THE STAR ENTERTAINMENT GROUP LTD

The Star, Sydney

MODIFICATION 14 SUSTAINABILITY REPORT

SEPTEMBER 2016

WSP | PARSONS BRINCKERHOFF

The Star, Sydney

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The Star Entertainment Group Ltd

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EXECUTIVE SUMMARY

The Star Entertainment Group Limited (SEGL) is a leading operator of integrated resorts catering to both local and international visitors, and is the operator of The Star Sydney (The Star). The Star is embarking on a five year redevelopment journey to create a landmark, exemplar integrated resort within the City of Sydney. The Star is proposing to attain the highest standard of built form outcomes for the site through the proposed redevelopment by encouraging innovation and best practice approaches in order to achieve an environmentally sustainable development that positively contributes to the overall architecture of both Pyrmont and the City of Sydney.

The Star is committed to sustainability leadership in energy and waste reduction within the entertainment sector, and greening their footprint in the communities in which they operate. Sustainability is an ongoing and constantly improving process for SEGL at an organisational level, an operational level and at an individual site level. The proposed works associated with Modification 14 will be designed and delivered in accordance with The Star's internal Environmental Management Policy, Environmental Principles, Sustainable Procurement Policy and Sustainable Design Guideline.

The above guidelines outline a holistic approach to sustainability specifically for SEGL's assets in order to achieve SEGL's own sustainability targets in 2016 measured against a 2013 baseline. The targets, as publically available on SEGL's website, are as follows:

- 5% potable water reduction
- 5% reduction in energy consumption
- 5% greenhouse gas (GHG) emissions savings
- 10% increase in operational recycling rates

A number of existing major sustainability initiatives on the site have been identified and their impacts on greening their carbon footprint explained. These initiatives include but are not limited to:

- Mechanical system operation improvements
- Rainwater harvesting system
- Electric vehicle charging

A number of sustainability initiatives proposed for the site under Modification 14 have been outlined in Section 3 of this report, including:

- Harbour heat rejection system upgrade
- Low carbon on-site energy generation system
- Variable Speed Drive (VSD) upgrades for all circulating pumps and ventilation fans
- Light Emitting Diode (LED) lighting upgrades
- Vertical transportation upgrades
- National Construction Code (NCC) compliance of new build building envelope and services and compliance upgrades to existing building envelope and services elements
- High efficiency building fabric
- High efficiency building services
- Comprehensive energy sub-metering system for monitoring and targeting purposes

- Comprehensive water sub-metering system for monitoring and targeting purposes, and leak detection

Section 4 outlines the sustainability initiatives which are being considered for implementation as part of all future SEGL's projects and redevelopments across the portfolio of assets.

In addition to the proposed initiatives, Section 5 of the report outlines Green Star certification options, which will be considered for implementation on the project.

1 MODIFICATION 14 PROPOSED WORKS

1.1 Modification 14 Overview

The Star Entertainment Group Limited (SEGL) is a leading operator of integrated resorts catering to both local and international visitors, and is the operator of The Star Sydney (The Star). Consistent with The Star's licence obligation to operate the site to an international standard, SEGL is proposing to advance a revitalisation of the existing complex.

The Star is embarking on a five year redevelopment journey to create a landmark, exemplar integrated resort within the City of Sydney. This proposed redevelopment will occur through the lodgement of two S75W applications with the Department of Planning and Environment, identified as Modification 13 and Modification 14. All works pertaining to Modification 14 are detailed below.

The Star is proposing to attain the highest standard of built form outcomes for the site through the proposed redevelopment by encouraging innovation and best practice approaches in order to achieve an environmentally sustainable development that positively contributes to the overall architecture of both Pyrmont and the City of Sydney. This will be done through the implementation of advanced ESD initiatives, improved people and movement connections, upgrades to the external appearance and presentation of the facility and improved integration with the adjacent urban fabric.

Modification 14 includes the following proposed works:

