WOOD & GRIEVE ENGINEERS

Major Alterations & Additions – The Stevenson Library
SSD8922 - The Scots College

Ecologically Sustainable Development Report

Prepared for:

The Scots College
C/- Impact Group

Date:
11 April 2018

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Project No. 36763
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Revision

REVISION	DATE	COMMENT	APPROVED BY
1	07/03/2018	Draft Report	NCJ
2	11/04/2018	DA Report	NCJ

Contents

1. Executive Summary

This Ecological Sustainable Development Report has been prepared for Impact Group on behalf of The Scots College for the proposed Major Alterations & Additions - The Stevenson Library (SSD8922) project located within The Scots College campus at 29-53 Victoria Road, Bellevue Hill NSW.

This report provides an overview of the proposed Ecologically Sustainable Development (ESD) principles and sustainability initiatives to be included within the project and is intended to form part of the Environmental Impact Statement (EIS) for the State Significant Development Application - SSD8922. This is a direct design response to the ESD Principles of the Secretary's Environmental Assessment Requirements (SEARs), and NSW Environmental Planning and Assessment Regulation 2000, as required by the NSW Environmental Planning and Assessment Act 1979 No 203.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers)
- Detail regarding specific ESD initiatives which will be implemented throughout all phases of the project.
- Demonstration of assessment against a suitably accredited rating scheme to meet industry best practice; and
- Identify initiatives that minimise the consumption of resources, water (including water sensitive urban design) and energy.

Information contained within this report has been prepared in direct response to the:

- Secretary's Environmental Assessment Requirements – ESD Principles;
- NSW Environmental Planning and Assessment Act 1979;
- NSW Environmental Planning and Assessment Regulation 2000;
- State Environmental Planning Policy – Education Establishments & Chile Care Facilities – 2017;
- Woollahra Development Control Plan 2015;
- Woollahra Local Environment Plan 2014; and
- Feedback from the GANSW Pre-DA meeting, dated 27.02.2018

In coordination with the above, the project will implement a number of sustainable design principles and includes initiatives designed to mitigate the environmental impact of the following:

- Energy – including improved energy efficiency across the buildings and its associated sources.
- Water Efficiency – including reduced potable water demand and improved storm water quality.
- Materiality – considering the whole of life impact of materials and considering their retention and selection to minimise harm to the environment, including efficiency and construction.

The following sections detail the development's specific sustainable design response in more detail.

2. Introduction

The proposed development consists of the redevelopment of the existing Stevenson Library space, with the following detailed project elements:

- Removal of exiting facades & internal finishes;
- Retainment of the existing structural slabs & relevant building services (fire services, stormwater detention);
- New internal fit-out including new fire stairs, amenities & purpose built school related facilities;
- New slab in-fills (as required);
- New building façade; and
- New building services.

The property is located within the existing Scots College school campus & within the Woollahra Municipal Council zone.

This report addresses the ESD and efficiency aspects in response to Key Issue 7 – within the Secretary's Environmental Assessment Requirements (SSD8922) listed under Section 78A(8) of the Environmental Planning & Assessment Act (Schedule 2 – Regulation 2000).

Further to the above, the report also addresses Schedule 4 – Principle 2 – sustainable, efficient and durable as noted within the State Environmental Planning Policy – Education Establishments & Chile Care Facilities – 2017.

The report utilised best practice sustainable design principals and borrows elements from external sustainability assessment tools deemed to be in-line with accepted industry best practice.

Figure 1: Proposed Redevelopment Perspective – Eastern Facade. Source: JCA Architects.

Introduction

2.1 Sustainable Design Initiatives

In pursuit of the ESD design principles, the Stevenson Library redevelopment will pursue design excellence benchmarked from a number of sources.

These include best practice design initiatives from:

- Secretary's Environmental Assessment Requirements – Section 78A(8);
- NSW Environmental Planning and Assessment Act 1979;
- NSW Environmental Planning and Assessment Regulation 2000;
- State Environmental Planning Policy – Education Establishments & Chile Care Facilities – 2017;
- Woollahra Development Control Plan 2015; and
- Woollahra Local Environment Plan 2014.

2.2 Environmental Planning and Assessment Regulation 2000

SEARs outlines requirements for this development that must be addressed as part of the Environmental Impact Statement. These are:

- Detail how **ESD principles** (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the development.

Schedule 2 7(4) of the Environmental Planning and Assessment Regulation 2000 states:

"The principles of ecologically sustainable development are as follows:

(a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options,

(b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

(c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

(d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,

(iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems."

- Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice standard; and
- Include a description of the measures that would be implemented to minimise the consumption of resources, water (including water sensitive urban design) and energy.

2.3 State Environmental Planning Policy (Education Establishments & Childcare Facilities) 2017

Schedule 4 – Schools – design quality principles of the SEPP includes **Principle 2** – sustainable efficient and durable which states the following:

> *Good design combines positive environmental, social and economic outcomes. Schools and school buildings should be designed to minimise the consumption of energy, water and natural resources and reduce waste and encourage recycling.*
>
> *Schools should be designed to be durable, resilient and adaptable, enabling them to evolve over time to meet future requirements.*

2.4 Woollahra Development Control Plan (DCP) 2015

Woollahra Municipal Council has a specific DCP developed in 2015 with aim of addressing ESD & sustainability more broadly within the precinct. The ESD elements addressed by this report are replicated below:

DCP Chapter E6: Sustainability – Part E: General Controls for All Development

Objectives:

(O1) To promote ESD in the design, construction and use of non-residential buildings.
(O2) To encourage the use of environmentally sustainable building materials.
(O3) To maximise the benefits of passive solar design.
(O4)To promote the use of renewable energy sources while minimising visual impacts, particularly when located in heritage conservation areas.

NCC Section J – Energy Efficiency

The DCP refers to the inclusion of minimum mandatory energy efficiency measures identified within the National Construction Code (NCC). The objective is to reduce building greenhouse gas emissions by improving operational efficiency of buildings by addressing matters such as building fabric, thermal performance and glazing.

The following sub-sections are applicable:

Part J1 – Building Fabric
Part J2 – External Glazing
Part J3 – Building Sealing
Part J5 – Air-Conditioning & Ventilation Systems
Part J6 – Artificial Lighting & Power
Part J7 – Hot Water Supply; and
Part J8 – Access for Maintenance & Facilities for Monitoring

Section E6.2: Commercial & non-residential buildings

In addition to the above, the following objectives are noted as applicable to the proposed development.

(O1) To promote sustainable buildings, design & construction.
(O2) To design buildings to reduce the need for artificial heating & cooling and artificial lighting during daylight hours.
(O3) To ensure window placement maximises opportunities for cross ventilation.
(O4) To ensure that the use of glazing maximises solar penetration during winter months.
(O5) To reduce water consumption and encourage on-site water retention and re-use.
(O6) To encourage tree selection that reduces to need to artificial heating & cooling of buildings.

2.5 GANSW – Pre-DA Meeting Minutes

Further to SEARs requirements, the Government Architect NSW (GANSW) provided the following feedback following a pre-DA meeting held 27.02.2018. The following extracts documented within the meeting minutes are relevant to the detailed response provided within Section 3.0 of this report.

"…GANSW raised concerns around the environmental performance of the proposal and passive thermal controls. GANSW recommends the project team undertake further consultation and design development prior to EIS submission regarding environmental performance and functionality of the internal layouts and circulation in response to internal height limitations including ventilation strategies and access to natural light…"

"…provide further detail on the environmental and sustainable initiatives to be incorporated including information to demonstrate the anticipated performance of proposed passive thermal control measures and/or hybrid strategy (natural ventilation; potential for photovoltaic array)…"

3. Project Design Response

3.1 SEARS Design Response

The following documents the project's dedicated response to the Principles of ESD as defined within Clause 7(4) – Schedule 2 of the Environmental Protection and Assessment Regulation 2000).

3.1.1 Precautionary Principle

There are no perceived threats of serious or irreversible environmental damage as a result of proposed development on the desired site. The site is a pre-existing building, which currently stands on the College campus. Provided the partial demolition of the existing building is managed accordingly, the proposed development is not likely to result in irreversible environmental damage, as the net impacts (ecological footprint) on the environment are relatively similar. Due to the site containing a pre-existing building, the ecological value of the site is unlikely to be significantly impacted.

The proposed development is to have the same use as the existing building with the existing major site infrastructure retained and upgraded to accommodate improved building amenity. Therefore, no serious or irreversible environmental damage is expected due to the on-going operation of the building.

3.1.2 Inter-generational equity

The proposed library redevelopment conserves inter-generational equity through minimising the consumption of resources whilst providing an upgraded built environment that will ensure the health and well-being of occupants into the future. The proposed development includes the re-use of a significant proportion of existing building structure resulting in significantly reduced levels of embodied energy as a result of development. In addition to the existing building structure, applicable building services such as fire protection & on-site detention (stormwater management) infrastructure shall be retained and re-used. This design intent will reduce demand on virgin raw materials, ensuring future generations are adequately supplied with such materials.

