SYDNEY FOOTBALL STADIUM REDEVELOPMENT

STATE SIGNIFICANT DEVELOPMENT APPLICATION

Concept Proposal and Stage 1 Demolition

SSDA 9249

APPENDIX N:

Environmentally Sustainable Design Strategy and Statement for Demolition

NSW GOVERNMENT

Sydney Football Stadium Redevelopment

Environmentally Sustainable Design Strategy

Infrastructure NSW

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aurecon

Bringing ideas to life

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Appendices

1 Executive Summary

1.1 Introduction

This report supports a State Significant Development (SSD) Development Application (DA) for the redevelopment of the Sydney Football Stadium which is submitted to the Minister for Planning pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act). A staged approach to the planning applications is proposed which includes:

- **Stage 1** – Concept Proposal for the stadium envelope and supporting retail and functional uses as well as development consent for the carrying out of early works, including demolition of the existing facility and associated structures.
- **Stage 2** – detailed design, construction and operation of the stadium and supporting business, retail and functional uses.

This report relates to the Stage 1 Concept DA and detailed Early Works package.

Infrastructure NSW is the Proponent for the Stage 1 planning application.

1.2 Purpose

The purpose of this report is to outline the sustainability strategy that will be adopted by the Sydney Football Stadium Redevelopment project.

Included in this report are the minimum sustainability initiatives that will be implemented by the project. These initiatives will drive the stadium development towards sustainability by delivering a stadium which minimises its consumption of natural resources and maximises its positive impact on the community, from a social and environmental perspective.

The stadium is committed to achieving formal sustainability certification so that the holistic environmental priorities of the project are carried through to the end of construction, and that the stadium is recognised internationally for its efforts. The project will be pursuing a LEED Gold rating which represents Australian best practice. LEED is a holistic sustainable building rating scheme administered by the United Stated Green Building Council.

This strategy also outlines many sustainability initiatives which are available to the project, and could be implemented as the design is developed. Site, design and budget permitting.

1.3 Overview of Proposed Stadium

The SFS Redevelopment Stage 1 application includes a Concept Proposal and Early Works package.

The Concept Proposal comprises:

- A new stadium with up to 45,000 seats on the site of the existing stadium including:
- New facilities for general admission;
- New playing pitch;
- Hospitality facilities; and
- Ancillary food and beverage and entertainment facilities
- New basement with service vehicular access for servicing and bump-in/bump-out.

- New public domain works surrounding the stadium, building on the venue's unique parkland setting.
- Urban Design and Public Domain Guidelines.
- Signage strategy.

Indicative concept building envelope plans are included within the Environmental Impact Statement for the project. These plans outline the extent of the proposed stadium building envelope and surrounding public domain to be included in the Stage 1 planning application.

From a capacity, operational and mix-of-use perspective, the new stadium will be consistent with the existing Allianz Stadium.

The Stage 1 Early Works comprises:

- Site establishment, including erection of site protection fencing and temporary relocation of facilities;
- Decommissioning and demolition of the existing stadium and associated structures including the existing Sheridan, Roosters and Waratahs buildings and the administration building of Cricket NSW to ground level and 'make safe' of the site;
- Use of the existing Moore Park 1 (MP1) car park for construction staging; and
- Make good of the site suitable for construction of the new stadium (subject to separate Stage 2 application).

The SFS Redevelopment will create a new stadium with up to 45,000 seats through a range of seating styles and corporate facilities. The stadium will include state of the art technology with digital screens throughout to improve the fan experience. Sightlines will be improved and facilities including catering, amenities and accessibility will be designed to service future needs, creating a world-class customer experience befitting a global city such as Sydney.

1.4 Secretary's Environmental Assessment Requirements (SEARs)

This report addresses the following SEARs:

SEAR	Section
2. Policies Address the relevant planning provisions, goals and strategic planning objectives in the following:	
■ NSW Energy Efficiency Action Plan 2013;	3.2
■ NSW Resource Efficiency Policy (GREP);	3.3
■ Sustainable Sydney 2030	3.1

<table>
<tr><th>SEAR</th><th>Section</th></tr>
<tr><td>9. Ecologically Sustainable Development (ESD)</td><td></td></tr>
<tr><td>▪ 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.</td><td>4 & 5</td></tr>
<tr><td>▪ 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 and technology and use of renewable energy.</td><td>4 & 5</td></tr>
<tr><td>▪ Undertake a preliminary analysis of the likely service demands for drinking water, wastewater and recycled water services and outline the preliminary Integrated Water Management principles detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design. This should include preliminary details of sustainability initiatives that will minimise/reduce the demand on supplies.</td><td>Primarily addressed within services report</td></tr>
<tr><td>10. Environmental Risk
Include preliminary consideration of the management of environmental risks to all persons utilising the future facility, including but not limited to:
▪ extreme heat;
▪ storms and flooding;
▪ terror attacks; and
▪ building performance and mitigation of climate change, including consideration of Green Star Performance.</td><td>4.7

Terror attacks addressed in separate security principles report</td></tr>
<tr><td>11. Design of Resilience to Climate Change
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 material selection and social equity aspects (respite/shelter areas).</td><td>4.7</td></tr>
</table>

2 Introduction

This report has been written to support the Stage 1 Environmental Impact Assessment and precedes the detailed design of the stadium. The majority of the content of this report can only be demonstrated in the detailed design (Stage 2 DA) of the project. The key purpose of this report is to provide a baseline commitment to sustainability.

2.1 Definition of Sustainability

Sustainability is a broad and all-encompassing term which is often understood to mean different things by different people. This section of the report aims to provide the relevant background and context to understand what is meant by ‘Environmentally Sustainable Design’ in the context of the Sydney Football Stadium.

The definition of sustainability that this strategy is working toward is:

> *The principles of ecologically sustainable development are as follows:*
>
> *(a) "precautionary principle"*
>
> *(b) "inter-generational equity”*
>
> *(c) "conservation of biological diversity and ecological integrity"*
>
> *(d) "improved valuation, pricing and incentive mechanisms"*

This is as defined in clause 7(4) of Schedule 2 of the EP&A Regulation 2000.

The key sustainability focus areas in which respond to this definition are:

- Minimising greenhouse gas emissions from operational energy consumption, onsite emissions and transport to and from the site;
- Minimising consumption of natural resources such as water and materials;
- Maximising biodiversity on site through selection of native vegetation; and
- Working towards true social sustainability.

The goal is to create a place of benefit rather than just reducing harm

2.2 Sustainable Stadiums - Australia

In recent years there have been several stadiums developed across Australia. Sustainability has been a core consideration for many of these stadiums, with most including onsite energy generation, smart energy design and water sensitive design. The key sustainability initiatives implemented by these projects are summarised here.

Western Sydney Stadium (2019)

Figure 1 Western Sydney Stadium

- Capacity for 30,000
- Targeting LEED Gold
- On-site renewable energy generation with roof mounted PV
- Rain water capture and energy efficient lighting

Perth Arena (2012)

Figure 2 Perth Arena

- Capacity for 15,500
- Displacement ventilation in the arena delivered from underneath the seats
- Mixed-mode natural ventilation in the public concourses
- Locally sourced materials (e.g. West Australian granite for entry foyers)
- Largest solar panel array in Perth Metropolitan area with 111kW capacity generation

Melbourne Rectangular Stadium (AAMI Park, 2010)

Figure 3 AAMI Park

- Self-supported Geodesic dome roof design resulting in 50% reduction in steel against typical cantilever roof structure
- Internal lighting utilizes the curvature of the roof to reflect light to the seating bowl, providing a more uniform and efficient bowl lighting system
- Individual glass and metal roof panel is designed to allow specific levels of daylight penetration and views in/out of the stadium
- External LED lighting on the façade produces a unique public art installation and uses about one tenth of the power compared to a traditional flood lit façade
- Rainwater collection system saving up to 2,000 kL

Margaret Court Arena (Melbourne, Redeveloped in 2010)

Figure 4 Margaret Court Arena

- LEED Gold
- Capacity for 6,000 to 7,500
- Retractable roof to minimize reliance on lighting and AC systems when external conditions are favorable
- Reuse of existing structure + recycling of construction waste generation
- Sustainably sourced timber
- Rainwater harvesting for toilets to maximize water savings

Metricon Stadium (Carrara Stadium, Redeveloped in 2017)

Figure 5 Metricon stadium

- Capacity for 35,000
- Solar halo consisting of 2,000 m² of roof mounted PV
- 215kW -peak generation, supplying up to 20% of the stadiums total energy needs
- Rain water harvesting for toilets, landscape irrigation and general wash down

2.3 Sustainable Stadiums - International

Presented here are two examples of world-class sustainable stadium design.