1. **Level B4 Infrastructure Upgrades** - Upgrades to existing generators, existing harbour heat rejection system, natural gas system, existing domestic cold water system and an additional sewer connection.
2. **Level 00 – Porte Cochere and Astral Lobby Upgrade -** Realignment of Porte Cochere to accommodate expanded and upgraded Astral Lobby, upgraded Astral Lobby Bar and retail expansion and upgrades of the Main Casino Entry, including valet improvements to the Porte Cochere.
3. **Level 00 Back of House Upgrades** - Internal upgrades and improvements to multiple aspects of the back of house space at Level 00.
4. **Level 00 Astral Luxury Retail Zone** - New luxury retail zone connecting from Astral Hotel Lobby out to Jones Bay Road. Change of use from office / back of house to retail.
5. **Level 00 - SELS Fitout** - Refurbish existing SELS Level 00 toilets at southern end of building to allow for adjacent lift lobby circulation areas. Upgrades and tenancy improvements to existing retail tenant at northern end of SELS building along Jones Bay Road. No external changes to SELS are proposed, with internal alterations only.
6. **Level 00 SELS Lighting** - External lighting of the SELS building along Pyrmont Street to celebrate the heritage elements of the building.
7. **Level 00 Darling Café** – New café within the existing Darling Hotel Lobby at Level 00.
8. **Level 00 to 01 - G-Star Raw Escalators** - Replace existing G-Star Raw retail shop at Level 00 with new escalators providing access from Level 00 to Main Gaming Floor at Level 01. Includes new arrival bar adjacent to escalators at Level 01.
9. **Level 01 - Main Gaming Floor Slab Infill** - Slab expansion off the Main gaming Floor at Level 01 over the existing main entry foyer facing Pirrama Road. No facade works are proposed.
10. **Level 02 – Oasis Gaming Area** – Minor external alterations to the Oasis unenclosed gaming area at Level 02.

11. **Level 03 - Sovereign Expansion** – Expansion to the existing Sovereign Room at Level 03. This includes refurbishment of existing food, beverage and gaming locations, expansion of food and beverage opportunities an VIP gaming and unenclosed gaming areas.
12. **Level 03 - Event Centre Pre-function Space -** New pre-function space adjacent to the MUEF at Level 03, to allow for circulation changes from the level 03 expansion.
13. **Vertical Transportation Drum -** New escalators as part of a vertical transport arrival strategy from Level 00 to Level 03.
14. **Level 04 – Star Administrative Offices** - Fitout of existing administrative offices within Astral Residences tower. Internal improvements only.
15. **Level 05 – VIP Lobby & Check-In -** Conversion of existing pool plant space and enclosed pool deck at Level 05 to a lobby for the VIP hotel guest lounge.
16. **Level 05 - Astral Residences Reception -** Conversion of meeting room to Reception and check-in lobby. Includes minor expansion to existing enclosed space.
17. **Northern Porte Cochere Canopy -** Removal of a section of the current glazing (retaining the canopy structure) of the current porte cochere canopy and include a new ceiling at a lower height over a section of the new slab (NW Gaming slab infill).

As with all new and existing redevelopments at The Star, sustainability forms a key consideration for the project. This report seeks to address the following SEARs requirements for the project:

Identify how the development will incorporate best practice ESD principles in the design, construction and ongoing operation phases of the development.

1.2 Sustainability at The Star

SEGL is committed to sustainability leadership in energy and waste reduction within the entertainment sector, and greening their footprint in the communities in which they operate. Sustainability is an ongoing and constantly improving process for SEGL at an organisational level, an operational level and at an individual site level.

Sustainability opportunities within The Star includes initiatives related to its operations, refurbishments and new building components. SEGL undertook a materiality assessment in 2014 to understand areas for improvement including performance of waste management, water consumption and energy consumption. Following on from this, SEGL launched an Environmental Management Policy, Environmental Principles document and a Sustainable Procurement Policy to constantly improve, manage and measure their performance across key sustainability metrics. SEGL also report annually on their performance against their sustainability performance objectives. The sustainability performance objectives for FY2016 are presented in Table 1.1 below.

Table 1.1 FY2016 Sustainability Objectives

Focus Area	Objectives 2016
Governance and Reporting	• Identify reportable benefits against the Group Sustainable Procurement Policy • Improve ESG disclosures and performance reporting by establishing industry appropriate sustainability metrics considering business activities, expansion and development pipelines
Our Stakeholders	• Incorporate green criteria into tenant lease renewals across our casino properties • Develop a communications plan to reach out to guests on sustainability issues and obtain feedback on our performance
Our Team Members	• Integrate adherence with Echo's E&S program into all PDs • Actively support the implementation of ideas generated through the Group innovation program
Our Suppliers	• Introduce an ESD scorecard for capital projects to prioritise sustainable outcomes and increase asset performance considering whole of life and operating costs • Reduce packaging of key food and beverage product lines across the business and promote product stewardship in the supply chain
Our Environment	• Implement a minimum of 5 energy and water savings opportunities identified in building audits FY15 in FY16 across all properties that demonstrate sound ROIs and environmental savings • Assess viability of organics or food waste recycling in QLD and implement where commercially viable • Obtain a NABERS tenancy rating for the Echo Entertainment Group office.
Our Communities	• Increase the number of sustainability trained professionals across the business leading to green project outcomes • Introduce a giving program for redundant amenities to communities in need

The proposed works associated with Modification 14 will be designed and delivered in accordance with the guidelines and documents abovementioned, as well as SEGL's Sustainable Design Guideline. The guideline will be used throughout the planning, design, tender, construction and operational phases of the development to ensure sustainability outcomes are achieved. The guideline outlines a holistic approach to sustainability specifically for SEGL's assets and sets out the following environmental targets to be achieved in 2016 measured against a 2013 baseline:

- → 5% potable water reduction
- → 5% reduction in energy consumption
- → 5% greenhouse gas (GHG) emissions savings
- → 10% increase in operational recycling rates

2 CURRENT SITE INITIATIVES

Throughout the operations of The Star, a number of sustainability initiatives have been implemented on the site and have been in operation for up to almost 20 years. The proposed works associated with Modification 14 would utilise and support existing and ongoing sustainability initiatives on the site. Major sustainability initiatives on the site are outlined in this section of the report.

