts have been designed to maximise the floor area for functional uses and reduce unnecessary circulation spaces. The architectural design has incorporated adaptable design principles. Interior layouts can be modified as required to suit future University needs.
4. Strategies for structural strengthening to satisfy other objectives	No structural strengthening of the existing has been identified, however a structural survey of the existing frame is required to ensure that the new façade can be incorporated
5. Residual life of the building at its current state	The residual life of the building in its current state is minimal as the existing building is not adequate to cater for The University's needs. The refurbishment and extension of the building is required to ensure staff & student needs can be catered
6. Life cycle cost of the proposed refurbishment scheme	Refurbishment has considered life cycle costs of maintaining existing structure and existing services. Some of the existing services have been deemed inadequate for proposed new use and therefore require upgrades. Services additions are required for the new spaces and will be provided by central plant located the adjacent Bioscience building
7. Best construction management schemes to minimise risk	Construction methods to be used will minimise risks to occupants and staff. Considerations of OH&S will be maintained during all construction works
8. Functional performance after refurbishment	The proposed function of the spaces has been considered in terms of layout and University operations.
9. Minimising waste to achieve sustainability objectives	A waste management plan in construction and operation is to be generated to reduce volumes of waste to landfill
10. In-service performance after refurbishment	Energy and water meters are to be incorporated to monitor environmental savings in operation. Future facilities management criteria are subject to further development

This project is a refurbishment and expansion project that is to result in the re-living of an existing building within the existing urban environment. Minor works are proposed to the existing structure to ensure the main structure is maintained and expanded where feasible along the east portion of the building on either end of the existing core to extend the current floor plates. New building services are to serve the new extension along the east wing and some services are to be upgraded where feasible to the existing spaces.

3.3 Sustainability Goals

The following sustainability goals have been identified for the project on review of the University of New South Wales DCP 2020 requirements and green building standards:

1. Energy efficiency through implementation of energy saving initiatives
2. Minimisation of new materials through use of existing structure
3. Improvement of indoor environment through the integration of passive design measures
4. Minimisation of operational emissions
5. Stormwater and rainwater re – use where feasible
6. Waste minimisation in construction and operation

Measurement of Sustainability Goals

The following measures have been identified for the project to demonstrate the achievement of sustainability goals for the development:

Goals	Element	Measure
Green Star rating	Education v1 Design initiatives incorporated	Green Star Initiatives scorecard and star rating
Energy Efficiency	Energy savings	kg CO _{2-e} per annum
Materials minimisation	Embodied water & energy savings	ML & MJ
Stormwater management	Stormwater retention	kL per annum
Waste minimisation	Wastes volumes to landfill	kg to landfill

It is anticipated through the design development stage of the project that the above project environmental ratings and savings will be identified.

4. Sustainability Initiatives

The following sustainable design initiatives have been proposed for the redevelopment of the UNSW Wallace Wurth building with consideration to the existing limitations and opportunities of the building.

4.1 Energy Efficiency Initiatives

The following energy efficiency measures have been proposed for the project which satisfies the UNSW 2020 DCP key energy management requirements of:

- Implement energy conservation
- Reduce greenhouse gas emissions through design and management, and
- Consider renewable energy technologies such as photovoltaic cells in the design of new buildings and refurbishment projects

Plant Upgrades

New more efficient refrigeration plant including new chillers and pumps will replace the older original plant in the Lower Ground Biosciences Central Energy Plant room and be integrated with the University's site wide Building Monitoring and Control System for energy efficient control and monitoring of the systems. Air handling systems are to be selected and zoned to suit the functional spaces and operation of the new build East portion of the building and upgraded along the West areas.

Outside Air Economy Cycles

Outside air economy cycles will be provided to all air handling systems serving the new building extensions and to new preconditioning systems serving the new fan coil units for the refurbished parts of the existing building to utilise free cooling when ambient conditions are suitable. Outdoor air economy cycles can provide cooling demand reductions in the order of 20% to 30% or around 5% of the air conditioning energy use when applied appropriately to existing plant. It is expected that this initiative will provide good energy savings by reducing the cooling energy consumption of the building as outdoor air is utilised in lieu of return air during mild ambient conditions.