Levi's Stadium (California, 2014)

Figure 6 Levi's stadium

- Capacity for 75,000
- First United States football stadium to achieve LEED Gold certification
- PV generation from solar-paneled roof decks and solar paneled pedestrian bridges
- 2,500m² "Green Roof" on the top of the Stadium Suite Tower
- Water reclaim system for both potable and non-potable usages, including the playing field irrigation water
- Usage of reclaimed and recycling building products from local sites
- Live dashboard display featuring daily building statistics such as energy measurements, water and air monitors etc.

MetLife Stadium (New Jersey, 2010)

Figure 7 MetLife stadium

- Capacity for 82,500
- Construction of stadium involved 40,000 tons of recycled steel, half of which was sourced from Giants stadium
- PV panel generating up to 350 kW to power lighting fixtures
- Solar Ring on a mile-long track running around the top of MetLife stadium, consisting of LED fixtures to display team colors and additional hues
- Large water savings by using synthetic turf for the playing field, waterless urinals, low-flow fixtures, sensor-controlled taps and native low-water plant species

3 Policies

3.1 Sustainable Sydney 2030

In 2007, the Council of the City of Sydney consulted with tens of thousands of members of the local community to capture the community's vision for Sydney over the next 20 years. The result was *Sustainable Sydney 2030*, an ambitious plan outlining the City's commitment to the sustainable development of Sydney to 2030 and beyond.

Broadly, the key focus areas identified by the local community are for Sydney to be: a leader in environmental management; economically prosperous as a global city; and livable, inclusive and culturally alive. Progress in these areas are measured against ten ambitious targets as outlined in Figure 8 below.

Figure 8 Ten targets to measure progress to 2030 (Sustainable Sydney 2030: Community Strategic Plan, 2017)

What does this mean for the stadium?

Whilst the Sustainable Sydney 2030 strategy does not have direct bearing on this development, it is worth considering the greater Sydney masterplan and taking note of the sustainability goals for neighbouring developments.

In this respect, three goals are directly applicable to this development.

Table 1 City of Sydney 2030 Goals

	Sustainable Sydney 2030 Goal	How will stadium design acknowledge these goals?
Goal 1	70% reduction in Green House Gas emissions based on 2006 levels by 2030	On-site renewable energy generation, with a focus on high efficiency HVAC plant and natural ventilation schemes.

	Sustainable Sydney 2030 Goal	How will stadium design acknowledge these goals?
Goal 2	50% of electricity demand met by renewable resources. Zero increase in potable water use from 2006 baseline	Renewable energy generation or purchased renewable resources. High efficiency taps and fixtures across the entire facility, with heavy emphasis on non-potable water usage through rain water harvesting and bore water supply.
Goal 7	At least 10% of total trips made in the city area are by bicycle and 50% by pedestrian movement	Integration of pedestrian and bicycle path facilities on a precinct level, with facilities to encourage these modes of transport

3.2 NSW Government Energy Efficiency Action Plan

In 2013 the New South Wales Government released its Energy Efficiency Action Plan (EEAP). An ambitious and wide-reaching plan to drive energy efficiency throughout NSW to ensure energy security into the future, reduce greenhouse gas emissions and lower electricity costs.

This plan is working to achieve the following goals:

- realise annual energy savings of 16,000 gigawatthours by 2020
- support 220,000 low income households to reduce energy use by up to 20% by 2014
- deliver high standard building retrofit programs so 50% of NSW commercial floor space achieves a 4-star NABERS energy and water rating by 2020.

The energy efficiency action plan details 30 actions across five streams to deliver savings on bills and reduce pressure on future prices. The five streams are:

- strengthen the energy efficiency market
- energy efficient homes
- energy efficient business
- energy efficient government
- statewide delivery.

Synergies between this ESD Strategy and the EEAP

- Project is overcoming the split incentive barrier to energy efficiency by including the SCG Trust as a key stakeholder throughout the project development and by creating a strong technical brief which will result it high levels of energy efficiency.
- Project is committed to achieving a higher level of energy efficiency than the current stadium
- The stadium is committed to achieving a high level of energy efficiency through the targeted LEED Gold rating
- The project's peak electricity demand won't coincide with the grid peak demand due to the operational profile of the stadium

As the detailed design is developed in preparation for the Stage 2 Development Application, this plan will be further considered.

3.3 NSW Government Resource Efficiency Policy (GREP)

The NSW Resource Efficiency Policy (GREP) delivers specific actions from the NSW Energy Efficiency Action Plan.

The aim of GREP is to reduce the NSW Government's operating costs and lead by example in increasing the efficiency of the resources it uses.

This policy comprises a series of measures and targets which are summarized, along with their applicability to the Sydney Football Stadium Redevelopment, in table 2.

Table 2 GREP Measures and Applicability to the Sydney Football Stadium

GREP Measure	Description	Application to Sydney Football Stadium Redevelopment
Energy		
E1: Targets to undertake energy efficiency projects	All clusters will undertake energy efficiency projects at sites representing 90% of their billed energy use by the end of 2023–24, with an interim target of 55% for Health and 40% for other clusters by the end of 2017–18.	As the Sydney Football Stadium is a 'new building' this measure will be met by addressing measure *E4: Minimum standards for new buildings*
E2: Minimum NABERS Energy ratings for offices and data centres	All large office buildings and datacenters will achieve and maintain high NABERS Energy ratings.	**Does not apply** The office spaces included in the stadium are predicted to be less than 2,000 m^2 in total size. Should these office areas increase during design development this requirement will be readdressed.
E3: Minimum standards for new electrical appliances and equipment	All new electrical equipment purchased by the government must meet minimum energy efficiency ratings.	This measure will be addressed during detailed design.
E4: Minimum standards for new buildings	New buildings must be designed and built so that energy consumption is predicted to be at least 10% lower than if built to minimum compliance with National Construction Code requirements.	The stadium is committed to achieving a high level of energy efficiency and is committed to exceeding this target. This measure will be addressed during detailed design.
E5: Identify and enable solar leasing opportunities	Small government agencies will self-assess their suitability for solar leasing.	**Does not apply** This measure only applies to government sites where consumption is less than 100,000 kWh per annum.
E6: Minimum fuel efficiency standards for new light vehicles	Improve minimum fuel efficiency standards for new light vehicles	This measure is an operational requirement and is therefore not relevant at this early stage of the project.
E7: Purchase 6% GreenPower	Purchase a minimum of 6% GreenPower.	This measure is an operational requirement and is therefore not relevant at this early stage of the project.
Water		
W1: Report on water use	All agencies will report on water use.	This measure is an operational requirement and is therefore not

GREP Measure	Description	Application to Sydney Football Stadium Redevelopment
		relevant at this early stage of the project.
W2: Minimum water standards for office buildings	All new and refurbished owned office buildings and leased office buildings with a net lettable area of over 2000 m^2 will achieve a whole building NABERS Water rating of 4 stars where cost-effective.	**Does not apply** The office spaces included in the stadium are predicted to be less than 2,000 m^2 in total size. Should these office areas increase during design development this requirement will be readdressed.
W3: Minimum standards for new water-using appliances	All new water-using appliances, shower heads, taps and toilets purchased by agencies must achieve specified levels of water efficiency.	The stadium is committed to achieving a high level of water efficiency. This measure will be addressed during detailed design.
Waste		
P1: Report on top three waste streams	All agencies will report on their top three waste streams by total volume and by total cost.	This measure is an operational requirement and is therefore not relevant at this early stage of the project. Note the project will have dedicated waste facilities that will be designed to facilitate effective waste management during operation.
Clean Air		
A1: Air emission standards for mobile non-road diesel plant and equipment	Contractor-supplied and government-purchased equipment will comply with EU or US EPA standards.	**Does not apply**
A2: Low-VOC surface coatings	All surface coatings will comply with the Australian Paint Approval Scheme (APAS) where fit for purpose.	The stadium is committed to achieving excellent indoor environment quality. This measure will be addressed during detailed design.