2.1 Mechanical System Operation

Air conditioning and mechanical systems within The Star are constantly being monitored, and optimised to improve performance. Currently, the following changes are being implemented to reduce the site's energy consumption and greenhouse gas emissions whilst not compromising on occupant comfort:

- Reducing and modulating the outside air volumes across gaming floors to minimise air conditioning energy consumption
- Implementing an economy cycle on the main gaming floors to minimise air conditioning energy consumption
- Reconfiguring chilled water headers for improved mixing, resulting in both better air conditioning of spaces and minimised air conditioning energy consumption
- Improved efficiency of equipment being upgraded through the use of more modern technology

2.2 Rainwater Harvesting System

The Star has an existing rainwater harvesting system in the form of a bio membrane reactor. The use of the system reduces the reliance on potable water, hence reduces water consumption on the site. The system operates by:

- Capturing rainwater through a rooftop collection system
- Stores and filters water for non-potable reuse
- Reuses water for the purposes of bathroom flushing, urinal flushing and landscape irrigation

The proposed works associated with Modification 14 will be fully integrated with this system.

2.3 Electric Vehicle Charging

The Star is one of only two locations within Sydney offering Tesla electric vehicle supercharging. The Star have been an early adopter in electric vehicle charging, enabling the transition from combustion engine vehicles to electric vehicles to occur more rapidly.

3 FUTURE SITE INITIATIVES

The Star is embarking on a five-year redevelopment journey and, as such, sustainability will form a central part of this process. This section of the report outlines the initiatives which will be implemented under Modification 14.

3.1 Harbour Heat Rejection System

The Star has successfully operated a harbour heat rejection system for almost 20 years. The system includes a water intake point in Jones Bay, a heat exchanger and pumping system within The Star basement, and a water discharge point in Pyrmont Bay.

As part of the Modification 14 works, The Star wish to enhance the operation of the harbour heat rejection system to support space cooling and other cooling loads of the existing site's operations as well as the new areas of Modification 14.

The harbour heat rejection system forms a major part of The Star's sustainability strategy and will provide the following benefits:

- Significant water efficiency benefits. Up to 50% of a building's water consumption can come from cooling tower make-up water. As a 24 hour, 7 day a week operation, this water saving is a significant amount and is estimated to be in the order of 160ML per annum. Any future development, including Modification 14, will increase the potable water savings when connected to this system.
- Risk of legionella outbreaks. Legionella disease can commonly spread through evaporative heat rejection systems. It has become a health risk to the public with recent deaths occurring in Sydney as a result of Legionella. By utilising a harbour heat rejection system, rather than the cooling towers on the site, the risk of legionella is eliminated.
- Increased rooftop space for patron amenity. Roof top areas within Sydney commonly cannot be accessed by patrons and occupants for outdoor amenity as these areas are used for plant rooms and cooling towers. By utilising the harbour heat rejection system, The Star has reduced the amount of roof top space needed for plant rooms and cooling towers, instead using basement areas for plant rooms. The Star has therefore activated roof top spaces to create an improved environment for patron usage of roof top spaces.

3.2 Low Carbon On-site Generation

The Star is implementing a low carbon on site generation system as part of the Modification 14 works. The system will be a gas fired microturbine system located in The Star's plant room in the basement and will generate low carbon electricity to meet a portion of the sites annual electricity demand. The capacity of the system will be determined during detailed as the project progresses.

A by-product of this system is a significant amount of heat generated to operate microturbine. The project can capture this energy firstly through the use of heat exchanges to produce heating hot water for the site, and secondly to fuel absorption chillers to provide air conditioning cooling to the site.

Presented below in Figure 3.1 and Figure 3.2 is an example of a 4MW microturbine system in operation over a typical summer week and typical winter week respectively at The Star.