Natural Daylighting

Natural daylighting within a building offers improvement to the internal environment of a building and can result in reductions in energy consumption associated with artificial lighting. The design incorporates an atrium along the full length of the building which separates the existing west wing from the new proposed east wing. The atrium will promote natural daylighting to these spaces and reduce artificial lighting during daylight hours. This feature aids in improving indoor comfort of occupants.

Lighting Specification and Design

Lighting efficiency is important in maintaining low energy consumption for reuse projects. Lighting consumption for a facility such as this could account between 25-40% of the estimated energy use of the facility. To satisfy these requirements all teaching spaces and offices areas are to be fitted with efficient fixtures (minimum T5 fluorescent) to reduce the ongoing energy consumption. Reduced lighting densities are to be targeted for the relevant spaces.

Automated Lighting Control System for Functional Spaces

Lighting controls (time switches) allow lights to be turned off when areas are unoccupied or when daylighting provides sufficient light to the space. Lighting controls are to be adopted for the building to switch off when spaces are unoccupied. This will ensure that no interior lights are operating when not required. Lighting controls will be zoned to maximum of 500m², or each functional space (whichever is lesser), such that the areas can be lit according to needs of occupants and building management requirements.

Daylighting sensors to the perimeter zones of the building are to be incorporated to allow lights to switch-off automatically during daytime when daylighting levels are adequate. Motion sensors are proposed for back-of-house areas and plants spaces with manual overrides will be provided to all areas to ensure safety.

Services and Space Management

Mechanical services will be designed to suit the occupancy and functional operation of the spaces served. The atrium air conditioning system shall be designed to efficiently condition only the ground floor; spill air from the air conditioning systems on the higher levels will provide some tempering to the higher levels of the atrium. This will reduce the overall electricity demand and energy consumption of the building.

The mechanical systems will comprise a combination of new and existing of central plant water cooled chillers and gas fired heating water generators (located in Biosciences Lower Ground Plant room) providing chilled and heating water to a combination of roof mounted air handling units and ceiling mounted fan coil units. The Wallace Wurth West Wing will be served predominantly by ceiling mounted chilled and heating water fan coil units provided with preconditioned outside air from roof mounted air handling systems, whilst the new build East Wing will be served predominantly by roof mounted air handling units and in ceiling variable air volume (VAV) boxes.

Digital Controls

As part of the mechanical upgrade to the building existing controls are to be decommissioned and new direct digital controls (DDC) are to be installed to the entire mechanical services system and connected to a new Building Management System (BMS). This will incorporate high level interfaces to lighting control system, fire system, energy monitoring and the security system.

Other control upgrades proposed to the building include:

- Replace and upgrade all VAV box controls
- Replace all temperature and pressure sensors with digital sensors

Mixed Mode Ventilation

A mixed mode ventilation system to the office spaces on the east side shall be implemented where possible. A mixed mode ventilation/air conditioning system is a two mode system which uses natural ventilation and mechanical ventilation at different times (hours of the day and seasons) throughout the year to provide a comfortable working environment. When the spaces are being naturally ventilated energy is saved by not having to operate fans and provide heating or cooling.

By providing a mixed mode ventilation system, occupants will benefit from improved indoor air quality and the overall energy consumption of the building can be reduced. To reduce the heat gains into this space, performance glazing is to be specified to the atrium roof lights and external façade glazing.

Monitoring & Reporting

The use of sub-metering to record and measure the electricity consumption of different energy uses within the facility is to be integrated into the Building Management System (BMS). Metering will allow the facility manager to monitor energy usage attributed to the different spaces such as toilets and back of house areas, laboratories, teaching and offices.

Ongoing reporting will allow the University facility management team to set goals for energy consumption reductions and attribute energy costs to particular uses. By monitoring energy, losses and wastage can be identified, therefore improving the overall performance of the building in operation. This initiative is subject to further design development and review.