4 Environmentally Sustainable Design Principles

Outlined here are the key initiatives that will be implemented by the project. The combined result of these initiatives will ultimately be a sustainable stadium.

The key sustainability commitment for the project will be the LEED Gold certification. This will mean that minimum levels of performance are met across the full spectrum of sustainable development – from sustainable management practices, energy consumption and transport through to water consumption and emissions. However, some sustainability initiatives are so critical that they should be addressed independently of these rating schemes and so they are outlined here. Additionally, outlined here are the sustainability initiatives that go beyond the scope of LEED.

4.1 Energy

Australia's electricity market is predominantly coal based. In addition to emitted greenhouse gases, coal is non-renewable meaning that quantities are limited. The current reliance on non-renewable energy sources is not sustainable.

In responding to this environmental risk, the stadium design will be such that energy demands are minimised where possible, and onsite renewable energy opportunities are utilised to their full potential.

4.1.1 Energy Efficiency

The Stadium will be designed to achieve a high level of energy efficiency through smart envelope design, intelligent lighting and efficient air conditioning.

ENERGY PRINCIPLE

THE STADIUM WILL ACHIEVE A HIGH LEVEL OF ENERGY EFFICIENCY

Details

- The project will exceed the overall NCC energy efficiency requirements outlined in Part J
- The project will demonstrate this high level of energy efficiency by targeting a minimum of 3 points within the LEED credit 'Optimize Energy Performance'
- This will be achieved through envelope, lighting and HVAC design

4.1.2 Efficient lighting

The project will utilise energy efficient lighting throughout to reduce operational energy demand and running costs.

ENERGY PRINCIPLE

ALL LIGHTING WILL BE LED

Details

- All lighting used in the project will be LED. This includes the following:
  - General lighting
  - Stadium lighting
  - Pitch grow lighting
- The exception to this rule will be where it can be demonstrated that the life cycle cost of LED lighting is unacceptable

4.1.3 Onsite energy generation

The stadium will include onsite energy generation in the form of Solar Photovoltaics on all suitable roof areas.

ENERGY PRINCIPLE

THE STADIUM WILL INCLUDE ONSITE ENERGY GENERATION

Details

- All suitable roof spaces will include Solar Photovoltaic cells unless it can be demonstrated that the life cycle cost is unacceptable
- The project will endeavour to produce an onsite renewable energy contribution of 10% of annual energy consumption
- The project will target a minimum of two points within the LEED credit 'Renewable Energy Production'

4.2 Water

Intelligent and responsive water design is critical to ensuring a sustainable stadium design. Historically, stadiums are designed such that water cycles through the building and then flows off site as wastewater. In Sydney, the water supplied by Sydney Water is of some of the highest quality in the world and yet this is being used to flush toilets and run cooling towers, while rainwater is funnelled off site.

The Stadium will be designed to maximised water efficiency so that the quantity of high quality potable water required by the stadium is minimised. To further reduce the remand for potable water on site, rainwater and bore water will be collected and used onsite.

4.2.1 Water efficiency

The Stadium will be designed to achieve a high level of energy efficiency through efficient fittings and fixtures, minimising landscape irrigation needs and through smart water design.

WATER PRINCIPLE

THE STADIUM WILL USE 20% LESS WATER THAN THE A STADIUM DESIGNED TO ACHIEVE ‘STANDARD PRACTICE’

Details

- The stadium will use 20% less building than a ‘reference building’ as demonstrated in accordance with the LEED Indoor Water Use Reduction credit
- Standard practice is defined as the ‘reference building’ outlined within the LEED Indoor Water Use Reduction credit
- This reduction will be achieved with water efficient taps, toilets, urinals and showers as well as efficient landscape irrigation

4.2.2 Rainwater collection and reuse

Rainwater will be harvested from the stadium roof for reuse on site. Rainwater will be used for toilet flushing and non-pitch landscape irrigation.

WATER PRINCIPLE

RAINWATER WILL BE COLLECTED FROM THE STADIUM ROOF FOR REUSE ONSITE

Details

- Rainwater will be collected from the roof for us on site. During detailed design a water balance analysis will inform the best use of this rainwater. The expectation is that it will be used for toilet flushing and/or cooling tower used and/or landscape irrigation.

4.3 Materials

4.3.1 Life Cycle Assessment

Material selection for the stadium will consider full life cycle impact.

MATERIALS PRINCIPLE

A WHOLE BUILDING LIFE CYCLE ASSESSMENT WILL BE UNDERTAKEN DURING DETAILED DESIGN

Details

- The project will conduct a whole building Life Cycle Assessment during detailed design
- The assessment and outcomes will be in accordance with the LEED credit 'Building Life-Cycle Impact Reduction'. Three points will be targeted using option 4.
- The use of Life Cycle Assessment will allow for a greater understanding of the environmental impacts of design choices

4.3.2 Demolition and construction waste management

A high level of waste recycling will be achieved for the stadium demolition and construction.

MATERIALS PRINCIPLE

90% OF DEMOLITION AND CONSTRUCTION WASTE WILL BE DIVERTED FROM LANDFILL

Details

- The project will divert 90% of its construction and demolition waste from landfill through recycling and reuse
- Recycling rates for the demolition of the existing stadium will be maximised as far as practicable and in line with the 90% diversion target
- Demolition and Construction Waste will be managed in accordance with the LEED Credits 'Construction and Demolition Waste Management Planning' and 'Construction and Demolition Waste Management'

4.3.3 Reuse of existing equipment

Usable materials within the current Allianz stadium will be salvaged for reuse on the SCG site, or by the local community.

MATERIALS PRINCIPLE

EXISTING MATERIALS AND EQUIPMENT WITHIN THE CURRENT STADIUM WILL BE REUSED WHERE POSSIBLE

Details

- A closure plan will be created for the project which outlines the opportunities for reuse of materials and equipment from the existing stadium
- ICT equipment and LED Screens with remaining useful life will be transferred to the Cricket Ground
- Stadium seats are not fire-retardant so cannot be given away to other sporting facilities however there may be the opportunity to give seats away to the local community. If seats cannot be given away, they can be recycled. The seats components are made of steel and polypropylene, both of which are readily recyclable materials.

4.3.4 Game day operational waste

Waste management infrastructure will be put in place to allow the stadium to achieve a high level of recycling once in operation.

MATERIALS PRINCIPLE

INFRASTRUCTURE WILL BE IN PLACE TO MAXIMISE OPERATIONAL RECYCLING RATES

Details

- During the detailed design phase, waste facilities will be sized to allow for effective waste management in operation
- Bin infrastructure will be optimised throughout the stadium design to encourage patrons to dispose of their waste appropriately
- During detailed design the project will refer to the City of Sydney Policy for Waste Minimisation in New Developments Guidelines which outline spatial, access and amenity requirements for waste management

4.4 Transport

The mode of transport used by people as they travel to and from the Stadium has a direct impact on the sustainability of the stadium. Historically, the major mode of transport to the stadium is private vehicle. This not only contributes high levels of greenhouse gas emissions to the atmosphere, but also places significant burdens on local road infrastructure, especially on game days.