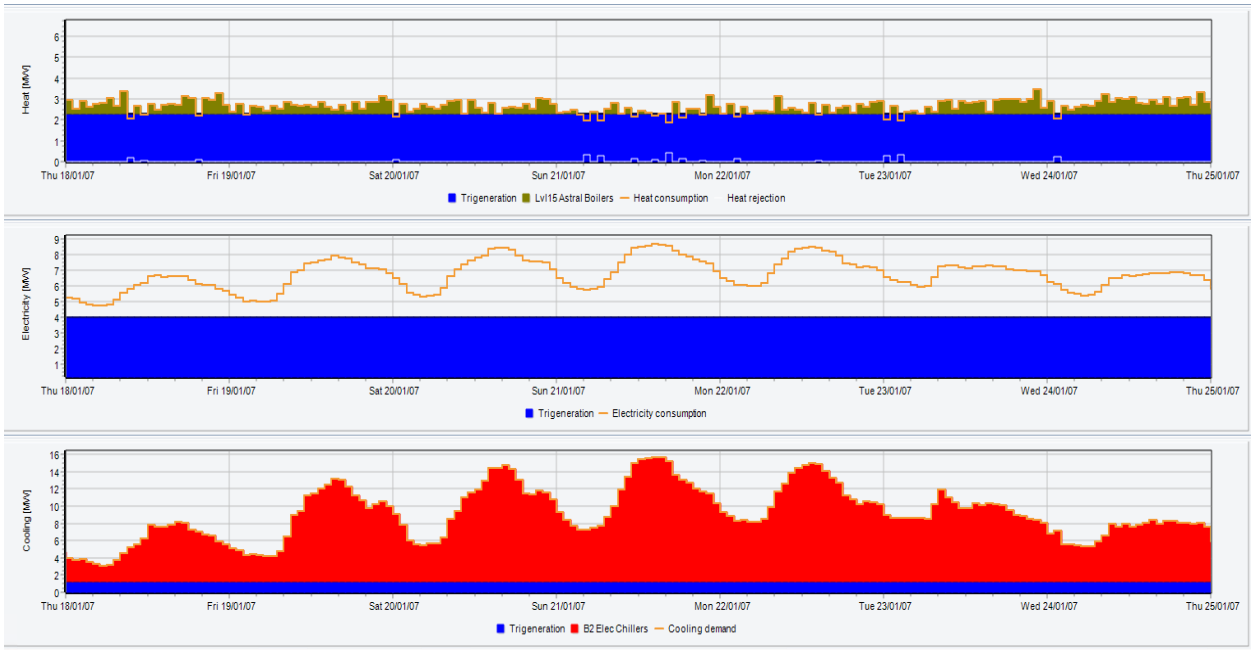

Figure 3.1 Low carbon on-site energy generation system, typical summer week

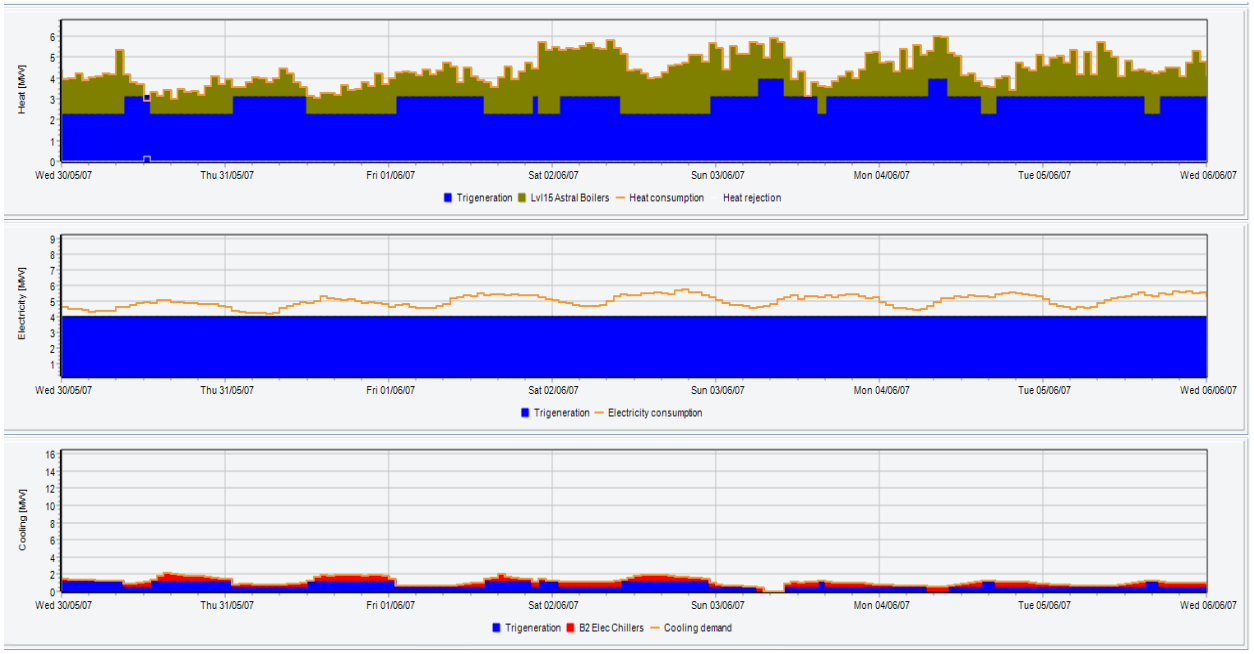

Figure 3.2 Low carbon on-site energy generation system, typical winter week

The top profile of each figure represents the heating demand and heating supply. The orange line represents the demand on the site, the green area represents the demand met by gas boilers, and the blue area represents the heating supplied by the onsite generation.

