KAMBALA SCHOOL SPORTS PRECINCT **20/07/2020**

SEARs Ecologically Sustainable Design (ESD) Report

Revision 03
For SSDA

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Revision Information

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1. Introduction

This report supports a State Significant Development Application (SSDA) submitted to the Department of Planning, Infrastructure and Environment (DPIE) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act), for the proposed redevelopment of the sports precinct of Kambala School at 794 -796 New South Head Road, Rose Bay.

This application is SSD by way of clause 8 and schedule 1 under State Environmental Planning Policy (State and Regional Development) 2011 on the basis that the development is for the purpose of an existing school and has a Capital Investment Value of more than $20 million.

This report has been prepared having regard to the Secretary's Environmental Assessment Requirements issued for the project by DPIE, ref no SSD-10385 issued on 24 November 2019. The report identifies and responds to relevant government policy and/or targets pertinent to the development, as stipulated under the 'Ecologically Sustainable Development' section in SEARs for SSD-10385, issued on 24th November 2019.

In summary, the requirements from the following items are consolidated with respect to developing as ESD framework:

- Details of the requirements under guidelines/policies listed
  a) Government Architect NSW (GANSW) Environmental Design in Schools Manual
  b) NSW and ACT Government Regional Climate Modelling (NARCLiM) climate change projections
- Details of how best practice ESD principles, as defined by Part 7(4) Schedule 2 of the Environmental Planning and Assessment Regulation 2000, will be incorporated in the design and ongoing operation phases of the development.
- Details of how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This is based on a materiality assessment and includes waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design, and technology for the use of renewable energy.
- Details of preliminary considerations of building performance in support of climate change mitigation, including consideration of equivalent 4-star Green Star Design & As Built v1.3 pathway.
- Details of how the design of the development is responsive to the CSIRO projected impacts of climate change
- Details of water conservation, including practical opportunities to implement water sensitive urban design principles
- Details of energy efficiency, including practical opportunities to minimise energy consumption from non-renewable sources and to implement effective energy efficiency measures.

1.1. Backround

Need for a Campus Masterplan

Kambala is an independent day and boarding school for girls up to 18 years. Kambala also has an early learning centre catering for approximately 70 girls and boys aged between 6 months and 4 years. The school was established in the late 1800s and moved to the current campus in 1913. The campus has evolved in an organic and ad-hoc manner over the last 100 years as the school and its demands have grown.

A new campus-wide planning approach offers the opportunity to strategically plan for the future in a sustainable and effective manner and to preserve the unique aesthetic and heritage qualities of the campus. The preparation of a campus-wide planning approach is also consistent with the School's 2019 - 2023 Strategic Plan which identified the need for a broader strategic plan to coordinate renewal and development in a feasible and staged manner.

1.2. The Site

Kambala is located at 794 -796 New South Head Road, Rose Bay and is within the Woollahra Council local government area (LGA). Situated in the eastern suburbs of Sydney, the School is approximately 8km east of the Sydney CBD. The School is located on New South Head Road which is a classified road connecting the City with the eastern beaches. The School is surrounded by predominantly residential uses.

The campus is bound by New South Head (to the east), Bayview Hill Road (to the north) and Tivoli Avenue (to the west). Fernbank Boarding House is located at 1A -3 Bayview Hill Road opposite the Kambala School grounds. No works are proposed to this part of the campus in this DA. The locational context of the School is illustrated at Figure 1. Figure 2 provides an aerial map of the School and its immediate surrounds.

The School campus slopes down from New South Head Road in the east to the west and comprises a series of existing buildings in the western part of the campus that range in height and age. The south western and north western part of the campus accommodates much of the school's existing built form, while the eastern part has the school's sporting fields and courts.

The Kambala School building known as Tivoli House is in the heart of the campus. The house, its interiors, gateposts, gates and flanking walls with railing facing Tivoli Avenue, as well as 2 Norfolk Island Pines are listed as a heritage item in Woollahra Local Environmental Plan 2014 (WLEP 2014).

Within the School campus, the site of this SSDA is illustrated in Figure 3. The site proposed for new buildings is on top of the existing sports field and music building, as shown in green. The site proposed for demolition works and associated façade redevelopment and landscaping works is shown in red and is limited to a portion of the existing Hawthorne Building and the Arts building. The site of new landscape works is shown in yellow and includes all external spaces connecting these works. It is anticipated that the construction works will be staged, so the construction site for any given stage will be smaller than the overall site identified in Figure 3. The four key main buildings proposed at identified in Figure 4.

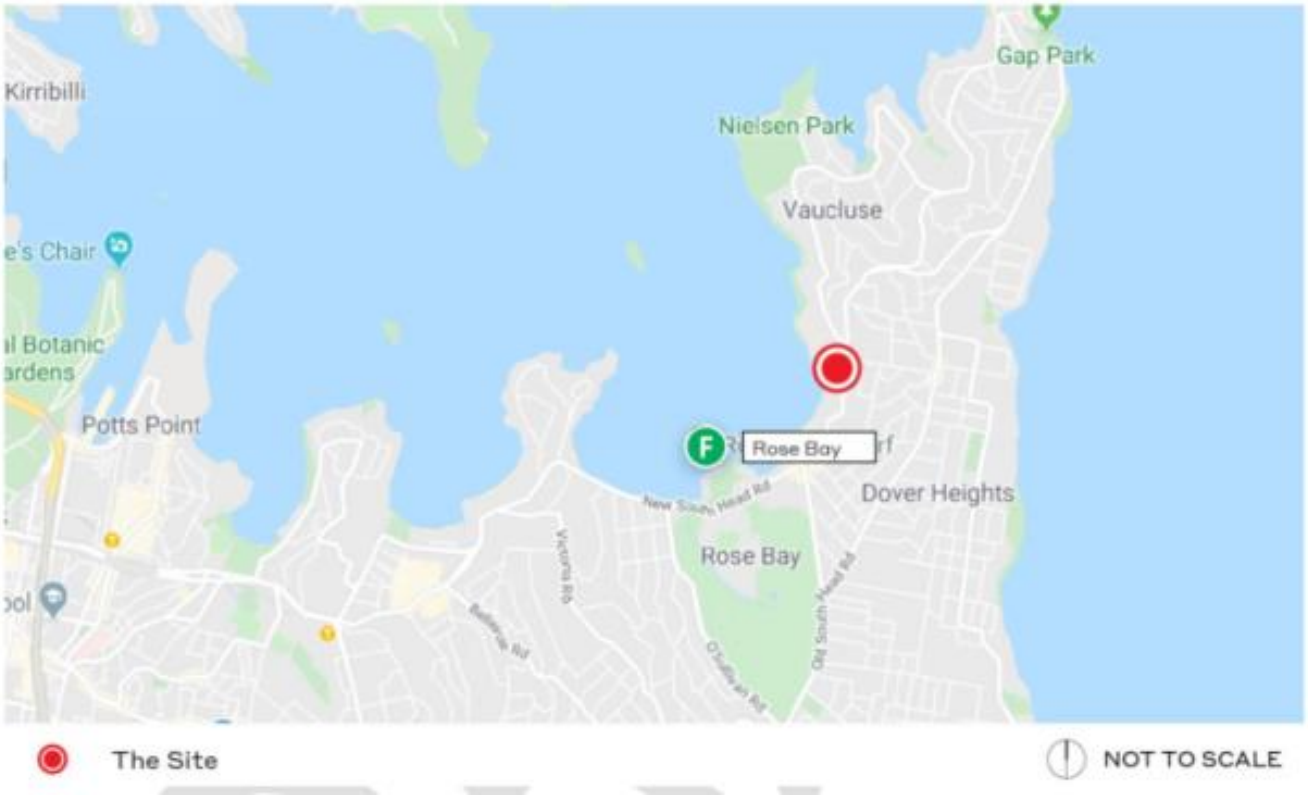


Figure 1 – Kambala School Location Context Plan (Source: Ethos Urban)

Figure 2 – Aerial Map of the Kambala Campus (Source: Near Map)

Figure 3 – Project Scope (Source: AJC)

Figure 4 – Key Plan (Source: AJC)

1.3. Site Climate

The site is a coastal climate with minimum annual temperature ranges from 8.1°C to 18.9°C and maximum annual temperature ranges from 16.4°C to 26°C. Based on the BOM Sydney (Observatory Hill), the winds generally have a 9am annual wind speed of 7.9-13.3 km/h in North or East direction, compared with an increase at 3pm to an annual wind speed of 12.7-19.5 km/h blowing in generally Western direction.