The opportunity exists to encourage staff and visitors to adopt active forms of transport such as cycling, walking and public transport. The stadium will be designed to promote these transport forms and to accommodate greater access by these modes into the future.

The project is well serviced by a number of public transport options. Currently there is access by bus on ANZAC Parade and Oxford St as well as trains at Central Station. Light rail is currently under construction along ANZAC Parade and will be completed prior to the completion of the stadium – this will further promote public transport access to the site.

The stadium design does not include additional car parking, and the scope of the stadium itself does not include any car parking for general visitors. The majority of car parking available to spectators visiting the stadium is located on Moore Park lands which are outside of the control of the Sydney Cricket Ground Trust.

4.4.1 Bicycle Access

Bicycle infrastructure will be included in the stadium design to encourage cycling by staff and visitors.

TRANSPORT PRINCIPLE

CYCLING WILL BE ENCOURAGED

Details

- The stadium precinct will be designed to maximise cycling visibility and access.
- Regular staff: secure undercover bike parking, lockers, showers and change facilities will be provided for 5% of regular staff.
- Event day staff: bicycle parking and lockers will be provided for 5% of event staff.
- Spectators: 100 bike parking spaces will be provided in a visible location(s) for use by spectators.

4.4.2 Pedestrian

The stadium precinct will be designed to encourage and promote pedestrian access.

TRANSPORT PRINCIPLE

PEDESTRIANS WILL FEEL WELCOME, SAFE AND COMFORTABLE

Details

- Pedestrian access will be improved through the creation of a ‘front door’ to the stadium

- Wayfinding (both natural and signage) will promote pedestrian access
- Lighting will be provided along pedestrian pathways to maximise safety
- Safety in Design Principles will be adopted so that pedestrians are safe and comfortable

4.4.3 Private cars

Where private vehicles are used, green vehicles will be encouraged.

TRANSPORT PRINCIPLE

PREFERRED PARKING WILL BE RESERVED FOR GREEN VEHICLES

Details

- 5% of all parking spaces within carpark MP1 will be preferred parking provided for Green Vehicles. Information on what constitutes a green vehicle is available at greenvehicleguide.gov.au

4.4.4 Electric Vehicles

The stadium will be future-proofed by installing infrastructure to allow for future uptake of electric vehicles.

TRANSPORT PRINCIPLE

ELECTRIC VEHICLE INFRASTRUCTURE WILL BE INCLUDED IN THE SITE DESIGN

Details

- Infrastructure will be installed on site to allow for the future installation of electric vehicle charging points in MP1.
- A nominal number of electric vehicle charging points (2 charging points) will be provided on Day 0, with additional charging points installed as demand increases.

4.4.5 Communication

A Green Travel Plan will be created for the stadium which highlights the various active transport options for staff and visitors. This plan will be communicated to staff and visitors.

TRANSPORT PRINCIPLE

ACTIVE TRANSPORT WILL BE PROMOTED

Details

- A Green Travel Plan will be made available to all staff and visitors.

4.5 Sustainable Sites

In designing the external components of the stadium, the project will consider the broader impacts of the building on the surround community. The stadium has the opportunity the positively influence the local heat island effect, local ecosystems as well as storm water runoff.

4.5.1 Biodiversity

Biodiversity on the site will be maintained, and hopefully improved, through the use of native and endemic species

ECOLOGY PRINCIPLE

NEW VEGETATION WILL BE NATIVE

Details

- 95% of new vegetation provided on the site will be native to Australia with priority given to endemic species

4.5.2 Heat island effect

Consideration will be given to the urban heat island effect of the site.

ECOLOGY PRINCIPLE

SITE DESIGN WILL MINIMISE SOLAR HEAT ISLAND EFFECT

Details

- The stadium roof will be designed to maximise solar reflectance through the selection of light coloured materials (with the exception of those areas covered with solar panels).
- 75% of site area will consist of light coloured surfaces, landscaping and shaded areas.
- Additional tree planting to increase shade canopy (where this can be achieved on site)

4.5.3 Stormwater

The stormwater system for the site will be such that storm water runoff is appropriately detained on site, and that the quality of the water leaving the site is maximised.

ECOLOGY PRINCIPLE

STORMWATER QUANTIY AND QUALITY

Details

- The development will not increase the storm water burden on downstream waterways
- The project will meet stormwater pollution reduction targets in accordance with the Construction Best Practice standards for urban stormwater quality published by the CSIRO/Victorian Stormwater Committee

4.6 Social Sustainability

Social sustainability addresses the elements of the stadium that affect the social world such as social and cultural life, social amenities and systems for citizen engagement.

A socially sustainable stadium is one that is equitable, diverse, connected and democratic. It is a stadium that has a positive impact on the local community and which actively welcomes people from all backgrounds.

4.6.1 Community Engagement

SOCIAL SUSTAINABILITY PRINCIPLE

THE NEW STADIUM DESIGN WILL ALLOW FOR GREATER COMMUNITY ENGAGEMENT

Details

- The current Alliance stadium is closed off and impervious to the local community. The tall black fences effectively cut the site off from the local community and limit the availability of the site for passive use by the local community. The new design will remove these fences and open the site up to the community allowing for greater engagement.

4.6.2 Diversity

The design of the stadium will embrace diversity and lay the foundations for equitable use by all members of society. Everyone will feel welcome at the site.

SOCIAL SUSTAINABILITY PRINCIPLE

BUILDING INFRASTRUCTURE WILL ALLOW FOR USE BY ALL MEMBERS OF SOCIETY

Details

- Sufficient toilet facilities will be provided for men and women in line with the National Construction Code. Facilities will be provided for people of all physical abilities.
- Parenting rooms will be provided so that parents and families feel welcome at the stadium. These rooms will provide spaces to allow parents feed, change and care for their children.
- Prayer rooms will be provided to allow space for individuals to practice their faith in accordance with their spiritual guidance.

4.6.3 Modern Slavery

The Australian Government is currently working to develop a suite of laws designed to stamp out modern slavery. These laws will address slave-like conditions within Australia, as well as within the supply chain of Australian companies. In anticipation of the release of these new laws, the Stadium project will exhibit leadership by identifying the modern slavery risks within the project's supply chain.

SOCIAL SUSTAINABILITY PRINCIPLE

A PRELIMINARY MODERN SLAVERY AUDIT WILL BE CONDUCTED

Details

- As the project is developed, modern slavery will be considered. It is likely that this will involve an audit of supply chains by the chosen contractor and/or the SCG Trust. This will be confirmed within the Stage 2 Development Application.

4.7 Climate Change Adaptation and Resilience

The consensus within the scientific community is that over the next 50 years we will see hotter temperatures across the globe, an increase in extreme events and rising sea levels.

The Sydney Football Stadium will need to consider the changing climate and ways in which resilience can be built into the design.

The following discussion has been informed by several information sources including the Climate Change in Australia Technical Report. Specific predictions regarding changes to climate have been sourced from Chapter 7 – 'Projects: Atmosphere and the land'. In general, the predicted changes here are based on the Representative Concentration Pathway (RCP) 4.5.

Over the next 30 to 50 years Sydney's climate is expected to change in the following ways:

Table 3 Summary of climate change effects

Extreme heat days	Increase in temperature	Rainfall	Increase in storm events	Rising sea levels
				
Increase number of extreme heat days over the next 50 years	Continual annual increase in average temperatures	Decrease in rainfall causing severe draughts in the NSW region	Increase in storms and storm water across the NSW region	Rising sea levels causing damage to infrastructure and roads

4.7.1 Increase in extreme heat days

In Sydney, the number of extreme heat days felt each year are expected to double by 2090. The impact of a hotter and drier environment will place significant stress on urban ecosystems. This will require a greater provision of urban greening for growing cities to provide a 'breathing' and 'cooling space'. Shading and the terrain selection such as vegetation or lighter coloured pavements will be essential to reducing urban heat.