The centre profile of each figure represents the electrical demand and supply on the site. The orange line represents the demand on the site, the blue area represents the electrical supply from the onsite generation.

The bottom profile represents the cooling demand and supply on the site. The orange line represents the demand on the site, the blue area represents the cooling supply from the absorption chillers and the red represents the cooling supply from the electrical chillers.

On site generation has the advantage of a lower carbon intensity electricity compared to grid imported electricity. By utilising waste heat to address site heating demand and absorption chillers to address site cooling demands, a very low carbon intensity energy can be achieved on the site.

Figure 3.3 below illustrates the predicted greenhouse gas emissions on the site attributed to each fuel type (grid sourced electricity and natural gas). It demonstrates that the operating greenhouse gas emissions on the site are reduced substantially with the implementation of the on-site generation system. This can be attributed to the lower emission intensity of the gas microturbines compared with grid electricity.

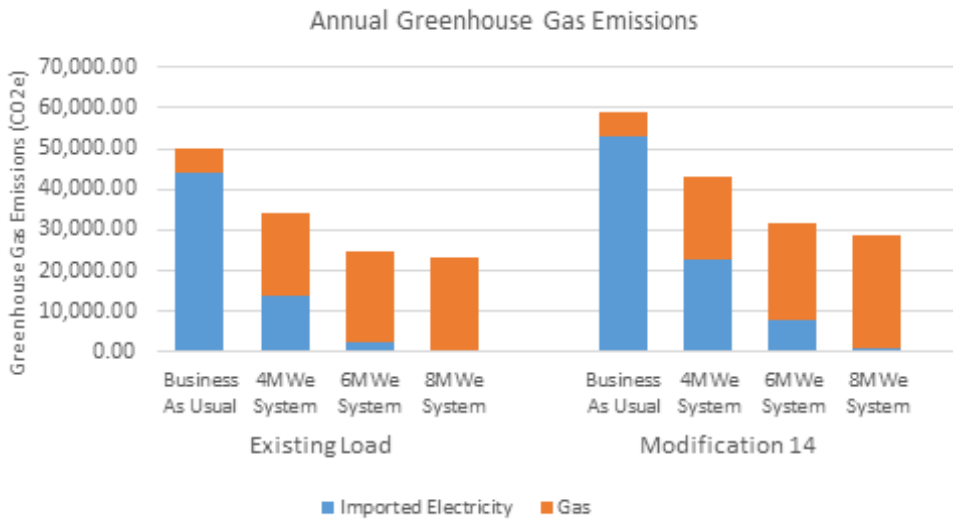

Figure 3.3 On site generation system, greenhouse gas emissions

Ongoing modelling is being conducted to determine the capacity of the on-site generation system. Significant greenhouse gas emissions will be saved by utilising this system on the site.

3.3 VSD Upgrades

The Star site has been operating continuously since opening in 1997. As such there are some fans and pumps which have reached the end of their service life. The Star will be installing new high efficiency circulating pumps and ventilation fans with integrated Variable Speed Drives.

The high efficiency pumps and fans will allow energy and greenhouse gas emission savings during operating hours. As these units typically operate 24 hours a day 7 days a week their upgrade will result in a sizable improvement in the Star's operational efficiency.

The Variable Speed Drives will allow the fan and pump motors to turn down to match the load on the site at any given time. The Variable Speed Drives can typically save up to 60% energy and greenhouse gas emissions compared with a constant speed traditional fan or pump motor.

3.4 LED lighting Upgrades

SEGL is committed to upgrading the lighting system across the property to high efficiency LED lighting systems. When designed and installed, the lighting power density is expected to drop from around 22 W/m^2 to around 10 W/m^2 in the gaming spaces.

This corresponds to an annual energy saving of over 1,000MWh and over 900 tonnes of greenhouse gas emissions per annum.

In addition to this, a significant amount of heat load in the space will be removed through the installation of the LED lighting. An estimated energy saving of 130MWh per annum can be achieved through reduced cooling requirements. This corresponds to a greenhouse gas emission savings of a further 114 tonnes per annum.