1.4. SEARs

The Department of Planning and Environment have issued Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statements (EIS) for the proposed development. This report has ben prepared having regard to Section 8 of the SEARs, as detailed below.

Table 1 – Compliance with SEARS

Compliance with SEARs	
Requirements	**Addressed in Section**
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 phases of the development	Refer to Section 2.1
Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low-carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.	Refer to Section 2.3 and Section 2.4 Refer to Appendix B – GANSW Alignment
Demonstrate how environmental design will be achieved in accordance with the GANSW Environmental Design in Schools Manual	Refer to Section 2.3
Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance.	Refer to Section 2.2
Include an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level.	Refer to Section 2.4 Refer to Appendix A – ESD Framework
Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change, specifically: - hotter days and more frequent heatwave events; - extended drought periods; - more extreme rainfall events; - gustier wind conditions; and - how these will inform landscape design, material selection and social equity aspects (respite/shelter areas).	Refer to Section 2.5
Address ESD in reference to NSW and ACT Government Regional Climate Modelling (NARCLiM) climate change projections	Refer to Section 2.5

2. Assessment Requirements and Project Responses

The following section details the policy requirements/ targets relevant to the ecologically sustainable design of the KSWSLP development. These will be reflected in the ESD Framework developed to capture the requirements; refer to Appendix A.

2.1. Environmental Planning & Assessment (EP&A) Regulation 2000

The ESD principles that are to be incorporated into the proposed development must be aligned with Clause 7(4) – Schedule 2 – Environmental Planning & Assessment Regulation (2000).

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.

Project Response

The proposed development will be constructed primarily on a pre-existing sports field. During the design and construction phases of the proposed development, the main contractor will implement an Environmental Management Plan (EMP) demonstrating formalised systematic and methodical approach to environmentally friendly construction that answers to site specific environmental risks and hazards. The project will also ensure the design does not incur adverse impacts to the environment by taking consideration of the project specific climate change risks. These project responses align with the targeted initiatives under the ESD Framework; refer to Appendix A – ESD Framework. Following these alleviate the concern of environmental damage.

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.

Project Response

To uphold inter-generational equity, the proposed development minimises the consumption of energy and water resources whilst reducing waste. The ESD principles incorporated into the proposed development facilitates the conservation of energy and water resources through energy and water efficiency measures.

Energy consumption will be designed to achieve a minimum 10% improvement above National Construction Code requirements. The reduction in water use will be established through high WELS rated water fixtures and fittings, and provision of rainwater capture and reuse system. An Environmental Management System (EMS; which will form part of the EMP) will be established and adhered to throughout construction to ensure the environmental impacts identified are well controlled by adequate planning and implementation. Waste generated during the construction and operational phases will be diverted from landfill to be recycled. 'Waste Audit' have prepared a "*Construction and Demolition Waste Management Plan*" forming part of the SSDA. Operational waste streams will be separated into general waste, cardboard and paper, commingled recycling and green waste recycling to maximise recycled waste. The current "*Operational Waste Management Plan*" (OWMP) written by 'Waste Audit' for the SSDA, details the above mentioned operational and construction waste strategies. Reducing energy, water and waste ensures that the health, diversity, and productivity of the environment is maintained for the benefit of future generations. The design will implement climate impact mitigation and management strategies by referring to climate prediction models for the site published by government bodies, with the aim of making the development more robust and future proof regarding climate change.

Conservation of Biological Diversity and Ecological Integrity

Namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.

Project Response

The proposed development is primarily repurposing the existing sports grounds and facilities, with some landscape gardens and scattered canopy trees being impacted or removed. The extent of the developments impact on the local ecology and risk mitigation and management strategies are assessed in the "*Biodiversity Development Assessment Report* prepared by 'Ecological Australia'. During the design phase of the development an EMP and EMS will be developed to mitigate any risks to the environment, and consideration of climate risks will help future proof the development to withstand the effects of climate change; detailed more in Section 2.5.

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; and

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.

Project Response

The valuation of the project's assets and services consider environmental factors through the implementation of various ESD initiatives. An EMP with an adequate EMS will be in place throughout the construction to ensure that excessive pollution and waste are minimised, and to establish recycling and landfill waste streams during construction and operational phases. The contamination and hazardous materials found prior to construction will be appropriately dealt with and remedial steps to decontaminate the site will be undertaken. An OWMP will be in place during operation to ensure the continuation of responsible recycling and waste management. A draft OWMP is has already been completed by Waste Audit outlining the expected waste generation, recycling steams, waste diversion targets and monitoring programs. A Lifecycle Cost Analysis will be done to evaluate the materials chosen and reduce the environmental impact of the development. The project responses to the EP&A Regulations align with the intent of multiple ESD Framework credits; refer to Appendix A – ESD Framework.

2.2. Improving Environmental Performance and Reducing Ecological Impact

The project has been designed to adopt national best practice sustainable building principles to improve environmental performance an to reduce ecological impact. The development will integrate high efficiency building services and façade design such that a 10% improvement to the NCC-2019 Section J will be achieved. The design adopts passive cooling and heating design strategies to reduce the energy demand and GHG emissions, reducing the buildings demand on mechanical HVAC systems. The visual comfort of the primary spaces will also be considered in an effort to reduce the amount of artificial lighting and increasing comfort within the space.

An ESD Framework that reflects:

(1) the aforementioned EP&A Regulation clauses;

(2) 4-star Green Star Design & As Built equivalency design;

(3) GANSW Environmental Design in Schools Manual; and

(4) Climate change responsive design

is developed (see Appendix A – ESD Framework), encompassing environmental performance, ecological impacts, construction management and general education around sustainability.

Key highlights of the building services within the ESD Framework are summarised as below:

Passive Cooling & Heating Design

The design adopts passive cooling and heating design principles to reduce the building's reliance on mechanical HVAC system and artificial lighting; acting to reduce energy consumption. This primarily includes implementation of extensive external shading to limit solar penetration in summer to reduce the heat load from the façade, and use of cross flow ventilation strategy in occupied spaces to provide adequate thermal comfort and pleasant indoor environment quality, whilst taking advantage of the coastal breezes. Further, the project will investigate ways to incorporate daylight technologies (fibre optics light collector / heliostat sunlight reflector panels) to redirect natural daylight into the occupied zones, which can also reduce operating costs by dimming/switching off the artificial lights.

Mechanical Services

All building services will be designed to achieve a high level of energy efficiency to achieve a 10% or more improvement on NCC 2019 Section J. The following mechanical strategies will be considered for implementation:

- All mechanical equipment to be efficient, subject to life cycle costing analysis outcomes
- Main sports hall (and potentially office, teaching area, and wellness centre as well) to be provided with mixed mode ventilation strategy where natural ventilation system will be used when the outdoor conditions (temperature, humidity, pollutant concentration) are favourable, and mechanical system will be used otherwise. Manual control override are to be provided where automated system are present
- Mechanical system to consist of a centralised plant configuration, which allows for diversity and improves energy efficiency
- Ductwork/pipework systems to be designed to reduce system pressure losses and reduce fan and pump motor power
- Variable speed dampers to be provided for ventilation fans, where suited
- Variable speed pumps to be provided where suited
- A Building Management Control System (BMCS) to be installed with automatic intelligent controls to optimise plant efficiency, and monitor and record energy consumptions to reduce energy wastage
- Where applicable, refrigerants to be specified that have low ozone depletion potential, and low global warming potential

Electrical Services

The project team will work to implement electrical services that assist energy efficient design, as detailed below, subject to detailed design of the project:

- Robust, long-life LED lighting with automatic lighting control system to reduce energy wastage – lighting control strategies may include implementation of area dimming, time clock, daylight sensors or PIDs
- Electrical equipment to be specified to be energy efficient to reduce building electricity consumption
- Major energy uses to be sub-metered by end use, and function area
- Energy & water monitoring screen to be provided at commonly accessed locations of the school (e.g. staff office areas, common walkway or main sports hall entry) to display energy & water consumption with student-friendly infographics for education purposes.
- Solar photovoltaics (PV) system to be installed (capacity to be determined through design progression).