The stadium will respond to this future climate change threat by observing best practice urban heat island effect mitigation measures such as the use of light coloured materials, maximising vegetation and the provision of shade both for the public and spectators. This will be resolved during the detailed design stage of the project.

4.7.2 Increased average temperature

By 2030, average temperature across eastern Australia are anticipated to increase by 0.6-1.2°C compared to 1990. By 2070, this increase is likely to reach between 1.3-2.6°C. Higher average temperatures will be felt as there is an increase in the number of extreme heat days.

The stadium will consider rising ambient temperatures during the detailed design of its air conditioning systems.

4.7.3 Increase in storm events and rainfall

Rainfall patterns are also expected to change with periods of drought and periods of extreme rainfall to increase. It has been observed that rainfall has declined across NSW over the past 40 years and an increase in flood-producing rain has been observed. Annual rainfall and the number of wet days over year have fallen across NSW between less than 200mm (north-west of NSW) to 1800mm (north-east of NSW). The increase of flooding rains has affected infrastructure and residents across the state resulting in road closures, power outages and evacuations.

Future predictions regarding rainfall levels have higher uncertainty than other climate indices, but there is agreement that rainfall will decrease across Eastern Australia. Estimates place the annual reduction at 1% by 2030 to 7% by 2090.

Significant storm events in Australia are typically created by East Coast Lows (ECL), the intense low-pressure systems that occur off the east coast of Australia bringing damaging wind gusts and heavy rainfall. Climate change modelling indicates that the pattern of these events is likely to change. The number of small to moderate ECLs in the cool season are likely the decrease, changes are not predicted during the warm season. However extreme ECLs in the warmer months may increase in number.

The stadium will respond to the threat of increased storm events through the consideration of external places of refuge, and the ongoing resilience of material selections. Stormwater detention and treatment systems will consider the predicted change in rainfall patterns. During detailed design the building design will also respond to the possibility of gustier wind conditions during storm events – this will inform structural and architectural solutions.

4.7.4 Sea level rise

Rising sea levels are already affecting some urban centres located on the coast. Sea levels are said to rise to 1.1m combined with a 1 in 100-year event for NSW (i.e. by the year of 2100). This would place a high risk of erosion damage to commercial, light industrial, transport and residential infrastructure in the NSW region.

The stadium is located away from the coast line and is unlikely to be affected by rising sea levels.

5 Leadership in Energy and Environmental Design (LEED)

The project is committed to achieving a Leadership in Energy and Environmental Design (LEED) rating. The targeted rating level is Gold which equates to Australian Best Practice.

LEED is a comprehensive and international environmental rating scheme administered by the US Green Building Council (USGBC) and evaluates the environmental design achievements of buildings of various typologies, including stadiums. Ratings range from Bronze to Silver, Gold and Platinum based on the achievement of credits in the following categories:

- Integrative Process
- Location and Transport
- Sustainable Sites
- Water Efficiency
- Energy and Atmosphere
- Materials and Resources
- Indoor Environment Quality
- Innovation

LEED v4 is the most current version of the rating tool.

5.1 Certification Overview

LEED is a documentation based rating scheme which means that the award of the rating is based on the project documentation. There are no onsite checks or ongoing performance requirements. A typical project undertakes a pre-certification assessment during the detailed design phase of the project which is an opportunity to gain feedback from the USGBC regarding the application of the rating scheme to the project. The final rating is awarded following practical completion and is based on the final, as built documentation produced for the project.

5.2 LEED Gold Pathway

To demonstrate that a LEED rating is possible and achievable for the project, a potential LEED pathway has been created. This pathway, by necessity, includes several assumptions which can only be resolved once the detailed design of the stadium is developed. The purpose of this strategy is not to lock the stadium into achieving specific credits, but is to demonstrate that the initiatives included in the project to date are appropriate and are driving the stadium towards its sustainability targets.

The potential LEED pathway is shown in Appendix A.

5.3 Other Sustainability Rating Tools

An investigation has been conducted to determine the feasibility of the Sydney Football Stadium achieving a sustainability rating using a number of alternative industry rating tools. Each rating tool is summarised below.

Table 4 Other Sustainability Rating Tools

Rating Tool	Organisation	Description	Relevance to Sydney Football Stadium
WELL Building Standard		WELL is a performance-based system for measuring, certifying, and monitoring features of the built environment that impact human health and wellbeing, through air, water, nourishment, light, fitness, comfort, and mind.	A WELL rating could not be targeted by the stadium itself, but could be applied to the commercial areas.
One Planet Living		One Planet Living uses 10 Principles as holistic framework to provide guidance for local government, businesses and the built environment to comprehensively address key sustainability issues and effectively make a sustainable lifestyle a reality.	This rating scheme could be used in addition to, or in lieu of, LEED to rate the stadium.
Green Star Interiors		Green Star – Interiors is an independent, national, voluntary rating tool to drive the development of healthy, productive and sustainable interior fitouts.	A Green Star Interiors rating could be targeted for any of the interior fitouts within the stadium.
LEED Interior Design and Construction		LEED Interior Design and Construction is an integrated design tool used to minimise environmental impact and maximise occupant comfort and performance of tenant spaces.	A LEED Interiors rating could be targeted for any of the interior fitouts within the stadium
Green Star Performance		Green Star – Performance is a holistic rating tool that measures the operational performance of building assets, identifies opportunities for improvement and realises the many benefits of sustainable building operations.	Green Star Performance could be used to assess the operation of the stadium to ensure sustainable operation practices are in place for the stadium's life.
Passivhaus		Passivhaus is a rigorous, voluntary standard for energy efficiency in a building. It's core focus is passive design, high insulation levels and stringent air tightness.	This rating scheme could be used in addition to, or in lieu of, LEED to rate the stadium.

6 World Class Environmentally Sustainable Design Elements

There are a number of opportunities available to the project to further improve its sustainability and reduce operational costs and impacts. At this stage in the design it is not possible to commit to specific sustainability initiatives however this section of the ESD Strategy outlines some of the initiatives that may be adopted by the project during detailed design (Stage 2 Development Application).

6.1 Energy

Large Photovoltaic Installation

The large stadium roof presents an opportunity to install solar panels. These panels can be used to produce energy for use by the stadium, surrounding buildings or to feed back into the local distribution grid.

Structural consideration will need to be given at an early stage so that the roof can support the weight of the solar panels. Current costs for solar panels are approximately $2 per Watt and at current energy prices a simple payback is achieved within 7 years where all the energy produced by the array is used within the building itself.

Figure 9 Taiwan Stadium 2014, Brazil Mineirao

Battery storage

A key drawback of on-site renewable energy generation, in the case of solar or wind power, is the intermittent nature of the sun and the wind. To fully utilise the potential of renewable energy, the energy would need to be available on-demand, not just when it's windy or sunny. This is particularly relevant to a stadium which hosts many night time sporting and concert events.

Lithium ion battery technology offers a potential solution to smooth out energy generation fluctuations and store energy for night time use. Sizable spatial consideration would need to be given to locate the batteries, and there are exhaust requirements for indoor storage.

Figure 10 Hornsdale Power Reserve facility in South Australia utilises Tesla Powerpack batteries and is the world's largest Lithium ion battery facility

Thermal storage

Thermal storage refers to additional storage of chilled water for use in HVAC systems. The chilled water is produced and the storage tanks are "recharged" overnight by air-cooled or water-cooled chillers. At this time, the chillers will utilise off-peak energy tariffs as well as the lowest overnight ambient temperatures. The low ambient temperatures result in the highest energy-efficient operating point for the chillers.