3.5 Vertical Transportation Upgrades

SEGL is committed to upgrading the vertical transportation on the site including lifts and escalators. The following upgrades are planned and the associated energy savings:

- Permanent Magnet, gearless, Variable Voltage Variable Frequency lift drives bringing an energy saving of 20% – 30% compared to business as usual drives
- Regenerative drive technology, bringing an additional energy saving of between 5% – 15% compared to business as usual technology
- Lift cars to include LED lighting, bringing an additional energy saving of 50% – 60% compared to business as usual lift car lighting

3.6 NCC Compliance Approach

Section J compliance for the development will be determined during the Modification 14 design phase. The likely compliance strategy will be as follows:

- "Deemed to Satisfy" pathway to achieve compliance for the following Sections:
  - Part J3 Building Sealing
  - Part J5 Air Conditioning and Ventilation Systems
  - Part J6 Artificial Lighting and Power
  - Part J7 Heated Water Supply and Swimming Pool and Spa Pool Plant
  - Part J8 Facilities for Energy Monitoring
- An "Alternative Solution" to the Deemed to Satisfy approach utilising the JV3 Verification Method for the following sections:
  - Part J1 Building Fabric
  - Part J2 Glazing

The NCC Section J compliance will ensure the building fabric and services are designed to deliver a high level of performance. Section J will deliver an energy and greenhouse gas emission reduction through reduced heating and cooling loads within the spaces, as well as efficient building services addressing these spaces.

3.7 Energy Sub-metering

Energy sub-metering is a key component of ensuring an energy efficient operation at The Star. As part of the ongoing aspirations of SEGL to achieve sustainability leadership the following key energy consumption equipment should be individually sub-metered as a minimum where new equipment is installed. This will enable SEGL to continue the rigorous energy metering and monitoring program.

- Chillers
- Heating hot water boilers
- Chilled water pumps
- Heating hot water pumps
- Condenser water pumps
- Harbour heat rejection pumps
- Air handling unit supply fans
- Return air fans
- Ancillary ventilation fans
- Packaged and split AC units
- Exterior lighting
- General lighting and small power
- Vertical transportation
- Hydraulic & fire systems
- Domestic hot water (DHW) boilers
- Gas engine input and output

3.8 Water Sub-metering

Water sub-metering is a key component of ensuring a water efficient operation at The Star. As part of the ongoing aspirations of SEGL to achieve sustainability leadership the following key water consumption items should be individually sub-metered as a minimum where new equipment is installed. This will enable The Star to continue the rigorous water sub-metering, monitoring and targeting program, and leak detection activities.

- Bathrooms
- Showers
- Landscape irrigation
- Rainwater supply

3.9 Additional Energy Efficiency Measures

The energy efficiency design measures that will be implemented on the project include and are not limited to:

- High thermal performance glazing and building fabric systems installed across the site where appropriate
- Minimised total supply and return air handling unit static pressures (including AHU coils & filters)

- Air handling units with low coil face velocities
- High efficiency chiller units

4 FURTHER SITE INITIATIVES

Sustainability initiatives across SEGL assets are considered throughout the entire life of the assets. As the assets are constantly being redeveloped, enhanced and improved, sustainability is a key consideration throughout the design, construction and operational phases. For all projects, SEGL consider the following initiatives and technologies to adopt on their projects. SEGL assets include a broad range of building typologies and as such initiatives are adopted where they are suitable and practicable on a project by project basis. Considering these initiatives will continue throughout the life of SEGL assets and has formed a normal workflow for SEGL projects.

4.1 Energy

- Mixed mode air conditioning and natural ventilation systems
- Minimisation of operational Greenhouse Gas Emissions (energy in-use)
- On-site renewables
- In-use operational energy monitoring
- Passive thermal systems
- High thermal performance façade for reduced peak thermal loads and improved air conditioning energy consumption
- High Visual Light Transmittance façade for daylight harvesting opportunities (reduced electric lighting energy consumption)
- Low-energy LED lighting technology, individually addressable and programmable
- Efficient light zoning
- High efficiency HVAC plant

4.2 Water

- Rainwater harvesting, maximising rainwater storage tank size and rainwater capture areas
- Blackwater and greywater recycling systems
- High water efficiency fixtures, fittings and equipment
- Use of low irrigation landscaping to minimise water consumption
- Reused water supply to urinals, pans and cooling towers where possible
- Maximise permeable surfaces, landscaping and storm water detention capacity for improved storm water discharge performance

4.3 Ecology and Biodiversity

- Maximise landscaped area
- Design to minimise heat island effect

4.4 Waste

- Efficient waste management plan
- Storage for major waste streams for recycling
- Design for disassembly and reuse at end of life

4.5 Materials

- Responsibly sourced, recycled and certified materials
- Source high strength steel from low energy intensive processing plants
- Minimise embodied energy
- Minimise VOCs, PVC and other pollutants indoors
- Consider end-of life disposal of materials, ensuring that impacts and emissions are considered
- Life cycle costs, including carbon, energy and costs of materials
- Selection of resilient materials to increase materials life

4.6 Transport

- Priority for small/efficient/electric vehicle car parking
- Provision for supercharging stations for electric vehicles
- Provision for cyclist parking spaces
- Urban design to promote access to public transportation