As the proposed development site has previously been developed on, valuable biological utility is not dimished as a result on the new development. Given there is limited diversity of the environment currently on the site, it is not envisaged that this will be significantly impacted as a result of new development.

Waste streams will be dealt with in ecologically safe methods. Waste-water and storm water will be plumbed to the existing stormwater infrastructure. Due to the College demand for sports field irrigation, the development is expected to benefit from a lower stormwater impact compared with a standard practice development as this water is to be retained for use within the school grounds.

The below methods will be implemented on this project to contribute to a greater sustainable outcome for this generation and those following:

- The original concrete structure (columns, slabs, beams) is being retained in its original position & reused within the proposed new development.
- Where timber products are used, sustainably sourced from accredited suppliers.
- High WELS rated water fittings ensuring lower building water demand.
- LED lights, which have longer lives, consume less energy and produce a higher quality light than their counterparts.
- Low-VOC paints, which do not emit dangerous volatile components, risking the health of users.
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process.
- A target of 90% of construction and demolition waste will be diverted from landfill.
- Consideration for low embodied energy products, recycled or green rated products, such as GECA or "Global Green Tag".

- On-site integrated renewable energy considerations which will reduce peak demand on existing energy infrastructure & improve the ecological footprint of the development; including:
    - Integrated photovoltaic glass panels – (external façade)
    - Solar roof tiles – acting as design integrated PV power source (assuming commercial availability at the time of construction); and
    - On-site supercapacitor allowing for increased energy storage & peak demand reduction.

Inter-generational equity is realised in the use of energy and water efficiency measures, which aim to reduce the consumption of limited resources, preserving these for future generations. Further detailed examples are provided within the following sections.

3.1.3 Conservation of biological diversity and ecological integrity

There is limited biological diversity on the current site due to the site being previously developed and occupied. The proposed library redevelopment will have limited, if any, impact on the current level of biological diversity and ecological integrity. Where new landscaping is proposed, the selection of plants will be in accordance with local bio-region ensuring the plant selection & local biodiversity is complimented.

3.1.4 Improved valuation, pricing and incentive mechanisms

This project will include the integration of a number of initiatives, which aim to internalise pollution and other undesirable environmental outcomes.

- Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System that is in accordance with NSW Environmental Management Systems Guidelines. This places a value on environmentally responsible building practices and places a form of “polluter pays” onto the contractors to ensure they are held responsible for the environmental management of the building site as they complete their work.
- The cost to recycle the construction and demolition waste will be borne by the project team. The project team will be required to target 90% recycling of construction waste. The increased cost of recycling construction materials will also incentivise the purchase of less materials, thereby reducing over-ordering and material wastage.
- The costs of producing the following pollution: sewage, landfill waste, and CO_2 emissions are partially borne by the project team and accounted for in the project’s sustainability initiatives. The project has voluntarily elected to:
    - improve their water consumption efficiency, thereby paying to reduce production of sewage;
    - reduce their energy consumption, which means the project has paid for the design and implementation of solutions which will reduce CO_2 emissions; and
    - recycle waste streams in the construction and operation of the project, which will cost more than standard practice where all material waste is directed to landfill.

3.2 SEPP, Woollahra LEP/DCP & GANSW Design Response

The following section details a provisional list of ESD initiatives for inclusion within the design & development of the project. They have been selected on the basis they align with the controls and objectives identified within the relevant SEPP (education facilities) and Woollahra LEP/DCP. Furthermore, they are in direct response to the additional comments received by the Government Architect NSW.

3.2.1 Energy efficiency

A variety of energy efficiency measures are applicable to the proposed library redevelopment. These energy efficiency measures may form part of the final design and operation of the space. The final strategy will always be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy pyramid below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest return on investment.

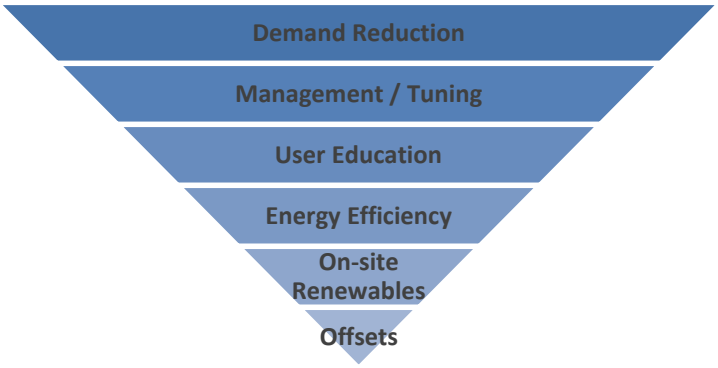

Figure 2 Energy efficiency strategy hierarchy.