Hydraulics Services

The project team will implement the hydraulics services that assist water efficient design as detailed below, subject to detailed design of the project:

- Potable water using fixtures to be high efficiency rated by WELS. Specification of fittings to be confirmed in the detailed design.
- Rainwater harvesting and reuse strategy to be implemented to reduce potable water consumption
- Potable water sub-metering to be connected to the BMCS to reduce wastage through identifying leaks or poor operational performance.
- High efficiency, heat pump hot water plant to be specified

Civil Engineering Services

The project team will implement design strategies to cater for water sensitive urban design principles (WSUD), with the aim of reducing pollutants (including Total Suspended Solids, Phosphorous, Nitrogen and Gross Pollutants) and not effecting the increase in natural annual average load of nutrients and sediments.

Sustainable Materials & Reducing Waste

The project team will take into consideration the sustainable strategies outlined below regarding materiality, waste reduction design measures, future proofing, and use of sustainable and low-carbon materials. Specification of materials or means to reduce waste will be confirmed in the detailed design.

- Specifying low VOC emitting materials to improve indoor air quality;
- Specifying engineered wood products with low or no formaldehyde;
- Applying life cycle assessment principles and learnings in relation to:
  - specifying green concrete steel and timber (such as Portland cement replacement, captured/reclaimed water for mix water, and recycled aggregates; steel manufactured from energy-reducing processes; and sourcing reused timbers);
  - minimising mass or volume of materials;
  - implementing sound procurement practices; and
- Pipe material selection based on current best practice such that:
  - PVC-u to be specified based on the GBCA guidelines
  - Polyethylene material to be specified for pressure water and gas services, as Polyethylene is recyclable and has significantly lower environmental impact than the alternative ductile iron material
  - Pipe bedding materials to be specified to be locally sourced, where practical
- Selecting permanent formworks, flooring, blinds and cables with no PVC or PVC products that comply to GBCA's best practice guidelines for PVC
- Prioritising locally sourced materials and procuring salvaged and/or recycled materials
- Specifying materials sourced with cradle to cradle credentials
- Efficient selection of materials to limit off-cut wastage during construction
- Promotion of off-site prefabrication to limit construction waste impacts

2.3. Government Architect NSW (GANSW) Environmental Design Manual

The Government Architect NSW (GANSW) has released an Environmental Design in Schools Manual which illustrates a set of design principles as guidelines to follow for new development and expansion of schools. The design principles from the GANSW Design Guide for Schools include:

- Context, Built Form and Landscape
- Sustainable, Efficient and Durable
- Accessible and Inclusive
- Health & Safety
- Amenity
- Whole of Life, Flexible and Adaptive
- Aesthetics
- Passive & Active Design
- Social & Community

The measures and project responses within the GANSW that are relevant to the Kambala School Sports Precinct development are provided in Appendix B – GANSW Alignment. The responses also link back to relevant EP&A Reg clauses and Green Star credits that has the similar design initiatives and its intent. Key design initiatives can be noticed in the previous Section 2.2.

2.4. Preliminary Consideration of Building Performance & ESD Rating Scheme

Preliminary consideration of building performance for the proposed development is reflected by applying passive sustainable design principles and achieving the minimum performance requirements stipulated under NCC 2019-Section J. Further, the building design addresses mitigation of climate change by improving the building's energy efficiency via adopting energy conservation strategies in building services design, as detailed in Section 2.5. Finally, the building's sustainable design and management practices are further supplemented by consideration of the design practices stipulated in the Green Star Design & As Built v 1.3 rating tool.

NCC 2019 – Section J Requirements

The National Construction Code (NCC): Building Code of Australia (BCA) 2019 Section J Energy Efficiency sets minimum energy performance requirements for all new developments, including the performance of building fabric and building sealing, glazing thermal performance, heating, air conditioning and ventilation systems, artificial lighting and power, and heating water supplies.

The project will demonstrate NCC 2019-Section J compliance by complying with the Deemed-to-satisfy (DTS) provisions stipulated and/or via an Alternative Solution – JV3 Verification Method approach.

Green Star Design & As Built v1.3

Green Star is a voluntary scheme administered by the national, not-for-profit organisation, Green Building Council of Australia (GBCA). The Green Star suite of tools provides an environmental sustainability rating of a building's performance. The tools are performance based and assess the environmental attributes of new and refurbished buildings in every state across Australia. The Green Star rating system is scaled to a star level from 0 to 6 stars. The project team has developed an ESD Framework (Appendix A – ESD Framework) to reflect an equivalent 4 star Green Star Design & As-Built v1.3 pathway, which requires a minimum of 45 points to be achieved.

2.5. Design for Climate Change Resilience

The Kambala School Sports Precinct will be designed to future-proof itself from the potential impacts of climate change.

NARCLiM Climate Change Projections

The NSW Office of Heritage and Environment, now part of the NSW Department of Planning, Industry and Environment, has developed the NSW and ACT Government Regional Climate Modelling (NARCLiM) climate change projections to provide a dataset for detailed new future (2020-2039) and far future (2060-2079) projections. Generally, it determines that there will be:

- More hot days and fewer cold nights;
- An increase in the number of heatwave events;
- More hot days above 35ºC; particularly in Spring and Summer;
- An increase in rainfall in Summer and Autumn and a decrease in Winter and Spring; and
- Change in the rainfall patterns that will affect drought and flooding events

CSIRO Climate Future Projections

In addition, the Intergovernmental Panel on Climate Change (IPCC) published four greenhouse gas (GHG) concentration trajectories known as Representative Concentration Pathways (RCPs) which are used by CSIRO for climate project modelling at a regional scale within Australia. The four RCPs and its definition include:

- **RCP 2.6** – Emissions peak around 2010, decline substantially – 1.0ºC pf Global Warming Mean and likely temperature range of 0.3ºC – 1.7ºC
- **RCP 4.5** – Emissions peak around 2040, then decline – 1.8ºC of Global Warming Mean and likely temperature range of 1.1ºC – 2.6ºC
- **RCP 6.0** – Emissions peak around 2060, then decline – 2.2ºC of Global Warming Mean and likely temperature range of 1.4ºC – 3.1ºC
- **RCP 8.5 –** Emissions continue to rise throughout the 21st century – 3.7ºC of Global Warming Mean and likely temperature range of 2.6ºC – 4.8ºC

The series of climate futures matrices representing the combination of time periods and greenhouse gas scenarios and classified by the combined changes of the climate variables identified above are provided in *Table 2*.

Project Response

To provide practical and realistic design advice, the use of climate projection data from the medium range scenarios, RCP 4.5, is considered for the 2030 climate projections. The RCP 8.5 scenario is considered an extreme worst-case scenario and has been considered for the 2070 climate projections.

The projections will have an impact on operational cost and occupancy comfort and safety. Hotter days with more heatwave events will particularly affect students, staff and the operation of building services equipment. This will also require higher capacity and operational costs for mechanical services to maintain occupancy comfort. Adequately reinforced façade components will be required to withstand increased rainfall.

The design initiatives in *Table 3* aim to mitigate the effect of future climate change. These measures should allow the project to meet the difficulties predicted by the CSIRO's climate change projections while maintaining occupancy comfort and operational efficiency.