5 ENVIRONMENTAL SUSTAINABILITY RATING STRATEGY

The proposed works associated with Modification 14 will consider the possible application of the Green Building Council of Australia's Green Star rating tools. Suitable rating tools could include:

- Green Star Design and As Built V1.1 – typically suitable for new base building elements
- Green Star Interiors V1.1 – typically suitable for new interior fit outs
- Green Star Performance V1.1 – Suitable for existing and new buildings when in operation

As Modification 14 consists of numerous upgrades, new build elements, fit outs as well as other upgrades, there is not a single suitable tool to capture the design, construction and operation of the development. As such, the listed tools will be considered for implementation on each of the individual proposed works associated with Modification 14 based on suitability.

5.1 Management

Green Star Accredited Professional

- Engage a Green Star accredited professional to guide and advise the project team on how to achieve holistic sustainable outcomes throughout the design, construction and operational phases of the project.

Commissioning and Tuning

- Complete a comprehensive services and maintainability review at key stages during the design process to ensure:
  - Commissionability
  - Controllability
  - Maintainability
  - Operability
  - Safety
- Provide comprehensive pre-commissioning, commissioning, and quality monitoring of all building services and systems in accordance with the CIBSE Commissioning Codes or both AIRAH DA27 & DA28 application manuals. Mechanical services only can choose to provide comprehensive pre-commissioning, commissioning, and quality monitoring in accordance with ASHRAE Guideline 1-1996.
- Undertake a minimum 12 month commissioning building tuning period on all mechanical, electrical (including lighting) and BMS services after building handover. This requires minimum monthly monitoring, minimum quarterly tuning & reviews & reporting, and a final recommissioning after 12 months of operation. A building tuning report is to be generated for the building owner and reviewed by the relevant member of the design team.
- Engage an independent commissioning agent to complete the following:
  - Work in collaboration with the contractor appointed by SEGL to provide commissioning advice to The Star and the design team and to monitor and verify the commissioning of all building services and building control systems

- Liaise with the project team to ensure that commissioning is undertaken with a multi-trade approach

Adaptation and resilience

→ Develop a site specific climate adaptation plan in accordance with:

- AS 5334:2013 Climate Change Adaptation for Settlements and Infrastructure

  OR

- ISO 31000-2009 – Risk Management – Principles and Guidance and AGO, Climate Change Risks and Impacts: A Guide for Government and Business

→ Implement the climate adaptation plan, including:

- At least two risk items identified in the risk assessment component of the Climate Adaptation Plan must be addressed by specific design responses
- All risk items identified as 'high' or 'extreme' must be addressed by specific design responses

Building information

→ Building operations and maintenance manual developed and made available to The Star that includes information relevant for the building facilities management team

→ A simple and easy-to-use Building Users' Guide developed and made available to The Star that includes information relevant for the building users, occupants and tenants' representatives. The Building Users' Guide shall include information regarding the building energy & environmental strategy, energy monitoring & targets, building services, transport facilities, materials & waste policy, expansion/re-fit considerations and references, where relevant.

Commitment to performance

→ A commitment from The Star to set targets, measure results and report quarterly for environmental performance, including:

- Energy
- Water
- Operational waste
- Indoor environment

→ Set targets and measure results of construction waste end of life interior fit outs

Metering and monitoring

→ A commitment from The Star to provide individual building energy and water meters to major and common energy and water uses and sources

→ Implement a comprehensive monitoring strategy, capable of capturing and processing data and accurately and clearly presenting data consumption trends

Construction environmental management

→ Have current and valid ISO-14001 Environmental Management System accreditation prior to and throughout all phases of the project works (including demolition, early works & construction phases). A copy of valid certification shall be made available to The Star.

- Prepare and implement a comprehensive, project-specific Environmental Management Plan (EMP) for all phases of the works (including demolition, early works & construction phases) in strict accordance with NSW Environmental Management System (EMS) guidelines. The EMP must include the requirement for all sub-contractors to adhere to the ISO14001 requirements.
- Throughout all phases of the works, maintain and provide copies of all reporting created through the use of the EMP confirming its thorough implementation in accordance with NSW EMS guidelines

Operational waste

- Implement a comprehensive Operational Waste Management Plan (OWMP), prepared by a suitable professional in accordance with best practice approaches, specific to the building design

5.2 Indoor Environment Quality

Indoor air quality

- Mitigate the entry of outdoor pollutants by designing the system for ease of maintenance and cleaning, and cleaning the system prior to occupation and use
- Ensure that the air conditioning system provides outdoor air ventilation at an improvement (up to 100%) over and above the minimum requirements of AS1668.2-1991. Include the provision of filtration meeting the particulate filtration efficiency requirements of AS1668.2-1991 Appendix D for the base rate selected.
- Ensure pollutants arising from printing equipment, cooking processes and vehicle exhaust are eliminated through removal of the source or exhausting directly to the outside and limiting their entry to the building