In response to this, the project has undertaken the following analysis to ensure the passive thermal design is maximised ensuring optimised energy efficiency:

External Façade Analysis:
The proposed development significantly improves the façade glass to façade area ratio which is a fundamental principle of energy efficient & passive thermal design. The following figures demonstrate the projects improvement in this area:

Eastern Elevation	Total Glazed Area (m2)	Percentage of Façade Area (%)
Existing Building	291.4	56
Proposed Alteration / Addition	156.2	21

*Figures provided by JCA Architects.

Project Design Response

Final building design will be subject to detailed energy modelling which has the ability to optimise glazing performance and ensure the building fabric performance is maximised. Preliminary assessments have already been undertaken with design consideration & development underway.

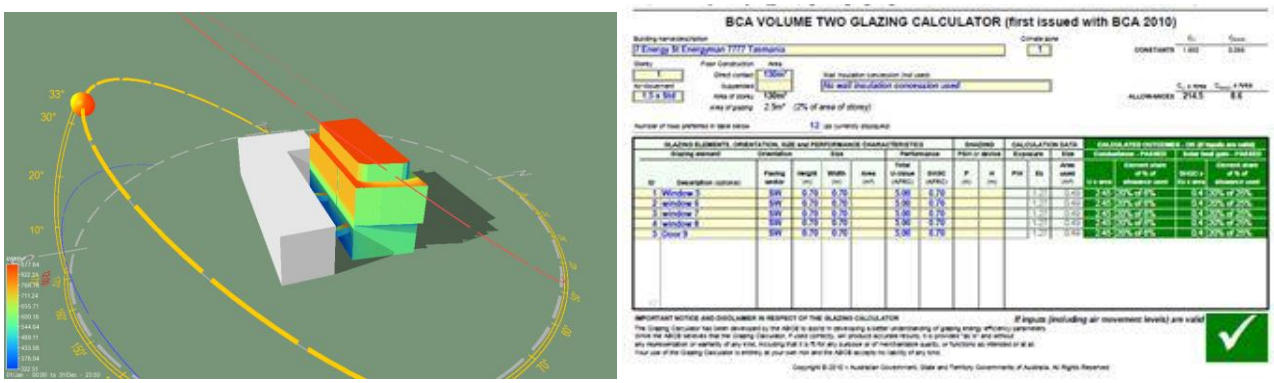

Figure 3: Sample image from IES thermal modelling software & NCC Section J glazing calculator. Source: IES Virtual Environment.

Figure typical ratios of energy end uses in an schools identified within a Government report published in 2012. Since the greatest energy consumption within the design control is HVAC &, lighting, these present the greatest opportunity for energy reduction. Proposed energy efficiency measures which are to be integrated into the project focus primarily on these energy end uses.

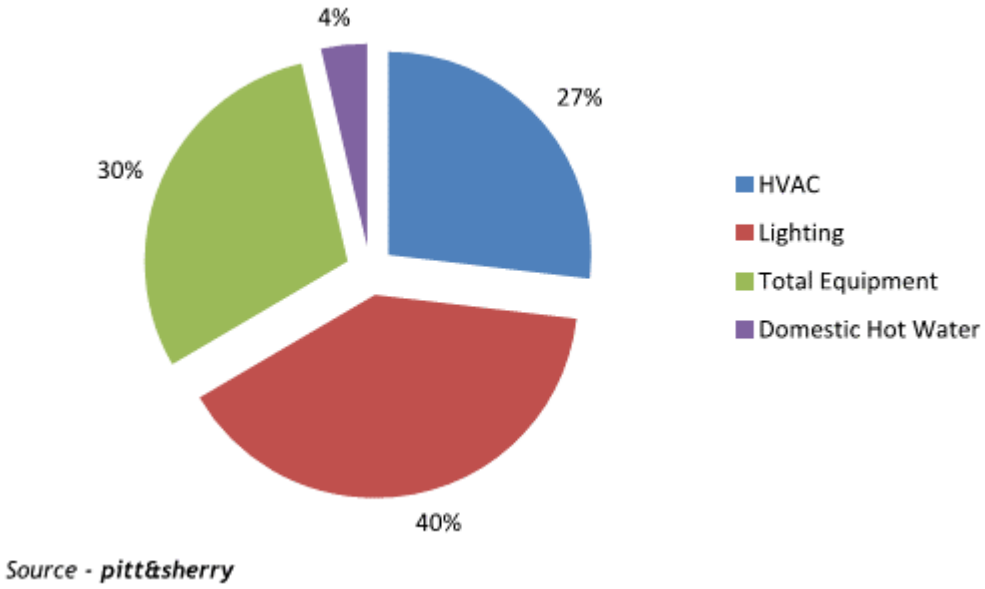

Figure 4: Typical electricity end-use shares 1999-2012. Source: Pitt & Sherry. Council of Australian Governments – Baseline Energy Consumption in Commercial Buildings in Australia, November 2012.