Table 2: Climate futures matrices for RCP 4.5 and RCP 8.5 at East Coast

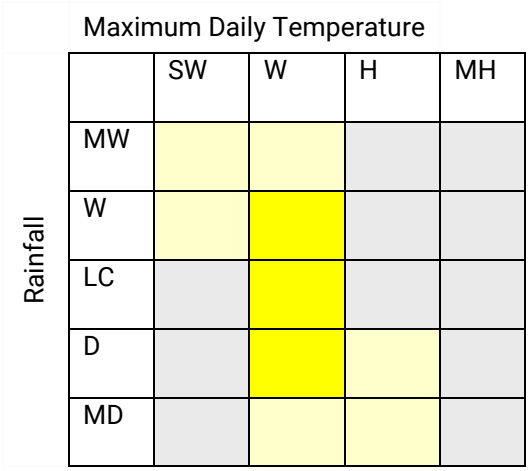
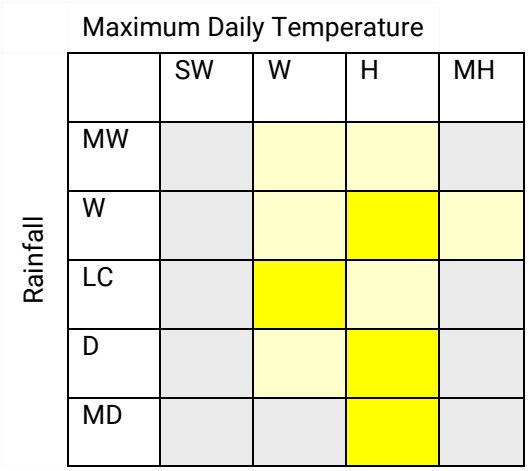
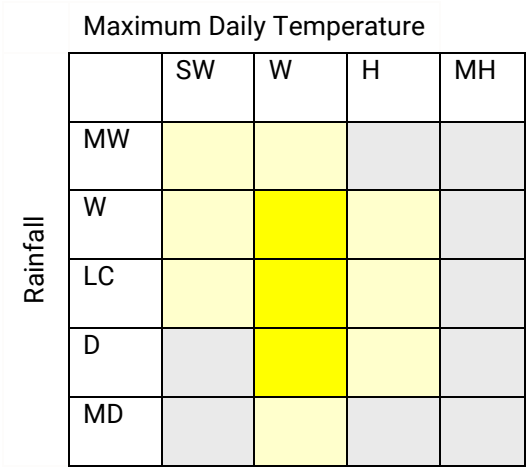
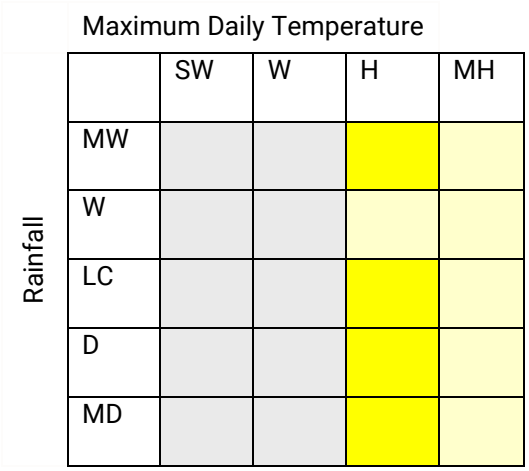
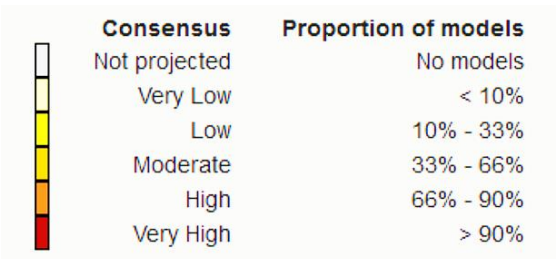
East Coast Climate Futures		Year	
		Summer 2030	**Summer 2070**
Emissions Scenarios	**RCP 4.5**		
	RCP 8.5		
Keys		**Maximum Daily Temperature** SW Slightly Warner < 0.5 W Warmer 0.5 – 1.5 H Hotter 1.5 – 3.0 MH Much Hotter > 3.0 **Rainfall** MW Much Wetter > 15.0 W Wetter 5.0 – 15 LC Little Change -5.0 – 5.0 D Drier -15.0 – -5.0 MD Much Drier < -15.0	

Table 3: Climate change projections and response initiatives for the Kambala School Sports Precinct

Climate Change Projections	Project Responses
Hotter days and more frequent heatwave events	The design team will consider investigating an extra 1°C (dry bulb) temperature to be added to the external ambient conditions to calculate the required cooling load of the building as a measure of accounting for 2030 RCP 4.5 projections. The cooling load will be satisfied by investigating the equipment associated with cooling to integrate into the final design; accounting for the requirement of RCP 4.5. Further, the increase in temperature as per 2070 RCP 8.5 projections will be met as the main HVAC equipment that will satisfy the cooling demand, will consider being replaced in approximately 25-30 years. Selecting external ambient conditions now to account for the provisions of RCP 8.5 projections would be counter intuitive, as the main equipment items which satisfy the cooling demand will be oversized and will not operate with the desired efficiency.
Extended drought periods	A rainwater harvesting and reuses system that captures services design will implement rainwater harvesting and reuse strategy to reduce potable water consumption that will assist in combating extended drought periods. The rainwater from the rooftop field areas will be used as the catchment area to reuse for toilet and irrigation. In addition, strategies that assist water efficient design include, subject to detailed design of the project: - Potable water using fixtures to be high efficiency and WELS rated. Specification of fittings will be confirmed in the detailed design. - Potable water submetering to be connected to the BMCS to reduce wastage through identifying leaks, or poor operational performances
More extreme rainfall events	The project will be responding to the potential effect of climate change – an increase in rainfall intensity – by conducting a flood assessment. *"SSDA Stormwater Management Plan"* has been, to identify potential for diversion of stormwater pipes and easements across the existing site and proposed site. The report suggests an increase in pipe capacity to offset the risk from a 1 in 100-year flood event. The onsite detention is to meet the Council's development control plan – Woollahra DCP 2015 Chapter DE2 Stormwater and Flood Risk Management – E2.2.4 to mitigate the risk of a 1 in 100-year flood event.

3. Conclusion

This report details responses to the Department of Planning, Industry and Environment's SEARs for the preparation of an Environmental Impact Statement (EIS) for the proposed development. The report demonstrates that a myriad of ESD initiatives have been incorporated within the proposed ESD Framework (see Appendix A – ESD Framework) that complies to all requirements under SEAR 8.

4. Appendices

Appendix A – ESD Framework

Kambala School Sports Precinct ESD Framework

Revision 02 (29 May 2020)

Credit #	Category	Initiative	Intention		Requirements
1	Energy & Carbon	Greenhouse Gas Emissions	Reduce Greenhouse Gas Emissions through passive design approach and energy efficiency of buildings in operation	1.1	Any new building envelope façade in conditioned space shall meet Section J Part J1 Building Fabric requirements.
				1.2	Any new glazing in conditioned space shall meet Section J Part J1 Glazing requirements i.e. comply with NCC Facade Calculator OR Meet the requirements nominated as part of a compliant JV3 assessment.
				1.3	Façade will be sealed to minimise air leakage / infiltration. This shall occur to any spaces where heating or cooling is delivered. New fabric elements to meet Section J Part J3 Building Sealing requirements.
2	Energy & Carbon	Efficient HVAC Systems / Passive Design	Provide passive systems wherever possible	2.1	Overall installed systems will exceed Minimum Energy Performance Standards (MEPS) or NCC Section J target for services. Target 10% exceedance to NCC2019 Section J.
				2.2	Mixed mode systems to be installed in the following spaces: - Sports hall - Office, Teaching & Learning spaces, Wellness centre (to be confirmed)
3	Energy & Carbon	Peak Energy Demand Reduction	Reduce peak demand on energy infrastructure	3.1	Peak load to be reduced by 10% through use of passive design, efficient fittings and onsite generation via PV systems.
4	Energy & Carbon	Lighting Strategies	Reduce artifical lighting energy consumption	4.1	LED light fixtures to be used throughout, as a minimum in teaching and learning space, and office spaces.
				4.2	Dimmable controls to be included for all areas. Daylight harvesting controls to be included for all perimeter areas with windows. Project is to investigate use of sunlight collecting & redirecting technologies (e.g. fibre optics light collector OR heliostat Sunlight reflectors) to maximise daylight harvesting into well-shaded spaces of the new building.
				4.3	All spaces except where required for safety reasons to have occupancy sensors. External lighting to have sensors and time clocks to manage operating hours.
5	Energy & Carbon	Energy Sub-Metering	Facilitate ongoing management of energy consumption	5.1	Energy (electricity, gas, thermal) sub-metering to be installed to allow for tracking, monitoring and trending.
				5.2	A system is to be installed that it is connected to the energy sub-metering network and is capable of monitoring and displaying the building's energy & water performance on at least a monthly basis. This could be a BMS or the like, depending on appropriateness. Display screens will be installed at multiple locations, where appropriate (e.g. staff office breakout area, commonly accessed pathway for students, entry of the sports hall) and provide student friendly infographics for ease of understanding, serving educational purposes. Additional information that encourage sustainable behaviour to students to be included too.
				5.3	Mobile App service for students & staff linked to the display screen that illustrates the live feed of the school energy & water consumption to be considered for development (for educational purpose)