Considerable floor area and structural considerations are required to locate a sizeable thermal storage tank.

Figure 11 440,000L capacity chilled water storage tank installed at Northern Beaches State High School

LED lighting with smart controls

LED lighting technology presents significant energy savings over traditional halogen or incandescent lighting systems, with much longer lifespans. In addition, they can be integrated with smart control systems to have dimming capabilities and programmable timing/sensor control.

LED technology is becoming industry standard and can be easily implemented throughout the entire stadium. Additional assessment is required on the feasibility of LED lighting for sports and pitch grown lighting. Smart controls can be integrated to bring occupancy and daylight sensing technology, as well as dynamic lighting for concert modes.

Figure 12 Dynamic LED lighting for multipurpose venues

Mixed mode capability for corporate boxes

Mixed-mode operations allow for spaces to be conditioned with AC systems or naturally ventilated when ambient conditions are favourable. Natural ventilation is provided through openable windows, doors or louvres which can be either manually controlled or automatically controlled via the BMS system.

For corporate boxes, mixed-mode systems would involve openable windows and doors which could open out to balcony areas for a more immersive viewer experience. There is minimal impact to the HVAC system to implement a mixed-mode strategy, save for additional HVAC controls to allow this to occur.

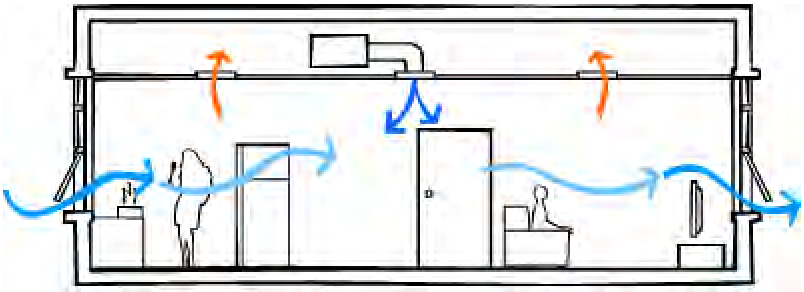


Figure 13 Mixed mode operation using windows and local AC units

6.2 Water

Treatment of grey water for reuse, e.g. for cooling towers

Greywater refers to all wastewater from streams excluding faecal contamination, i.e. sinks, showers, washing machines and dishwashers etc. The greywater can be treated and reused onsite for toilet flushing, landscape irrigation and other non-potable uses. Additionally, greywater can also be used as makeup water for cooling towers used in water-cooled HVAC systems. One key advantage of grey water systems is that the supply is not reliant on rain.

Greywater systems entail a large proprietary treatment system on-site. Additional piping systems would then be required to distribute and sort the greywater. A large storage tank would need to be located, through this could be placed underground.

Bore water for pitch growth

The current site has bore water availability, with the system currently being used on the SCG. The bore water is of high quality, making it suitable for pitch irrigation, toilet flushing and cooling tower makeup water.

Large storage tanks are required to hold the bore water for use. Additional consideration is required to gauge the availability of bore water to supply both the new stadium and the current SCG.

6.3 Materials

Commit to avoid all ‘red list’ building materials

Materials used within the building industry in Australia have far reaching consequences on the environment – both within our local communities as well as on larger ecosystems.

The Living Futures Institute maintains a ‘red list’ of the worst performing materials prevalent in the building industry. These materials typically have the following characteristics:

- Polluting the environment
- Bio-accumulating up the food chain until they reach toxic concentrations

- Harming construction and factory workers

The Stadium Redevelopment could commit to a stringent material review process to avoid the use of building materials that contain these red list items.

Figure 14 Examples of toxic material sources

Local material procurement

The stadium could choose to commit to purchasing a percentage of locally made and manufactured materials. The benefits of using local materials are two-fold: investment is made in the local community and the carbon emissions associated with material transportation.

AUSTRALIAN MADE

Renewable materials

Widely used construction materials such as concrete and steel have significant environmental impacts within their manufacturing process. The mining of raw materials, transportation to manufacturing sites, and then the energy required to transform these materials into usable steel and concrete place a significant burden on the environment.

There are renewable material alternatives that are available for some applications. Wherever possible, the stadium development should seek to maximise the use of renewable materials such as timber.

Figure 15 Use of timber in sporting facilities

Building Life Cycle Assessment

Life cycle assessment is a tool used to investigate the total environmental impact of project's life. From raw materials processing through to manufacture, construction, use and disposal. The analysis considers all aspects of the project from cradle-to-grave.

An analysis of this kind allows projects to examine the impact of design decisions on the overall project impact. Conducting a Life Cycle Assessment alone will not result in a more sustainable building design, but it will equip the project team with all the information they require to understand the ramifications of decisions made, and therefore guide the project to sustainability.

For a Life Cycle Assessment to be a useful tool to the project, it needs to happen early in the design development process.

Reduce Food and Beverage packaging

Once the stadium is operational, a significant component of the waste that will be managed by the site will be associated with food and beverage sales. This waste occurs at the site delivery, onsite food production, and sales stages of the food and beverage cycle.

The most effective way to reduce waste is to avoid it in the first place. SCG Trust may be in a position to review their operational policies so that food and beverage with less packaging are given preference.

6.4 Transport

Valet Bike parking

To allow for higher levels of bicycle parking in the future, without oversupplying bicycle parking at the early stages of the project, the stadium could incorporate a 'valet bike parking' strategy. To do this the stadium would have a number of portable bike racks that can be set up on event days. This service could accommodate higher cyclist numbers into the future.

Figure 16 Event day valet bike parking

Combined visitor bike parking with security bollards

Visitor bike parking could be combined with security bollards. This could potentially be an efficient use of materials and space.

Figure 17 Examples of security bollards doubling as bike parking

Integrated ticketing

Integrated ticketing is where public transport is included in venue ticket prices. This means that when a ticket is purchased, it includes free public transport access to and from the venue. The benefits are that public transport becomes incentivised.

Currently integrated public transport tickets are provided on a club basis. Rolling this out to all codes and events held at the Sydney Football Stadium could further encourage public transport use.

Infrastructure NSW will work with Transport for NSW and a number of other stakeholders to develop a plan to introduce integrated ticketing for events at SFS. Further details will outlined in the Stage 2 DA.

Figure 18 Sydney Buses, Light Rail and Trains

6.5 Sustainable Sites

Raingardens and tree pits

These are small-scale water treatment and detention systems used to slow storm water runoff and improve runoff water quality. Typically integrated with landscaping features. (TBC in next issue)

Figure 19 Tree pit

Large pot plants as security bollards

Landscaping and security requirements can be integrated through the use of large pot plants as security bollards. (TBC in next issue)

Figure 20 Examples of large pot plants acting as security bollards

6.6 Management

Digital management

Modern, complex building systems are automatically monitored and controlled by building management systems (BMS). These automated computer systems control the operation of all major HVAC plant, as well as lighting, power, fire and security systems.

Advanced digital management strategies can be implemented to further manage and reduce energy demands. These could include:

- Advanced metering and building tuning; whereby the performance and usage of the entire building is monitored over a set period, and building systems are retuned after this period to better match the individual requirements of the users
- CO_2 monitoring systems which can monitor the demand for fresh air in conditioned spaces, and therefore minimise the energy consumption of ventilation systems
- Automated alarm systems linked to the facilities management team (e.g. via mobile phone or paging systems) to allow for the best response times to system faults

Visual displays of energy and water use, particularly in corporate boxes.

Real time building performance information can be displayed to increase user and operator understanding of the buildings systems and environmental measures.

This could involve physical dashboards and screens located throughout high traffic areas such as lobby's or elevators. Displays could show current live building data such as PV generation figures and summaries of energy and water savings. Additionally, it could include education on sustainability initiatives and protocols implemented within the stadium.

Figure 21 Real time dashboards at the University of New South Wales (UNSW) display energy usage, PV generation and other building information figures.