Project Design Response

Energy efficiency measures, which will reduce energy usage & greenhouse gas emissions, include:

Passive Thermal Design

- Retained slab floors will utilise existing thermal mass of the building for passive heating/cooling effects.
- External façade & walls with incorporation of sandstone, mass masonry & concrete will create a thermally efficient external building fabric providing full year suitability within the Sydney climate zone.
- Façade design for maximum passive thermal performance. Highest concentration of glazing has avoided western orientation for optimised cooling, while concentration on the eastern façade is design to maximise passive thermal impacts of free heating in winter periods.
- Low-glazing to wall area ratios will improve passive thermal performance. Current proposed design allows for passive natural daylight;
- Optimised energy efficiency performance within NCC Climate zone 5 – 20-32% of total façade area.
- Optimised design for effective natural daylight on both eastern & northern facades.
- Glass selection to be considerate of passive thermal performance – solar control for summer, passive thermal heating optimisation in winter.
- High rated building fabric performance – high total R-values for thermal efficiency on exposed floors, external walls and exposed roof zones.
- Operable windows for mixed-mode space conditioning. This also allows for future design adaptability.

Lighting

- Efficient lighting e.g. LEDs. This will reduce the electrical load on the grid for the same electrical output. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials
- Lighting controls including timing and occupancy sensors to reduce the demand on the lighting system.
- Optimised lighting zoning control in order to reduce energy demand & improve efficiency via localised lighting control.
- Sub-metering will allow for effective energy management & optimisation of building performance. Typical meter allocation is end-uses in excess of 10,000kWa/annually; however this can be further optimised at the schools request.
- BMS building control will monitor & provide automated building operation & maximise energy efficiency.
- External lighting to timeclock controlled for optimised energy efficiency.

Heating / Air-Conditioning Systems

- High efficiency water cooled chiller is being proposed for space cooling, with significant increased energy efficiency above the existing air-cooled systems. The design decision has taken account of future flexibility & potential for future zoning changes.
- Energy and water efficient appliances – lowering energy demand
- BMS building control will monitor & provide automated building operation & maximise energy efficiency.
- Economy cycle integration for suitable times of the year when outdoor ambient conditions don't require mechanical pre-treatment.
- Centralised gas hot water system for lower GHG emissions impact.
- Mixed-mode system with natural ventilation integration – refer Figure 5 below.

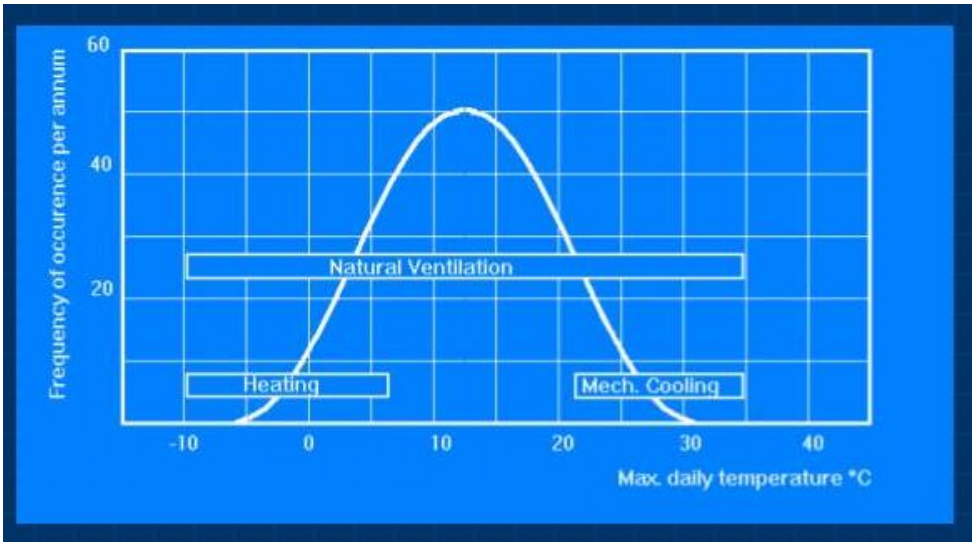

Figure 5: HVAC system diagram. Source: Troup Bywaters + Anders, London.