6	Water	Potable Water Efficiency	To reduce potable water consumption by occupants	6.1	The following fixtures will be installed to all areas to meet WELS rating requirements: All Toilet flush - 3 L/ half flush, 4.5 L/ full flush All Urinals - 1 L/flush All Indoor taps - 4.5 L/min All Showerheads- 7.5 L/min
				6.2	Rainwater Harvesting System will be installed that collects rainwater run-off from the roof, and reuse for toilets and/or irrigation (subject to design development)
7	Water	Water Metering	To monitor and manage water consumption	7.1	Water sub-metering to be installed for the following: - Toilets - Rainwater tank
				7.2	A system is to be installed that it is connected to the water sub-metering network and is capable of monitoring and displaying the building's water performance on at least a monthly basis. This could be a BMS or the like, depending on appropriateness.
8	Water	Stormwater and Landscape Irrigation	Improve quality of site stormwater runoff and reduce potable water consumed by landscape irrigation	8.1	Explore potential for edge swales or the like (e.g. planting) to treat water runoff from site. Subject to any installation of landscape areas.
				8.2	Implement xeriscape landscaping (drought tolerant plant species that do not require irrigation to survive), where appropriate.
9	Water	Domestic Hot Water	Reduce carbon and energy associated with the heating of water for domestic uses	9.1	Use electric heat pump system with storage (system using thermal energy in air to draw heat to warm-up the DHW temperature). This can eliminate gas usage on site. Energy incurred from the use of heat pump system can be offset by provision of PV system.
10	Sustainable Materials	Internal Materials	Reduce health impacts associated with material finishes and assemblies across the school	10.1	For all paints applied as internal finishes, VOC limits shall be in accordance with Green Star requirements
				10.2	For all adhesives and sealants used in the project, VOC limits shall be in accordance with the limits adopted by Green Star
				10.3	All carpets installed in the project shall have VOC limits in accordance with Green Star requirements.
				10.4	All specified internal engineered wood products shall be in accordance with the Green Star requirements for Formaldehyde
11	Sustainable Materials	Resource Efficiency	Reduce embodied energy and resource depletion associated with the project	11.1	A material procurement strategy for resource efficiency is to be implemented. - Any existing material will be reused where possible onsite. - A whole of lifecycle assessment should be conducted when selecting building materials. Project to also investigate using sandstone cut onsite during excavation for cladding and landscape elements.
12	Sustainable Materials	Recycled Material Content	Prolong the useful life of existing products and materials and encourage the uptake of products with recycled content	12.1	The project shall target: - 5% by cost of items within the new project (e.g. Desks) to have at least 20% recycled content or are reused. e.g. re-use timber for desk. - Reinforcing steel and structural steel to have recycled content unless strength cannot be met. - Concrete to have at least 30% replacement with SCM. - Refer to TTW Structural Engineering report for details surrounding the content of steel and cement mixes (recycled content of steel & concrete).
13	Sustainable Materials	Local Material Sourcing	To reduce embodied energy associated with transportation of materials	13.1	10% by cost of all construction materials, including fitout items to be sourced from the local area (within 1500Km of site, if feasible).

14	Sustainable Materials	Timber	To encourage the use of reused timber and timber sourced from forests whose conservation values are not degraded	14.1	90% (by cost) of all timber used shall be from a reused source or is certified by a scheme accredited by FSC International or PEFC and has a full Chain of Custody (CoC)
15	Sustainable Materials	PVC	Reduce the environmental and health impacts of PVC by encouraging the use of PVC that adheres to Best Practice Guidelines	15.1	90% (by cost) of PVC products & PVC containing products that meet the Best Practice Guidelines for PVC in the Built Environment, Products include: permanent formwork, pipes,flooring, blinds and cables.
16	Sustainable Materials	Zero Ozone Depletion Potential	To encourage practices that minimise the environmental impacts of refrigeration equipment	16.1	All refrigerants will have an ozone-depleting potential of zero
17	Sustainable Materials	Hazardous Material Survey	Reuse previously developed land and remediate contaminated land / buildings	17.1	A comprehensive hazardous materials survey has been carried out by JBS&G in accordance with the relevant Environmental and Occupational Health and Safety (OH&S) legislation. Any identified asbestos, lead or PCBs are to be stabilized, or removed and disposed of in accordance with best practice guidelines.
18	User Comfort & Wellbeing	External Views and Visual Comfort	To provide students and staff with a visual connection to the external environment	18.1	Significant areas of glazing have been incorporated into the external building envelope to provide visual comfrot in the form of access to natural views and increased levels of natural daylight. Note - glass selection to encourage natural light but constrained to Section J requirements. Where no thermal requirements for glazing, the project have introduced a higher VLT glass.
19	User Comfort & Wellbeing	Environmental Conditions (Wider Temperature Range)	To provide a range of spaces with a mix of environmental conditions to maintain thermal comfort with reduced energy consumption	19.1	The mixed mode ventilated spaces are controlled with the followings meet the users' thermal comfort: - Naturally ventilation when indoor temperatures are in between 18-24 deg C. - Cooling to be provided when indoor temperatures are greater than 24 deg C, and Heating when less than 18 deg C. - Automatic control can be considered (but with provision of manual control override switches) - For automated control, outdoor weather conditions are to be measured to dictate suitability for natural ventilation.
20	User Comfort & Wellbeing	Daylight (Internal)	To maximise daylight penetration into the floor plate, improving indoor visual quality and reducing lighting energy consumption.	20.1	Perimeter spaces with glazing to receive 2.5% daylight factor at floor level
21	Sustainable Transport	Public Transport	To encourage responsible and carbon-minimal forms of transport for users to the school	21.1	Signs and information shall be provided indicating connection to Sydney bike routes, local public transport - Wayfinding plan to address this.
22	Sustainable Transport	Cyclist Facilities	To facilitate the use of bicycles by occupants and visitors	22.1	Bike parking spaces have been provide for students and staff. Adequate showers, change facilities and locker storage have been provided.

23	Operations & Education	Recycling Waste Storage	To provide facilities that encourage and facilitate the recycling of waste	23.1	A dedicated waste storage area shall be used that is readily accessible for council waste collection. The area shall have a separate, designated space for the separation and collection of recyclables including: - paper & cardboard - glass - plastic - organics Note: refer to OWMP prepared by Waste Audit for full details
24	Operations & Education	Construction Waste Management	Minimise the amount of construction waste going to disposal	24.1	Both Demolition and Construction Tender to include requirement that the Contractor develops and complies with WMP and retains quarterly reports for demonstrating that the targets are being met.
				24.2	A WMP has been developed that addresses: -Construction waste management -Outlines how to achieve recycling rate for demolition / construction waste of min 80%. Note: refer to WMP prepared by Waste Audit for full details
25	Operations & Education	Environmental Management Plan	Minimise environmental impacts of all sources during construction stage.	25.1	Tender to include requirement that the Contractor develops and complies with EMP requirements and issues reports for demonstrating that the EMP is being successfully implemented.
				25.2	An EMP shall be developed by the Contractor that complies with Section 3 of the NSW Environmental Management System guidelines 2009. In addition, the plan is to address erosion / sedimentation of construction works to avoid polluting the surrounds.
27	Operations & Education	Efficient Equipment Selection	Ensure any new equipment to be installed is energy efficient	27.1	Any installed fridges, freezers, washers, dryers, microwaves are to be within 1 star of the highest available on the market under the Energy Rating Labelling Scheme (refer to energyrating.gov.au).
28	Operations & Education	Building Services Procurement	Ensure services are procured based on considering the life cycle cost and environmental impact associated with operation, replacement and maintenance	28.1	Select systems based on Life cycle cost (LCC) analysis looking at the Net Present Value(NPV) over a maximum 7 year period. Consideration to include capital, operational, maintenance, churn and replacement over the systems period assessed.
29	Operations & Education	Green Orientation and Ongoing Education	Encourage transfer of information to new and ongoing staff and student to optimise the sustainable performance of the school	29.1	Issue a School Sustainability Users Guide to inform all new staff of the school commitment to sustainability. Guide is to highlights the sustainability aspects of the project and nominates initiatives relevant to the user e.g. bike facilities, recycling bins, mixed mode and/or natural ventilation operation etc.
30	Social and Community	Public Performance Feedback System / Informatics	Monitor and communicate resources use to staff and student	30.1	Install display screen in public areas that show daily/monthly/ annual water & energy consumption. Waste recycling rates to be considered for display here too.
31	Social and Community	Community Space	Contribute to community wellbeing, maximise building use and provide additional facility to local community	31.1	Seek opportunites to enhance public facing areas with landscaping and ensure landscape and building design are integrated Provide an engaging environment for pedestrians visually and materially along public street frontages
				31.2	After hours usage of the schools sports facilities for weekend interschool sports competitions.
32	Benchmarks and targets	Sustainability Framework	Facilitate ongoing management and monitoring of sustainability drivers	32.1	An energy, water and waste target for the school shall be developed
				32.2	Quarterly reports by the School Facilities Management team during operation shall be issued to determine if the school is operating in line with the targets