Renewable Technologies

Solar hot water systems are to be used to provide hot water to showers, bathroom fixtures and kitchen areas. The space on the roof will accommodate the solar panels which could generate up to 30% of hot water demand for the site. This type of system would need to be supplemented by gas infrastructure. Estimated output from the system would be subject to a review of the available technologies within the detailed design stage of the project.

4.2 Water Efficiency

The following water efficiency measures have been proposed for the project which satisfies the UNSW 2020 DCP key water management requirements of:

- Reducing potable water consumption
- Increasing the use of bore water for non-potable water requirements
- Maximise the on-site retention of stormwater via natural infiltration and aquifer recharge, and
- Specification all water fittings with 4 star WELS ratings or better where available

On-site recovery & reuse

Rainwater is to be harvested from the main roof structure of the building and fed into the existing building services for site irrigation and potential toilet flushing. One 12 kL rainwater tank (or similar) is proposed within the building. The final location of the tank is subject to further design development.

Water serving laboratories and cooling towers for the new extension is to be sourced from the aquifer which will result in savings of the potable water consumption demand within the building. The project is not permitted to recharge the aquifer and all stormwater is to be filtered before being discharged through Randwick Council infrastructure. This is a Randwick Council requirement for the development that has defined that all stormwater from the building to be discharged to Council stormwater systems. On site stormwater management techniques have been reviewed by the project team in reference to CSIRO Urban Stormwater Best Practice Environmental Management Guidelines to determine the availability of addition Green Star points for the proposed design concept. This is to be further reviewed in the detailed stage of the project.

Specification of Fixtures & Potable Water consumption from Laboratories

Potable water usage for the site will be provided for to laboratories, basins in toilet areas, kitchen sinks and some external works for irrigation. To reduce the overall demand from these uses, fixtures are to be specified to achieve a minimum 4 WELS rating where feasible for the proposed use.

The specification of the laboratory fixtures are to meet minimum code requirements in lieu of water efficiency fixture specifications to ensure that they are fit for purpose. To reduce the potable water consumption from the laboratories, at least 95% of the water requirement for all once-through water is to be sourced from non-potable water sources within the existing aquifer on the campus.

4.3 Materials

The following materials efficiency measures have been proposed for the project which satisfies the UNSW 2020 DCP key materials management requirements of:

- Reducing solid waste to landfill and increase solid waste recycling, especially in construction and demolition phases
- Waste management facilities within the building to promote recycling by occupants
- Minimisation of resource consumption
- Specification of appropriate materials that promote improved indoor comfort

Reuse / Conservation of materials

The main building structure has been maintained to conserve resources and materials. By maintaining the main structure and parts of existing building fabric along the west and south elevations of the building, this will ensure that the embodied energy and water is minimised. Further by re-using the existing structure the waste volumes are reduced for the development.

Specification of appropriate materials and furniture

Interior finishes will consider the concentration of Volatile Organic Compounds with products for adhesives, paints, carpets and floor sealants. The design team will work with suppliers and contractors to identify opportunities to reduce the level of VOC's within products and finishes. This initiative is subject to further design development of the project team.

All furniture and flooring materials are to be selected with consideration of supplier environmental management systems, manufacturing emissions, ease of re-use and re-conditioning at the end of the products life. This is to reduce the overall environmental impacts of the selection of furniture within the building where feasible. The project team is to work with suppliers to identify opportunities to reduce the impact of finishes and promote reuse where feasible.

4.4 Management

The following management initiatives have been proposed for the project which satisfies the UNSW 2020 DCP key development management requirements of:

- Environmental Management Plans to NSW Guidelines for the construction phase of the project
- Waste Management Plan to manage the volume of waste sent to landfill. The project will be targeting minimum 80% of diversion of waste from landfill throughout the construction stage of the project

All plans are to be prepared by the head contractor in association with relevant consultants to ensure the appropriate services are delivered and hazards managed during the construction phase.