On-site Renewable Supply

- Inclusion of photovoltaic infused glass (Onyx solar) within the building façade design;
- Photovoltaic roof tiles (subject to commercial availability within Australia – Tesla) will provide on-site power utilising integrated roof infrastructure as the solar charger, rather than additional infrastructure; and
- On-site supercapacitor (electrical infrastructure) allowing for increased energy storage & peak demand reduction is also included within the project design intent.

Figure 6: Onyx integrated solar façade. Source: Onyx Solar

Figure 7: Tesla Solar Roof tiles. Source: Tesla

3.2.2 Water efficiency

A variety of water efficiency measures are applicable to the proposed library re-development. The following water efficiency initiatives are intended to influence the final design and operation of the spaces contributing to the project's overall commitment to reduce potable water demand.

Project Design Response

The following chart describes the typical water consumption of non-residential buildings in NSW.

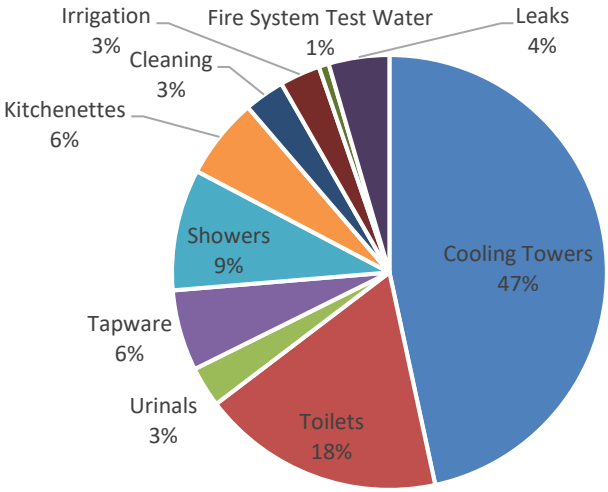

Figure 8: Typical water consumption for non-residential in NSW. Source: *NABERS Preliminary Assessment of an office in NSW, 2017*

Further to the information included within Figure 4, the project is likely to have an increased landscape irrigation demand (compared to typical) given College campus includes dedicated sports fields.

Water efficiency measures, which reduce water consumption & included within the project are:

- Water efficient fixtures and fittings – includes taps, wash basins, WCs, Urinals, showers and supplementary water uses for student education.

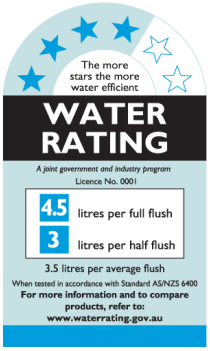

Figure 9. Example of a WELS water efficiency rating label.

In accordance with industry best practice standards, the following performance schedule identified within Green Building Council of Australia's – Green Star scheme will ensure potable water demand is effectively reduced:

Nominated WELS Fixtures – Green Star Design & As-built V1.2	
Fixture / Equipment Type	**WELS Rating (minimum)**
Taps	6 Star
Toilet	5 Star
Showers	3 Star (>4.5 but <= 6.0 L/min)

- Water meters linked to the BMS will ensure inefficiencies such leaks are detected prior to the significant loss of water.
- On-site rainwater harvest – offset for sports field irrigation demand. The project will connect & utilise the existing rainwater storage infrastructure located beneath the existing playing fields adjacent to the library building.
- Landscape irrigation supply (not including sports field supply) shall be also connected to existing on-site rainwater storage infrastructure reducing the demand from potable water supplies.
- Minimalistic impact of the project does not increase potable water demand as existing vegetation is largely un-impacted by the proposed development.

3.2.3 Sustainable Materials and Building Components

Additional resources aside from energy & water are consumed by new developments. These include the building materials in the initial build, through to the materials consumed by on-going building maintenance. The following resource efficiency measures are intended to influence the project's overall ecological footprint & reduce the environmental impact of the project as a whole.

Construction Materials

Construction materials are a highly carbon intensive component of any development. They often involve very energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development.

The following will be adopted by the project to reduce waste from construction materials.

- Reuse of existing materials – the original concrete structure (columns, slab & beams) will be reused within the new building avoiding the requirement for new concrete & steel material usage.
- Sustainably sourced timber.
- A high recycling target of 90% diversion from landfill for the construction and demolition waste.
- Recycled masonary.