Appendix B – GANSW Alignment

Refer also to the relevant section of the Architectural Design Report

Guide	PRINCIPLE CATEGORY	#	DETAILS	PROJECT RESPONSE	EP&A Reg 2000 (Schedule 2, Clause 7(4)) ALIGNMENT	GREEN STAR ALIGNMENT
Design Guide for Schools	Context, built form and landscape	1.1	Respect and respond to its physical context, neighbourhood character, streetscape quality and heritage	New built works will keep a respectful distance from Tivoli House. The development, barring the music building, will not add any height to the existing buildings, keeping the quality of views from and to the street.		
		1.2	Consider interpretation of Aboriginal cultral hertiage within the design of buildings and open spaces in consultation with local Aboriginal community	Recommend school to implement interpretation of cultural heritage. Will provide positive social impacts to the students and staff. Cultural heritage within design can be a key element to celebrate the history of the school / local area.		Aligns with Green Star Culture, Heritage and Identity credit to encourage the use, intepretation and celebration of buildings with cultural identity.
		1.3	Respond to its natural environment including scenic value, local landscape setting and orientation	An extensive views analysis has been undertaken to validate the success of sloping the site to conceal the building below New South Head Road.		
		1.4	Retain existing built form and vegetation where significant	KSWSLP will elevate the sports field and build beneath it allowing for landscape improvements and the rearranging of functions within existing buildings.		
		1.5	Include tree planting and other planting that enhances opportunities for play and learning	Trees and landscape elements will be provided within the new courtyard to enhance opportunities for students to interact, play and learn. Softscape elements on rooftop (tennis and outdoor courts) will also promote active and healthy lifestyle for students and staff.	Aligns with *Conservation of biological diversity and ecological integrity*	Aligns with Green Star Ecological Value credit which aims to improve the site's ecological value through implementation of landscaping.
		1.6	Ensure landscaping improves the amenity within school grounds and for uses adjacent to the school	The rooftop softscape elements (tennis and futsal courts) will improve the amenity within the school ground by providing students with additional sporting events. Softscape elements will also help reduce urban heat island effect associated with concrete / dark roofs.		Aligns with Green Star Ecological Value credit which aims to improve the site's ecological value through implementation of landscaping.
		1.7	Be informed by a current Conservation Management Plan (CMP) and consider local heritage items both on the school site and in the local neighbourhood	Recommend school to implement interpretation of cultural heritage. Will provide positive social impacts to the students and staff. Cultural heritage within design can be a key element to celebrate the history of the school / local area.		Aligns with Green Star Culture, Heritage and Identity credit to encourage the use, intepretation and celebration of buildings with cultural identity.
		1.8	take advantage of its context by optimising access to nearby transport, public facilities and local centres	The Kambala school is located near public transport on New South Head road and is in close promixity to Rose Bay centres.		Aligns with the Green Star Transporation Credit (Credit 17) to promote the use of public transport (lower emission transportation mode).
		1.9	Consider height and scale of school development in relationship to neighbouring properties.	It is a core principal of the KSWSLP proposal to not add any height to the existing buildings (other than the music builing - the roof of which is presently level with the sports field). Insead the proposal works with the existing site slope to largely conceal the building below the level of New South Head Road. An extensive view analysis has been undertaken to validate the success of this approach.		

Design Guide for Schools	**Sustainable, efficient and durable**	2.1	be responsive to local climate including sun, wind and aspect	Passive design principles have been utilised to respond to local climate. The central courtyard affords teaching and learning areas an aspect towards northern sun. The floor levels are designed to allow cross ventilation and natural light along the mostly subterranean north-east facade. Generous amount of shading have been incorporated into the building design to mitigate excessive solar heat gain and glare issue. Natural / mixed mode ventilation strategy of the sports hall is currently being investigated.	Aligns with *inter-generational equity* Conservation of energy resources through energy efficiency measure (passive design).	Credit 3.1 of Green Star Design & As Built v 1.3
		2.2	select materials and approaches to detailing that are robust and durable	Material selection should be based on whole of life practice which looks at lifecycle cost, robustness, durability, embodied carbon and end of life disposal / recyclability. Recommend school to procure a % of the total materials with third party sustainable ceritifications. For example, materials with high recycled content, Environmental Product Declarations, or Forest Stewardship Certificates.	Aligns with *precautionary principle & inter-generational equity & improved valuation, pricing and incentive mechanisms.* Selection of material based on careful consideration of whole of life.	Aligns with Green Star Sustainable Products and Life Cycle Impact intent to select materials based on whole of life assessment and to reduce the environmental impacts of building materials for the building over its entire life cycle.
		2.3	integrate landscape, planting and Water Sensitive Urban Design (WSUD) principles to enhance amenity and building performance	Where possible, integrated landscape & planting will be incorporated into the design as part of WSUD. In addition, rainwater capture and reuse system will be considered where feasible.	Aligns with *Conservation of biological diversity and ecological integrity*	Aligns with Green Star's Stormwater Credit to minimise stormwater outflows and reduce pollutants entering the public stormwater infrastructure or other water bodies. Aligns with Green Star Potable Water credit to minimise the use of potable main water.
		2.4	include deep soil zones for ground water recharge and planting	Deep soil zones for landscape will be considered where feasible.	Aligns with *Conservation of biological diversity and ecological integrity*	
		2.5	minimise reliance on mechanical systems	Natural and mixed mode ventilation strategy for certain areas are currently being explored (e.g. sports hall) to minise reliance on mechanical system. In addition, mechanical system will be selected based on energy efficiency. Recommend an energy model be developed for the proposed design which will be at least 10% better in terms of overall energy performance when compared to a NCC Section J compliant design.	Aligns with *precautionary principle & inter-generational equity & improved valuation, pricing and incentive mechanisms.* Selection of material based on careful consideration of whole of life (lifetime resource usage). Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy Credit to reduce greenhouse gas (GHG) emissions associated through energy efficiency measures / passive design.
		2.6	include initiatives to reduce waste, embodied energy and emissions, through passive design principles and the use of advanced energy production systems where possible	Recommend that for construction and demolition waste, a diversion rate of min 80% of waste to landfill be imposed onto the Contractor to ensure waste is minimised. For operational waste, encourage the school to provide recycling facilities for its student and staff (paper, plastic, glass etc.) and to set a recycling target which is tracked, monitored and reported. Material selection will be based on whole of life consideration which looks at robustness, durability, embodied carbon, end of life disposal / recyclability. Recommend school to procure a % of the total materials with third party sustainable ceritifications. For example, materials with high recycled content, Environmental Product Declarations, or Forest Stewardship Certificates. Project team investigating a 30-40% replacement of Portland cement with supplementary cementitious materials. Passive designs include large amount of shading, high thermal performance glazing and building envelope elements and natural ventilation. Building envelope and glazing thermal performance to be better than required by NCC Section J. Opportunity to employ renewnable energy (PV) has been investigated, with the capcaity and feasibility to be determined at detailed design phase.	Aligns with precautionary principle & inter-generational equity & improved valuation, pricing and incentive mechanisms. Selection of material based on careful consideration of whole of life (embodied carbon and lifetime resource usage). Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy Credit to reduce greenhouse gas (GHG) emissions associated through energy efficiency measures / passive design. Aligns with Green Star credit Responsible Construction Practices, Construction and Demolition Waste, and Operational Waste.
		2.7	maximise opportunitites for safe walking, cycling and public transport access to and from the school.	A Green Travel Plan will be implemented, including new bicycle parking, EOTF, new school bus services and improved pedestrial amenitites. Consideration the installation of Electric Vehicle charging stations to promote the use of low carbon emission vehicles.	Aligns with inter-generational equity Conservation of resources through less reliance on transporations with high emissions (cars etc.).	Aligns with the Green Star Transporation Credit (Credit 17) to promote the use of walking and cycling. Also promote the use of low emission vehicles.