Building Users Guide

A simple Building Users Guide is to be developed for the project to provide Facilities Management (building manager) with the details of the building that outline ideal operational and maintenance procedures. The document will include:

- Energy and environmental strategy
- Monitoring and targeting
- Building Services
- Alternative transport facilities
- Materials management
- Waste management
- Expansions and refit considerations for any future upgrades and refurbishments of the building

The Guide is to be produced in association with all consultants on the project and will be reviewed by UNSW Facilities Management throughout the relevant stages of the project to ensure that the approach is reasonable. This guide will form the basis of the Building Maintenance Guide for ongoing management of the facility.

Commissioning

The project will undertake a comprehensive commissioning strategy for the building that is to consider the staging of the works including temporary services. As part of the commissioning strategy pre-commissioning, detailed commissioning and post commissioning reviews are to be undertaken and an independent consultant is to be engaged to review the results throughout the staged delivery of the works. All testing data is to be consolidated into a report for review by UNSW and integration into the Building Users' Guide and Building Maintenance Guide.

4.5 Building Fabric

Building Constructions

All wall, roof and slab constructions are to be designed to the Building Code of Australia (BCA) 2010 Section J energy efficiency requirements. This includes the specification of appropriate insulation to the relevant constructions throughout the building to ensure that the fabric thermal constructions will reduce the extent of heat loss and heat gains during extreme weather conditions. As a minimum the following construction thermal values apply to the project:

Building Element	Description	Total R-value to be Achieved
Roof / ceiling construction	Minimum Total R-Value for a roof or ceiling	R3.20
External Walls	Outer wall of a building which is not a common wall	R2.80
Envelope walls	Parts of a building's fabric that separate a non-conditioned space or habitable room from exterior environment or non-conditioned space not considered external walls	R1.0
Envelope walls	Parts of a building's fabric other than above and not considered external walls	R1.80
Suspended slabs	Suspended floors without in-slab heating or cooling and enclosed non-conditioned space	R1.0

Façade Performance

The new extension to the building will incorporate shading systems to reduce overall heat gains through the façade. As part of the specification of the façade, glazing systems are to incorporate performance coatings that reduce external solar loads and framing systems are to incorporate appropriate thermal breaks to improve thermal resistance and reduce infiltration.

4.6 Transport

Cyclist Facilities

Cyclist facilities will be provided for the staff and students which will include bicycle racks to ground floor and shower facilities within lower ground level. Adequate change and locker facilities will also be provided in lower ground floor. This will encourage staff to use alternative forms of transport and reduced reliance on personal vehicles.

5. Sustainability Assessment

5.1 Existing Wallace Wurth Green Star Assessment

The Green Star Education v1 tool has been adopted to provide a measure of sustainability upgrade to this building. The Education tool is considered to be the most appropriate Green Star tool based for Wallace Wurth redevelopment based on the proposed uses and building classification.

Current Green Star Rating of the Building

The existing Wallace Wurth building has been assessed to have a Green Star rating of around 2 star (30 weighted points) based on the existing state of services, finishes and management procedures currently in practice. This has been based on the following category scores under the Green Star Education v1 tool:

Category	Green Star Education v1 Points Available	Existing Building Assessment
Management	14	9
IEQ	25	7
Energy	29	3
Transport	13	5
Water	16	6
Materials	27	6
Ecology	5	2
Emissions	14	3
Total	148	41
Weighted Points	100	30
Equivalent Green Star Rating		2 stars

We note that there is no Green Star tool available to assess existing education buildings. The Green Star Education v1 tool has been developed for existing buildings that are undergoing major refurbishments and new education buildings only. The above assessment has been made to provide a measure of how the existing building may rate across the sustainable design initiatives as defined in the Green Star Education v1 tool.

5.2 Green Star Rating Assessment

A review of the proposed redevelopment works has been undertaken against Green Star Education v1 tool. This has included a review of the existing site surroundings, existing building form and services against the Green Star initiatives criteria for the Education v1 tool. The review was undertaken to determine if a 5 star rating can be targeted for the project.