Tenant training / induction 'how to operate the stadium efficiently'

Specific user training could be beneficial in educating and informing irregular stadium visitors. The intent is that by arming these irregular users with a greater understanding of the impacts of their actions they will be more likely to operate the spaces they use efficiently. This could include an overview of current sustainability initiatives and energy saving best practices e.g. turning off lights as they leave, closing doors to air conditioned rooms, and keeping air-conditioning temperature levels within a reasonable band.

6.7 Social Sustainability

Water play park

The stadium could consider providing a water play park that is open to the public. The provision of such a facility would have multiple sustainability impacts, including:

- Community benefit – providing a facility which can be used by all members of the community on non-game dates
- Heat island effect reduction – the evaporation of water provides a cooling effect to the local microclimate which would have a positive effect on the local urban heat island effect
- Interpretation of Busby's Bore – the historically important Busby's Bore runs underground beneath the edge of the Sydney Football Stadium site. This bore is a significant part of Sydney's history but is ultimately invisible to the public. A water play park could provide an opportunity to interpret Busby's Bore and provide local context for the site

Figure 22 Examples of water play parks

Community garden

A community garden is a place which allows inner city residents the ability to grow food and have a direct connection to nature which can be difficult to experience in urban environments. A community garden would again provide a facility which could be enjoyed by the entire local community on non-game days. The provision of such a facility would have multiple sustainability impacts, including:

- Community site involvement
- Heat island effect reduction through increased vegetation and the evapotranspiration effect
- The ability to use any vegetables or herbs grown on site within the food and beverage facilities within the stadium

Figure 23 Examples of community gardens in urban settings

7 Conclusion

To conclude, the stadium is committed to sustainability. As the design progresses, further details of the implementation of sustainable design will be resolved.

The core sustainability principles identified for the project at this stage are summarised in table 5.

Table 5 Summary of core ESD principles

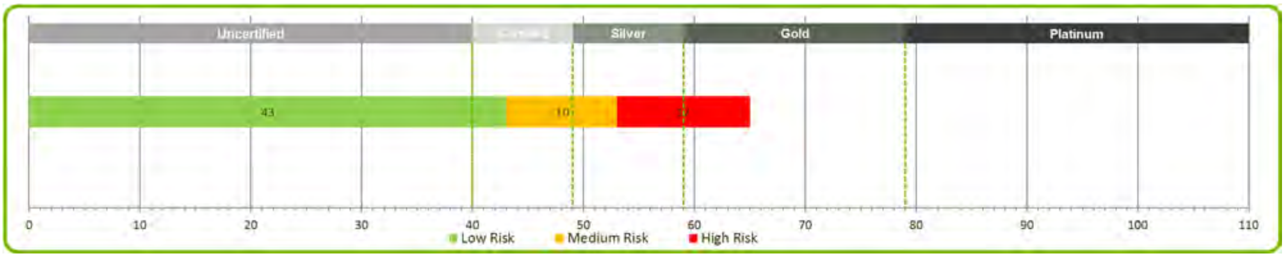
Category	Key principle
Energy	High levels of energy efficiency
	LED lighting
	Onsite renewable energy generation
Water	Efficient use of water through selection of fittings and fixture
	Rainwater collection and reuse
Materials	Life cycle assessment to inform material selection
	Demolition and construction waste management
	Reuse of existing materials
	Operational waste management
Transport	Provision of bicycle parking and associated facilities
	Improved pedestrian access
	Electric vehicle infrastructure
	Promotion of green vehicles
Sustainable sites	Native vegetation
	Reduction of urban heat island effect
	Stormwater quantity and quality
Social sustainability	Community engagement
	Design for diversity
	Modern slavery

The backbone of the project's sustainability journey is the commitment to achieve a LEED Gold certified rating. During detailed design the ESD strategy will be further developed.

Appendix A – LEED Gold Pathway

Sydney Football Stadium Redevelopment

LEED v4 Gold Credit Pathway



Category	Credit	Pos.	Easy	Hard	Difficult	Comments
Integrative Process	IP102: Integrative Process	1	1	0	0	Achieving this credit will require analysis to be completed as soon as a design is developed, ideally within the proposal documentation from contractors.
	Integrative Process Credits Totals	**1**	**1**	**0**	**0**	
Location and Transportation	LT101: LEED For Neighbourhood Development Location	0	0	0	0	-
	LT102: Sensitive Land Protection	1	1	0	0	
	LT103: High Priority Site	2	2	0	0	
	LT104: Surrounding Density and Diverse Uses	5	4	1	0	Likely to be achieved given proximity to Entertainment Quarter and Oxford Street.
	LT107: Access To Quality Transit	5	3	1	1	Preliminary calculations undertaken with Arup indicate that the ANZAC buses, light rail and Oxford St buses will give us a minimum of 3 points, potentially as many as 5. An unknown is the ANZAC Rd bus timetable following the operation of the light rail.
	LT108: Bicycle Facilities	0	0	0	0	LEED doesn't differentiate between building visitors and spectators and as such in order to target this credit visitor bicycle parking would need to be provided for at least 2.5% of the spectator capacity. This is more than 1,000 visitor bike spaces.
	LT110: Reduced Parking Footprint	1	1	0	0	Need to clarify strategy with regards to carparks EP2 and EP3. If we progress with the strategy that these parking stations are excluded then this credit is easily achievable.
	LT111: Green Vehicles	1	0	0	1	Will investigate potential AAP regarding carpooling - offering a discount for cars with 4 or more occupants.
	Location and Transportation Totals	**15**	**11**	**2**	**2**	
Sustainable Sites	SS101: Construction Activity Pollution Prevention	Prerequisite				

Category	Credit	Pos.	Easy	Hard	Difficult	Comments
	SS104: Site Assessment	1	1	0	0	
	SS105: Site Development - Protect or Restore Habitat	0	0	0	0	
	SS107: Open Space	0	0	0	0	Unlikely to be achieved given the limited site.
	SS108: Rainwater Management	0	0	0	0	Difficult to achieve given small external area - not yet discounted. Will explore further with Arup civil.
	SS110: Heat Island Reduction	2	0	0	2	Strategies that will need to be implemented to target this credit: - vegetation - shading - materials with high solar reflectance Risk associated with procuring materials which have been tested to American Standards
	SS112: Light Pollution Reduction	1	1	0	0	Design lighting to minimise pollution to night sky.
	Sustainable Sites Totals	**4**	**2**	**0**	**2**	
Water Efficiency	WE101: Outdoor Water Use Reduction	Prerequisite				
	WE901: Outdoor Water Use Reduction	2	2	0	0	Irrigation: - no irrigation required; OR - 30% reduction in irrigation demands
	WE102: Indoor Water Use Reduction	Prerequisite	Reduce indoor water use by 20% from baseline.			
	WE902: Indoor Water Use Reduction	6	1	2	0	
	WE104: Building-Level Water Metering	Prerequisite	Basic metering.			
	WE110: Cooling Tower Water Use	2	1	0	1	First point requires initial test of incoming water supply. Second point requires potentially extensive treatment of recirculated water.
	WE112: Water Metering	1	1	0	0	More extensive metering.
	Water Efficiency Totals	**11**	**5**	**2**	**1**	
Energy and Atmosphere	EA101: Fundamental Commissioning and Verification	Prerequisite				