Design Guide for Schools	**Accessible and inclusive**	3.1	Establish security requirements early to ensure any required secure lines can be designed and integrated with built form	Principles of crime prevention through environmental design will be applied to ensure that security measures are integrated with the development, and with the School's existing protocols.		
		3.2	Balance security with accessibility and inclusiveness by minimisng the use of fenscing particularly along street frontages	The existing stands of trees form a visual buffer to the school that will predominately mainatained. The sloping aspect of the site allows for embankments and balustrades to form a physical seperatation, with no high fences needed.		
		3.3	Engage students, educators and the community in development of the vision and design brief for the school.	A series of workshops were conducted with staff and studens in Decmber 2019 to understand the user requirements and aspirations. The outcomes of these sessions were recorded and consolidated inot the project functional brief. Community consultation has taken place with various local and community stakeholders - refer Community Engagement Report which forms part of this EIS		
		3.4	Allow for passive and dynamic play of different age groups.	Outdoor areas include a COLA, all-weather sports field, entry plaza and a northern courtyard with terraces and learning spaces. These facilities are catered to the Schools broad age groups from ELC to Year 12.		
		3.5	Provide school frontages and entrances that are visable, engaging and welcome.	A new pathway to reception will be built, with sight lines it will offer a clear path of travel to Tivoli House, the sports facility and Minter Building.		
		3.6	Encourage clear and logical wayfinding across the school site and between buildings for all users including after hours community users	Recommend digital signage for wayfinding if possible. Digital signage can also incorporate sustainability information (e.g. how much energy / water is saved each day, fun facts about a sustainable topic).		Aligns with Green Star credit Building Information which aims to educate occupants thus enable optimised performance.
		3.7	Ensure accessibility for all users of the site	The design envusres that the new school buildings and grounds are accessible, welcoming and inclusive to students, staff and visitors, with a range of needs. The design further considers how the new work can improve accessibility to existing areas of the campus that are not being refurbished at this stage.		
Design Guide for Schools	**Health and Safety**	4.1	Locate buildings and design facades that optimise fresh air intake and access to daylight	The sports hall is currently proposed to be natural / mixed mode ventilation to provide high air quality to students and staff. Overall, the building has been designed to incorporate passive design principles to promote access to daylight and views whilst minimising unwanted heat gain. This reduces reliance on mechanical system and thus reduces energy usage.	Aligns with *inter-generational equity* Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy credit for the reduction of GHG through energy efficient measures. Aligns with Green Star Indoor Air Quality and Visual Comfort credit to provide high indoor air quality and high levels of visual comfort to occupants
		4.2	Prioritise predestrians and avoid conflicts between vehicles and people	The internal roadways are to be redeveloped into a series of broad courtyards, prioritising pedestrian amenity and safety.		
		4.3	Provide convered areas for protection form sun and rain	The developments roof over-hang establishes an east-west main axis, creating a weather protected through-link that ends in the new COLA.		
		4.4	Support safe walking and cycling to and from school through connections to local bike and foot paths and the provision of bike parking and end of journey facilities	Local bicycle pathway information can be provided via digital signage or be incorporated into the school induction package for student and staff. Recommend additional bicycle facilities be provided to student and staff to promote a healthy lifestyle.	Aligns with inter-generational equity Conservation of resources through less reliance on transporations with high emissions (cars etc.).	Aligns with the Green Star Transporation Credit (Credit 17) to promote the use of walking and cycling. Also promote the use of low emission vehicles.
		4.5	Support passive surveillance, including through the location of toilets and areas for communal use outside of school hours	The design avoids untenable outdoor areas and creates a high-quality outdoor spaces with inbuilt passive surveillance, surrounded or overlooked by active-use areas. Toilets and changing facilitites are centralised for the sports hall and field.		
		4.6	Incorporate Crime Prevention Through Environmental Design (CPTED) principles	Ethos Urban has developed a CPTED Assessmet Report to support the SSDA.		
		4.7	Clearly define access arrangements for after school hours	Refer to the CPTED Assessment Report for details of after school hours access arrangements.		
		4.8	Consider location and number of toilet facilities to allow safe use by different age groups and genders	The number and location of toilet and change facilities (including end-of-trip facilities) has been considered to allow safe and convenient use by students, staff and visitors. Change facilities are centralised for both the sports hall and sports feld, promoting good supervision, especially during change-times for PDHPE classes.		

Design Guide for Schools	**Amenity**	5.1	Be integratedd into, and maximise the use of the natural enviornment for learning and play	The courtyard will be designed with biophilic landscaping elements to connect students and staff to nature. The courtyard will be one of the main social and play area for the students.		
		5.2	ensure access to sunlight, natural ventilation and visual outlook wherever possible	The sports hall is currently proposed to be natural / mixed mode ventilation to provide high air quality to students and staff. Overall, the building has been designed to incorporate passive design principles to promote access to daylight and views whilst minimising unwanted heat gain. This reduces reliance on mechanical system and thus reduces energy usage.	Aligns with *inter-generational equity* Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy credit for the reduction of GHG through energy efficient measures. Aligns with Green Star Indoor Air Quality and Visual Comfort credit to provide high indoor air quality and high levels of visual comfort to occupants
		5.3	facilitiate flexible learning by providing access to technology	Recommend digital technology be provided to inform student and staff on sustainability and how they can contribute. Examples - digital library, monthly articles via email on sustainable / social initiatives school has implemented etc.		
		5.4	seek opportunities for buildings and outdoor spaces to be learning tools in themselves	Provide learning material on the passive design of the buildings. Signs on how passive design is utilised to adapt to local climates (e.g. mitigation of unwanted solar via shading.), water saving initiatives (turn off taps / low flow fixtures). Signs can be made available in transit areas / lobbys with high traffic.		Aligns with Green Star credit Building Information which aims to educate occupants and drive changes thus enabling optimised performance.
		5.5	Provide a diversity of indoor and outdoor spaces to facilitate informal and formal uses	Network of open spaces around the building to redress the deficit quality outdoor areas with a variety of scale, materials and planting ratios.		
		5.6	Provde buffer planting in setbacks were appropriate to reduce the impact of new development	Where the current planting buffer is set to be removed, replacement trees and additional shrubs and groundcover are proposed.		
		5.7	Ensure outdoor play ground space is sufficient to accommodate the student population including future growth	New and additional outdoor play ground space has been incorporated into the new design to accommodate for future growth.		
		5.8	Locate buildings away from noisy roads and other noise sources to ennsure acoustic levels within teaching and learning spaces are acceptable	Learning spaces have been located away from roads as much as possible. Spaces with less noise sensitive requirements have been located adjacent to roadways.		Aligns with Green Star acoustic credit (Credit 10) to ensure noise and vibration transmissions are kept to a minimum.
		5.9	where teaching and learning spaces must be located alongside noise sources, arrange built form to ensure dual aspect that will allow for natural ventilation away from noise source.	Where possible, teaching and learning spaces have been located away from noise sources. High performance acoustic glass will be specified to reduce noise transmission. Proposed use of two-layer concrete roof to act as an effective acoustic barrier to the traffic corridor of New South Head Road. Recommend to adopt the Green Star internal noise levels for teaching and learning spaces.		Aligns with Green Star acoustic credit (Credit 10) to ensure noise and vibration transmissions are kept to a minimum.