The review has determined that achieving a 5 star rating for a refurbishment project will be difficult given the existing limitations of the building services, existing building site orientations and functional space uses which are predominantly high energy intensive uses. This is described in detail in the following sections for each of the relevant Green Star categories. Specific reference to the Green Star Education v1 point schedules is made to demonstrate where the project is not able to achieve the relevant points to meet 5 star target.

5.2.1 Energy Efficiency (Energy Category)

To achieve a 5 star Green Star rating the following energy benchmarks would apply:

Category	5 star Green Star Benchmark
Energy (total)	1,130,634 kWh / annum (20% improvement)
Mechanical (HVAC)	37.6 kWh/m ²
Electrical	32.5 kWh/m ²

This benchmark is a 20% improvement on minimum Green Star energy consumption targets. The project team has deemed that these energy consumption targets are not achievable given the proposed Laboratory facilities and existing services within the building. Laboratory facilities typically have a higher power demand and air volume demands in comparison to teaching spaces.

It is expected that the base building energy consumption attributed to the laboratory spaces and the existing west wing offices will exceed the energy consumption targets required to achieve a 5 star Green Star rating. To achieve these targets significant infrastructure upgrades would be required which would include the installation of cogeneration plant and replacement of all existing services. Due to the existing building constraints these items would add significant increases to the project capital costs.

The minimum Green Star energy consumption benchmark is the most appropriate energy target for the project given the limitations of the existing building services and extent of laboratory facilities. The project will not achieve points in the Energy category Greenhouse Gas Emissions (Ene-1) credit that would assist in achieving 5 star rating.

5.2.2 Indoor Environmental Quality (IEQ Category)

Thermal Comfort & Air Change

A review of the existing building services to the offices in the west wing have deemed that the Thermal Comfort conditions as defined in ASHRAE standards is not achievable to Green Star standards. Green Star requires that 100% of Useable Floor Area (UFA) (functional spaces) achieves Predicted Mean Vote (PMV) less than +/- 1 for 98% of all hours of operation. PMV measures the expected comfort of occupants in terms of air velocity and temperature given predefined occupant clothing and metabolic conditions.

On review of the existing HVAC systems to the offices it is not expected that the PMV levels for the different conditions will be within the limits for 98% of the hours of operation. The Wallace Wurth West Wing is served predominantly by ceiling mounted chilled and heating water fan coil units that have limited ability to change varying internal conditions. These types of units are controlled with thermostats that have limited ability to control temperature and air velocity measures across entire spaces, thus PMV measures are difficult to achieve to all entire spaces. To achieve this credit the existing services would need to be upgraded which would add significant increases to the project capital costs and scope of services to be undertaken for the project. This is a similar case

for the Air Change Effectiveness credit under Green Star IEQ category. Thus 5 points under the IEQ category are not available for the project given the limitations of the existing services.

Daylighting

The depth of the existing building structure and façade treatments to control solar gains pose constraints on the project achieving high daylight factors (natural daylighting) to all spaces within the internal environment. The introduction of internal atrium does assist in promoting natural daylighting into the interior environment however due to the expected uses (laboratory spaces), natural daylighting needs to be controlled so that it does not affect the functionality of these spaces and cause discomfort for occupants. The East facade incorporates external sunshades to control direct solar gains and limits direct daylighting into the spaces along this elevation.

The project is expected to achieve Daylight Factor of 2% to 30% of Useable Floor Space and thus will not achieve 2 additional points in Daylighting credit that would be available if 90% of the UFA achieved Daylight Factor of 2% or greater.

Increased Ventilation Rates

Increasing the ventilation rates to all spaces within the building would result in an increase in the energy demands of the ventilation systems and would add to the project capital costs. For these reasons the project is not targeting increased ventilations rates and therefore does not achieve 3 points in IEQ-1 credit.