Category	Credit	Pos.	Easy	Hard	Difficult	Comments
	EA103: Minimum Energy Performance	Prerequisite				
	EA903: Optimize Energy Performance	18	4	2	0	Achieving this number of points will require the following: - passive design considerations at the early stages of the design of air-conditioned spaces - efficient lighting (LED) throughout - extensive PV NB: Achieving energy points within LEED is significantly more challenging than within Green Star due to the scope of the assessment and the reference standards used.
	EA106: Building-Level Energy Metering	Prerequisite				
	EA108: Fundamental Refrigerant Management	Prerequisite				
	EA110: Enhanced Commissioning	6	4	0	0	
	EA118: Advanced Energy Metering	1	1	0	0	
	EA121: Demand Response	0	0	0	0	
	EA123: Renewable Energy Production	3	1	1	1	Full points awarded where onsite renewable energy contributes 10% of total building energy. This should be achievable however early consideration will need to be given to the location and use of PV: - matching demand and supply or using battery storage (PV power generation won't match demand profile) - stadium roof structure to be designed to accommodate PV from the outset
	EA126: Enhanced Refrigerant Management	1	1	0	0	
	EA128: Green Power and Carbon Offsets	2	0	0	2	Purchase GreenPower or offsets. 50% for 1 point. 100% for 2 points.
	Energy and Atmosphere Totals	**31**	**11**	**3**	**3**	
Materials and Resources	MR101: Storage and Collection of Recyclables	Prerequisite				
	MR103: Construction and Demolition Waste Management Planning	Prerequisite				
	MR108: Building Life-Cycle Impact Reduction	3	3	0	0	

Category	Credit	Pos.	Easy	Hard	Difficult	Comments
	MR112: Building Product Disclosure and Optimization - Environmental Product Declarations	0	0	0	0	
	MR114: Building Product Disclosure and Optimization - Sourcing of Raw Materials	0	0	0	0	
	MR115: Building Product Disclosure and Optimization - Material Ingredients	0	0	0	0	
	MR123: Construction and Demolition Waste Management	2	2	0	0	This will be a key credit for this project given the contentious nature of the development. Recycling the existing materials will be a significant consideration.
	Materials and Resources Totals	**5**	**5**	**0**	**0**	
Indoor Environmental Quality	EQ101: Minimum Indoor Air Quality Performance	Prerequisite				
	EQ104: Environmental Tobacco Smoke Control	Prerequisite				
	EQ110: Enhanced Indoor Air Quality Strategies	1	1	0	0	
	EQ112: Low-Emitting Materials	0	0	0	0	
	EQ113: Construction Indoor Air Quality Management Plan	1	1	0	0	
	EQ114: Indoor Air Quality Assessment	2	0	0	0	
	EQ115: Thermal Comfort	1	0	0	1	Requires individual thermal comfort control. The requirements are more stringent than Green Star.
	EQ117: Interior Lighting	2	1	0	0	
	EQ123: Quality Views	0	0	0	0	
	EQ124: Acoustic Performance	1	0	1	0	
	Indoor Environmental Quality Totals	**8**	**3**	**1**	**1**	
Innovation 1	INN101.1: Informing Design Using Triple Bottom Line Analysis	5	0	1	0	
	INN101.2: Walkable Project Site		0	0	1	

Category	Credit	Pos.	Easy	Hard	Difficult	Comments
	INN101.3 Verified Construction & Demolition Recycling Rates		0	0	1	This will be a key credit for this project given the contentious nature of the development. Recycling the existing materials will be a significant consideration.
	Exemplary Performance - LT110: Reduced Parking Footprint		0	0	1	
	Exemplary Performance - MR123: Construction and Demolition Waste Management		0	1	0	This project should be targeting excellent demolition recycling levels.
	Exemplary Performance - MR108: Building Life-Cycle Impact Reduction		1	0	0	
	Innovation 1 Totals (Up to a maximum of 5 credits)	**5**	**1**	**2**	**2**	
Innovation 2	IN102: LEED Accredited Professional	1	1	0	0	Assume the development team will include a LEED AP.
	Innovation 2 Total	**1**	**1**	**0**	**0**	
Regional Priority	RP Credit 1.1: Regional Priority - Renewable Energy Production	4	1	0	0	-
	RP Credit 1.2: Regional Priority - Green Power and Carbon Offset		0	0	1	-
	RP Credit 1.4: Regional Priority - Open space		0	0	1	-
	RP Credit 1.5: Regional Priority - Outdoor water use reduction		1	0	0	-
	RP Credit 1.6: Regional Priority - Indoor water use reduction		1	0	0	-
	Regional Priority Totals (Up to a maximum of 4 credits)	**4**	**3**	**0**	**1**	

Overall Totals			**43**	**10**	**12**

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Memorandum

To	**Tom Kennedy (iNSW)**	From	**Zofia Kuypers**
Copy	**David Riddell (Aver)**	Reference	**501857**
Date	**2018-05-11**	Pages (including this page)	**3**
Subject	**ESD Statement for Demolition**		

This statement outlines the Environmentally Sustainable Design Initiatives that will be implemented during the demolition of Allianz Stadium. The initiatives outlined here relate to waste avoidance and minimisation, environmental management and sustainability rating schemes (i.e. LEED). Finally innovation opportunities for the demolition have been identified and presented.

The initiatives outlined here support the Sydney Football Stadium's targeted LEED Gold rating. LEED Gold represents Australian Best Practice in environmentally sustainable design.

1 Secretary's Environmental Assessment Requirements (SEARs)

This memo has been written to address the following SEARs requirements:

6. Ecologically Sustainable Development (ESD)

- *Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated into the demolition stage of the development.*
- *Address how the proposed demolition will 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 measures, use of sustainable and low carbon materials, energy and water efficient design and technology and use of renewable energy.*

2 Key ESD Measures

As outlined in the project's Construction Management Plan, a number of key ESD measures will be implemented during the demolition phase of the project. These include:

- Waste Management:
  - 90% by weight of demolition waste will be diverted from landfill. Waste reuse opportunities will be investigated as first option followed by recycling and finally disposal;
  - The Contractor is to develop on site waste recording for all waste streams and volumes arising throughout the demolition phase. This information will be used to show the type, volume and rate of waste being generated, re-used and recycled; and
  - All demolished material will be source separated to ensure purity of the different recycling streams.
- Reuse of materials:

- Existing digital scoreboards to be reused by Sydney Cricket Ground Trust; and
- Where possible waste will be reused on site. For example, concrete will be crushed and reused on site which has the added benefit of reusing waste on site as well as avoiding truck movement to and from site.
- Recycling of materials:
  - All structural and reinforcement steel and non-ferrous metals will be transported from site for recycling;
  - Investigations have been made on reuse of seat (polypropylene) materials with opportunities for recycling and reuse;
  - Green waste including the removed turf shall be recycled; and
  - Glass will be source separated and recycled.
- Erosion and Sediment Control
  - The Erosion and Sediment Control Plan will detail measures to be undertaken on site to manage any potential detrimental impacts on downstream waterways.

3 LEED

The stadium is committed to achieving a certified LEED Gold rating and as such the following pre-requisite credits will be met by the stadium project:

- Prerequisite – Construction Activity Pollution Prevention
- Prerequisite – Construction and Demolition Waste Management Planning

Prior to the commencement of demolition works on site, the Erosion and Sediment Control Plan and the Construction Management Plan must be reviewed by the project ESD Consultant to ensure compliance with all relevant LEED requirements.

4 ESD Innovation Opportunities

The opportunity exists to extend sustainability initiatives to the design and operation of the site sheds used on site. The Green Building Council of Australia has an Innovation Challenge titled '**High Performance Site Sheds**' which outlines a range of best practice initiatives which can be implemented for site sheds. These include:

- Site shed reused or manufactured in a facility certified to ISO 14001
- Use of FSC Timber in constructing the site shed
- Metering of site shed energy and water consumption
- Use of entry mats to limit the entry of pollutants
- Insulation to roof
- Other initiatives as outlined within the document available on the GBCA website.

The demolition contractor will review these Green Star High Performance Site Shed requirements for applicability, noting that the short nature of the demolition works, and the reduced number of personnel, may make many of these initiatives ultimately unsustainable.

5 Conclusion

In summary, the ESD initiatives outlined herein will be implemented during the demolition of the stadium. These initiatives work to improve the overall sustainability of the demolition stage.