Design Guide for Schools	**Whole of life, flexible and adaptive**	6.1	Allow for future adaptation to accommodate demographic changes, new teaching and learning apporaches and the integratino of new technologies	The teaching spaces to be designed to be flexible and adaptable to accommodate future changes. Considerations of ease of relocating / adjusting service equipment within the ceiling space will be taken into account. This will have an impact on the embodied carbon of the building.		
		6.2	Be based on a masterplan of the school site that includes the testing of options for future potential growth	The greening of the campus', part of a boradercampus master plan, which seeks to enhance the heritage qualitites of the campus whilst maximising high quality teaching and learning spaces		
		6.3	take a whole-of-lifecycle approach when considering cost and consider wider public benefits over time	Material selection should be based on whole of life practice which looks at lifecycle cost, robustness, durability, embodied carbon and end of life disposal / recyclability. Recommend school to procure a % of the total materials with third party sustainable ceritifications. For example, materials with high recycled content, Environmental Product Declarations, or Forest Stewardship Certificates.		Aligns with the Green Star Material Life Cycle credits to consider a whole of lifecycle approach on material selection.
		6.4	provide capacity for multiple uses, flexibility and change of use over time	The structural grid is rationalised to a fexible large-span grid of circular concrete columns, allowing a multitude of interior confgurations. The outermost columns of the grid are external to the façade, further improving this fexibility.		
		6.5	respond to the findings of a site appraisal including in-ground conditions, contamination, flora and fauna, flooding, drainage and erosion, noise and traffic generation	The project has undergone extensive investigations including: acoustic, geotechnical, hazardous materials and contamination, traffic studies, biodiveristy and drainage modelling. Each investigation or report has informed and will continue to inform the detailed design.		
		6.6	Understand the potential impacts of future local projected growth	The project incorporates a modest growth in students enrollment numbers in line with the population growth of the area.		
		6.7	design learning spaces to cater for an range of learning styles and group sizes	Provide general learning areas of different sizes to cater to Year 11 and Year 12 class sizes, ranging from 1 to 22 students. The ft-out also incorporates a fexible 'learning commons' to provide further fexibility for teaching.		
		6.8	Consider providing areas for collaboration, group learning, presentations, specialised focus labs, project space and wet areas, display areas, sutdent brekout, teacher meetings, and reflective/ quiet spaces	Group learning, presentations, specialised focus sessions, project space, display areas, student breakout, teacher meetings and quiet, individual areas are all considered within the flexible 'learning commons'.		
Design Guide for Schools	**Aesthetics**	7.1	Reflect a commitment to and investigate in design excellence	Recommend Kambala school to adopt the Kambala Sustainability Framework developed by LCI which targets the most appropriate sustainability initiatives that aligns with GANSW guidelines and additional aspiration targets, such as procurement of sustainable products, diversion from landfill waste target, operational recycle waste target, energy and water targets. Targets to be discussed and confirmed with School.	Aligns with *improved valuation, pricing and incentive mechanisms.* The establishment of NCC requirements provides environmental goals for the project. Project requirements stipulate design teams are contractually required to deliver energy efficient building services. In addition, it is recommended that a construction and demolition waste target be set so that this creates a system where the polluter pays and creates and incentive to reduce pollution and waste.	
		7.2	create engaging and attractive environments	Developing under the sports field allows for an expansion of facilities without comprimising the street view of the school.		
		7.3	achieve a pruposeful composition of materials and elements through a rigorous design process	AJ+C architects pursued a rigorous and iterative design process to establish a clear design direction for the articulation of the building. Refer to the architectural design report for details.		
		7.4	provide an engaging environment for pedestrians visually and materially along public street frontages	The major public facing area, the entrance plaza to New South Head Road, will serce as an attractive and welcoming new entry for the School, and improved street presence for the neighbourhood.		
		7.5	seek opportunites to enhance public facing areas with landscaping and ensure landscape and building design are integrated	The architecture and landscape spaces are integrated with a cohesive built enviornment to serve as an attractive and welcoming new entry to the School.		
		7.6	Integrate service elements with the building design	The high-level preliminary design of service elements has been integrated into the design. For example, the large ducts providing supply air to the sports hall have been located within the drainage plenums to the north and south of the hall, eliminating exposed ductwork within the space		
		7.7	Balance internal spatial requirements with an external mass and scale that responds to its enviornment	The buildings longest façade, flanking the sports field, directly facing the Hawthorne and minter buildings, is modulated to balance its mass and scale in response to the setting. To the east, it is recessed, creating a generous COLA, while the remaining facade is split into two sections of different architectural expressions that relate to interior uses. One appears as a two-storey concrete-framed structure, the other is the steel-framed sports hall. The cantilevered sports field above is the unifying element offereing shade and weather protection to all three sections of the facade below.		
		7.8	Avoid long stretches of security fencing to public facing areas through arrangement of building edges, landscaping, gates an other openings	The existing stands of trees form a visual buffer to the school that will predominately mainatained. The sloping aspect of the site allows for embankments and balustrades to form a physical seperatation, with no high fences needed.		
		7.9	look for opportunities to include public art	The design team would like to reach out to the La Perouse Local Aboriginal Land Council, whose juristiction encompasses Kambala and the surrounding community, during the detailed design stage. We intend to explore the potential for aboriginal heritage interpretation for the proposed development, ideally via a building-integrated publicc artowrk such as a grand-scale feature ceiling.		

Environmental Design Guide for Schools	**Passive Design**	8.1	Passive Cooling and Heating	The building has been designed to incorporate passive design principles to promote access to daylight and views whilst minimising unwanted heat gain. Generous amount of shading is provided. This reduces reliance on mechanical system and thus reduces energy usage. Passive cooling through cross ventilation has strongly been incorporated into the design while balancing other design considerations such as noise and pollution. The extent of passive cooling will be resolved during the detailed design phase.	Aligns with *inter-generational equity* Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy credit for the reduction of GHG through energy efficient measures.
		8.2	Ventilation Strategy	Natural / mixed ventilation is currently proposed for the sports hall. Other opportunities for mixed mode ventilation will also be explored.		
		8.4	Shading	Large amount of shading is provided on the sports hall building to reduce unwanted solar gain and glare issues.		
		8.5	Building Envelope and Glazing	Building envelope and glazing thermal performance to comply with the stringent requirements of NCC 2019 Section J. Both envelope and glazing will have very high thermal performance to keep out unwanted heat loss / gain within the space. Where possible, the thermal performance is recommended to improve beyond Section J requirements.		
		8.6	Building Sealing	The building will be sealed in accordance with NCC Section J Part J3 to limit air leakage / infiltration.		
		8.7	Acoustic	Teaching and learning spaces have been located away from noise sources. High performance acoustic glass to be specified to reduce noise transmission. Recommend to adopt the Green Star internal noise levels for teaching and learning spaces.		Aligns with Green Star acoustic credit (Credit 10) to ensure noise and vibration transmissions are kept to a minimum.
		8.8	Daylight and Views	The building has been designed to incorporate passive design principles to promote access to daylight and views whilst minimising unwanted heat gain.		Aligns with Green Star Indoor Air Quality and Visual Comfort credit to provide high indoor air quality and high levels of visual comfort to occupants
		8.9	Encourage Physical Activity	Large outdoor open space, play area and sports facilities are provided to encourage physical activities for the students. Bicycle parking is included in the design. Refer to landscape architect's drawings for location. End of trip facilities have been provided for both staff and students. Refer to architect's drawings for location. A "Green Travel Plan" has been prepared, which outlines the school's commitment to promoting an active and healthy lifestyle whilst reducing carbon emissions.		Aligns with the Green Star Transporation Credit (Credit 17) to promote the use of walking and cycling. Also promote the use of low emission vehicles.
	Active Design	9.1	Energy Efficiency	Project to incorporate passive design principles (shading, natural ventilation, high thermal performance glazing and fabric), active design principles such as selection of efficient mechanical equipment and use of LED lights.	Aligns with *inter-generational equity* Conservation of energy resources through energy efficiency measure (passive design).	Aligns with Green Star Energy credit for the reduction of GHG through energy efficient measures.
		9.2	Water Efficiency	Recommend school to install high WELS rated fixtures and fittings. In addition, investigate the use of rainwater capture and reuse system if feasible.	Aligns with *inter-generational equity* Conservation of energy resources through water efficiency measure.	Aligns with Green Star Water credit to reduce the use of potable main water.
		9.3	Renewable Energy	Renewable energy technology (PV) has been investigated. The viability and extent of PV will be confirmed during the detailed design phase.	Aligns with *inter-generational equity* Conservation of energy resources through renewable measure.	
	Social and Community	10.1	Natural and Cultural Environment	Provide opportunities for the students and staff to learn about the local natural and cultural environment. During the detailed deisng stage, the design team will seek to incorporate elemements of cultural hertiage interpretation. Will provide positive social impacts to the students and staff. Cultural heritage within design can be a key element to celebrate the history of the school / local area.	Aligns with *Conservation of biological diversity and ecological integrity*	
		10.2	Community Assets	Recommend making the sports facilities accessible to the community outside school hours to improve social cohesion and to promote an active lifestyle for the wider community.		
		10.3	Contribute to Local Environment	Rainwater from the roof of the proposed building will be collected in rainwater tanks, with overflow going to the OSD tanks; aligning with the Council's requirements around reducing excess run-off in storm events. The rainwater will be reused landscaping and toilet flushing. The softscape roof top courts and the landscape will help allievate urban heat island effect.	Aligns with *Conservation of biological diversity and ecological integrity*	