Design Materials

Improved indoor environment quality is a significant benefit of sustainable design. The design will include a significant commitment to improve indoor environment quality via the following initiatives:

- Thermal comfort provided by the bespoke air conditioning system, high thermal mass & availability to natural daylight & passive thermal performance.
- Material selections, which focus on reducing volatile organic compounds (VOC) levels and minimise formaldehyde impacts. Paints, sealants, adhesives, carpets, floor and material finishes will all comply with best practice VOC criteria as identified within Green Star – industry best practice standard.
- Engineered wood products will limit formaldehyde levels via architectural specification in accordance with industry best practice standards.
- Steel material to be sourced from suppliers who are signatories to the Australian Steel Institute Sustainability Charter ensuring the manufacture of steel products is sustainable and reduces energy demand.
- PVC materials will be procured from suppliers which comply with industry best practice guidelines for PVC manufacture which aims to reduce the environmental impact of PVC material production.
- Consideration of additional material specifications which select & prefer materials and products which include reused content, environmental product declarations, third party sustainability certifications or product stewardship programs.
- Design intent also includes selection of durable, long-life cycle materials such as sandstone, slate and copper – materials that have demonstrated over time to improve the building longevity and life cycle.

Operational Materials

The major waste streams from school buildings are comprised of paper and cardboard from writing and study materials, mixed glass, plastics recyclables, and organics from food items. The proposed redevelopment will be responsible for providing operational waste facilities in accordance with City of Sydney waste removal and separation guidelines.

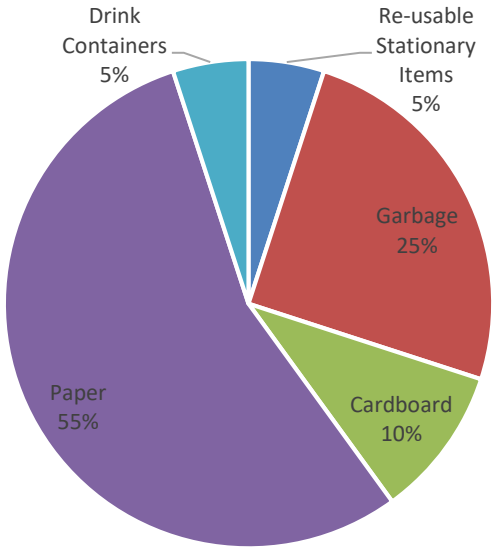

Figure 10: Typical composition of School waste streams *(Source: Recycling Near You)*

A dedicated Site Waste and Recycling Minimisation & Management Plan (SWMMP) has been prepared for the proposed development by SLR Consulting Australia. The plan seeks to identify, quantify and classify the likely waste streams to be generated during both construction & operation and in addition, identify the appropriate servicing requirements.

In summary, the SWMMP identifies the following key objective & design responses:

- 90% recycling target for general construction waste consistent with industry best practice;
- Identification of likely waste streams & how each waste stream shall be treated for both construction & operation;
- Identification of storage locations & allocated waste resources;
- Signage requirements for optimised waste recovery / recycling; and
- Identification of monitoring & reporting schedules for optimised future waste management.

For further information, The Department should refer to the independent SWMMP prepared by SLR Consulting Australia.

4. Summary

Ecologically Sustainable Design is a driving consideration in the redevelopment of the Stevenson Library project. As described within the report above, the building will incorporate a number of ESD initiatives in order to reduce energy demand & associated greenhouse gas emissions, potable water consumption and material resources of the College. All of the initiatives proposed, have been developed with consideration to the *Secretary's Environmental Assessment Requirements* by Department of Planning and Environment.

The ESD initiatives outlined in this report are examples of the applicant's commitment to ESD for the redevelopment.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- Significant retention of existing building structure
- Energy & greenhouse gas emissions
- Potable water reduction
- Minimising waste to landfill
- The indoor environment; and
- Occupant amenity and comfort

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the proposed Stevenson Library redevelopment project.