5.2.3 Materials Specifications (Materials Category)

PVC Minimisation

HDPE pipework is to be specified where feasible for the proposed pipework installations. Further investigations are to be undertaken to determine the percentage of PVC this represents in terms of cost for the project. If the costs associated with this PVC replacement is greater than 30% of costs of all PVC products used in the project then the project will achieve Green Star points in this category. This initiative is subject to further investigation during design development stage and therefore the project is not targeting this credit.

Timber Specifications

Timber products that are certified by Green building Council of Australia's 'Essential' criteria scheme such as Forest Stewardship Certified (FSC) or Programme for the Endorsement of Forest Certification (PEFC) are to be sourced for the project where feasible. Timber products on the project are expected to be extensive and it may not be possible to source all (100%) timber products with the relevant credentials as this credit would apply to furniture, finishes and construction materials. Therefore the project is not targeting this credit. This initiative is subject to further investigation during design development stage.

5.2.4 Services Design (Emissions Category)

Cooling Towers

Cooling towers are to be installed for the project to serve the new services along the east wing, thus the Green Star credit Emi-8 Legionella is not available for the project. To improve the energy efficiency of the proposed new services to the East Wing cooling towers have been proposed. The project will not achieve 1 point in Emi-8 credit as a result.

Refrigerant Specifications

All new refrigerants are to have zero Ozone Depleting Potential (ODP). These refrigerants are readily available in the market, however refrigerants with Global Warming Potential (GWP) of 10 or less are not readily available. The project is not targeting refrigerants with a GWP less than 10 due to constraints in existing marketplace availability

of chiller specifications that will meet these needs and project delivery timing. The project will not achieve 2 points in Emi-2 as a result.

Tertiary Water Treatment (Blackwater)

Tertiary water treatment plant is not proposed for the project due to significant capital costs that would be associated with this plant and equipment installation and spatial constraints on the building that this plant would impose. The project will incorporate rainwater harvesting and reuse which is considered an appropriate solution for refurbishment project and will result in water savings for the building. The project will not achieve 3 points in Emi-6 credit as a result.

5.2.5 Wallace Wurth redevelopment Green Star Rating Assessment

Based on the Sustainable Design initiatives as described in Section 4 of this report and the review of the building in terms of achieving 5 star target the following Green Star Education v1 rating has been determined for the project:

Category	Green Star Education v1 Points Available	Points Targeted for Wallace Wurth Redevelopment
Management	14	12
IEQ	25	13
Energy	29	6
Transport	13	6
Water	16	12
Materials	27	14
Ecology	5	2
Emissions	14	5
Total	148	70
Weighted Points	100	50
Equivalent Green Star Rating		4 stars

We note that there is no Green Star tool available for existing education buildings and therefore the above assessment is indicative only. The assessment provides an indication of how the existing building may rate against the Green Star Education v1 tool and the set of sustainable design initiatives. The Green Star Education v1 tool is only applicable to buildings that are undertaking major refurbishments or new buildings.

5.3 Summary

The project is committed to achieving a 4 star Green Star Education v1 design desktop rating for the initiatives as identified in Section 4 this report. This is considered a significant upgrade to the sustainability rating in comparison to the current state of the building. Through the installation of new energy efficient services, upgrades to metering systems and building management systems, incorporation of new initiatives such as rainwater harvesting tanks and building user's guides, reuse of existing structure and comprehensive commissioning of services, the project is able to improve the Green Star rating for Wallace Wurth building from 2 to 4 stars.

This is illustrated in the following table:

Category	Green Star Education v1 Points Available	Existing Building Assessment	Points Targeted for Wallace Wurth Redevelopment
Management	14	9	12
IEQ	25	7	13
Energy	29	3	6
Transport	13	5	6
Water	16	6	12
Materials	27	6	14
Ecology	5	2	2
Emissions	14	3	5
Total	148	41	70
Weighted Points	100	30	50
Equivalent Green Star Rating		2 stars	4 stars

The project team will provide a submission to the University of New South Wales relating to each of the initiatives on completion of the detailed design stage of the project. Through this commitment the project is considered to meet the objectives of The University of New South Wales DCP 2020 Plan.