Appendix A: Industry Best Practice Comparison

Green Star - Design & As Built Scorecard

Project:	Stevenson Library Alteration - SSD8922
Targeted Rating:	4 Star - Best Practice

Core Points Available	Total Score Targeted
100	49.0

NA	CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED
	Management				14	
	Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	1
	Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies
			2.1	Services and Maintainability Review	1	1
			2.2	Building Commissioning	1	1
			2.3	Building Systems Tuning	1	1
			2.4	Independent Commissioning Agent	1	
	Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	2
	Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1
	Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1
			5.2	End of Life Waste Performance	1	
	Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	Complies
			6.1	Monitoring Systems	1	1
	Responsible Building Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies
			7.1	Formalised Environmental Management System	1	1
			7.2	High Quality Staff Support	1	
	Operational Waste	Performance Pathway	8A	Performance Pathway - Specialist Plan	1	1
			8B	Prescriptive Pathway - Facilities	-	
	Total				14	11

	Indoor Environment Quality				17	
☐	**Indoor Air Quality**	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1
☐			9.2	Provision of Outdoor Air	2	
☐			9.3	Exhaust or Elimination of Pollutants	1	1
☐			10.1	Internal Noise Levels	1	1

☐	**Acoustic Comfort**	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.2	Reverberation	1	
☐			10.3	Acoustic Separation	1	
	Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies
☐			11.1	General Illuminance and Glare Reduction	1	1
☐			11.2	Surface Illuminance	1	1
☐			11.3	Localised Lighting Control	1	1
	Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies
☐			12.1	Daylight	2	2
☐			12.2	Views	1	1
☐	**Indoor Pollutants**	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	1
☐			13.2	Engineered Wood Products	1	1
☐	**Thermal Comfort**	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	
☐			14.2	Advanced Thermal Comfort	1	
	Total				**17**	**11**

Energy					**22**	
	Greenhouse Gas Emissions	E. Modelled Performance Pathway	15A.0	Conditional Requirement: Prescriptive Pathway	-	
			15A.1	Building Envelope	-	
			15A.2	Glazing	-	
			15A.3	Lighting	-	
			15A.4	Ventilation and Air-conditioning	-	
			15A.5	Domestic Hot Water Systems	-	
			15A.6	Accredited GreenPower	-	
			15B.0	Conditional Requirement: NatHERS Pathway	-	
			15B.1	NatHERS Pathway	-	
			15C.0	Conditional Requirement: BASIX Pathway	-	
			15C.1	BASIX Pathway	-	
			15D.0	Conditional Requirement: NABERS Pathway	-	
			15D.1	NABERS Energy Commitment Agreement Pathway	-	
			15E.0	Conditional Requirement: Reference Building Pathway	-	Complies

		15E.1	Comparison to a Reference Building Pathway	20	6
Peak Electricity Demand Reduction	Prescriptive Pathway	16A	Prescriptive Pathway - On-site Energy Generation	1	1
		16B	Performance Pathway - Reference Building	-	
Total				**21**	**7**

Transport				**10**	
Sustainable Transport	Prescriptive Pathway	17A.1	Performance Pathway	0	
		17B.1	Access by Public Transport	3	1
		17B.2	Reduced Car Parking Provision	1	1
		17B.3	Low Emission Vehicle Infrastructure	1	
		17B.4	Active Transport Facilities	1	1
		17B.5	Walkable Neighbourhoods	1	1
Total				**7**	**4**

Water				**12**	
Potable Water	Prescriptive Pathway	18A.1	Potable Water - Performance Pathway	0	
		18B.1	Sanitary Fixture Efficiency	1	1
		18B.2	Rainwater Reuse	1	1
		18B.3	Heat Rejection	2	
		18B.4	Landscape Irrigation	1	1
		18B.5	Fire System Test Water	1	
Total				**6**	**3**

Materials				**14**	
Life Cycle Impacts	Performance Pathway - Life Cycle Assessment	19A.1	Comparative Life Cycle Assessment	6	4
		19A.2	Additional Life Cycle Impact Reporting	4	1
		19B.1	Concrete	0	
		19B.2	Steel	0	
		19B.3	Building Reuse	0	
		19B.4	Structural Timber	4	

Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	1
		20.2	Timber Products	1	
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	
Construction and Demolition Waste	Percentage Benchmark	22A	Fixed Benchmark	-	
		22B	Percentage Benchmark	1	1
Total				**14**	**8**

Land Use & Ecology				**6**	
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies
		23.1	Ecological Value	3	
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies
		24.1	Reuse of Land	1	1
		24.2	Contamination and Hazardous Materials	1	1
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	
Total				**6**	**2**

Emissions				**5**	
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1
		26.2	Stormwater Pollution Targets	1	1
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies
		27.1	Light Pollution to Night Sky	1	1
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	
Total				**5**	**3**

Innovation				**10**	
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process		
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in	30B	Market Transformation		
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks	10	

Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star	30E	Global Sustainability		
Total				**10**	**0**

TOTALS	AVAILABLE	TARGETED
CORE POINTS	100	49.0
CATEGORY PERCENTAGE SCORE		49.0
INNOVATION POINTS	10	0.0
TOTAL SCORE TARGETED		49.0