Internal noise levels

- Ensure the internal noise levels are suitable and relevant to the activity in the room, including any building services noise and external noise ingress
- Ensure the reverberation levels are reduced to a suitable level for the relevant activity within the room
- Ensure enclosed spaces have been built to minimise cross talk between rooms for improved privacy

Lighting comfort

- High frequency ballasts shall be installed for all fluorescent luminaires
- Lighting design to provide good maintained illuminance values across entire rooms with suitable colour deviation and eliminated glare
- A combination of lighting and surfaces improve lighting uniformity to give visual interest
- Where appropriate, provide localised lighting control to occupants within their immediate environment

Visual comfort

- Control glare from sunlight through the use of blinds, screens, fixed devices or other means
- Ensure nominated areas receive high levels of natural daylight throughout the day
- Ensure nominated areas have a clear line of site to high quality internal or external views

Indoor pollutants

- At least 95% of all internal painted surfaces have low or no Total Volatile Organic Compounds (TVOC) Content
- At least 95% of all adhesives and sealants have low or no Total Volatile Organic Compounds (TVOC) Content
- All carpet (including underlay) and flooring products have low or no Total Volatile Organic Compounds (TVOC) Content
- 95% (by area) of all composite and engineered wood products (including exposed and concealed applications) have low formaldehyde emissions levels

Thermal comfort

- Ensure the air conditioning system achieves Predicted Mean Vote (PMV) levels between -0.5 and +0.5 inclusive shown through Dynamic Thermal Simulation modelling, in accordance with ISO7730, achieved during Standard Operating Hours of Occupancy for 98% of the year using standard clothing and metabolic rate values

5.3 Energy

Greenhouse gas emissions

- Demonstrate that the building achieves a greenhouse gas emission reduction compared to a benchmark building through improved façade performance, high efficiency services and other energy efficiency initiatives

Peak electricity demand reduction

- Demonstrate that the building achieves a peak electricity demand reduction compared to a benchmark building through alternative on-site energy generation

5.4 Water

Potable water reduction

- Ensure that the predicted potable water consumption for sanitary use within the building has been reduced against a ‘best practice’ benchmark through the use of water efficient fixtures/fittings and a rainwater capture system
- Connect to the rainwater collection system connected to each flushing device and the landscape irrigation with sufficient capture area and tank storage capacity
- Reduce the potable water consumption requirement by no less than 90% for any landscape irrigation incorporated into the development through the sourcing of water from the on-site rainwater collection system
- Provide sufficient temporary storage and piping to enable recirculating fire system testing so that a minimum of 80% of all routine fire protection system test water and maintenance drain-down water is captured for re-use on site
- Each floor fitted with a sprinkler system must have isolation valves or shut-off points for floor-by-floor testing

5.5 Materials

Comparative life cycle assessment

- Complete a whole of life, life cycle assessment compared to a reference building, measuring the extent of environmental impacts against a number of environmental categories

Responsible building materials

- Ensure steel is sourced from a responsible steel maker and that the steel is produced using energy reducing processes in its manufacture
- At least 95% (by cost) of all timber used in the building and construction works have been sourced from any combination of the following:
  - Reused timber
  - Post-consumer recycled timber
  - Forest Stewardship Council (FSC) International Certified Timber
  - Programme for the Endorsement of Forest Certification (PEFC) Timber
- At least 90% (by cost) of the common uses of PVC products in the development must meet best practice guidelines for PVC in the built environment, be products that do not contain PVC or a combination of both
- The common uses of PVC in a building development refer to the following:
  - Pipes, conduit and associated fittings
  - Wire and cable insulation
  - Flooring(including vinyl flooring and carpet with PVC backing) and resilient wall covering products that contain PVC

Sustainable products

- Specification of products that meet the following criteria:
  - Resued Products
  - Recycled Content Products
  - Environmental Product Declarations
  - Third-Party Certification
  - Stewardship Programs

Construction and demolition waste

- Construction waste going to landfill should be reduced by 90%

5.6 Land Use & Ecology

Ecological value

- The ecological value of a development site is to be enhanced beyond its previously existing state

Sustainable sites

- Reuse of an existing brownfield for the project, using previously developed land

Heat island effect

- Provide external surfaces with either landscaping or high levels of solar reflectivity

5.7 Emissions

Stormwater

- The post-development peak event discharge from the site does not exceed the pre-development peak discharge
- All stormwater discharge from site meet a high pollution reduction target

Light pollution

- No external luminaire has an upward light output ratio that exceeds 5%
- The lighting design complies with AS4282 ‘Control of the Obtrusive Effects of Outdoor Lighting’

Microbial control

- Eliminate legionella impacts

Refrigerant impacts

- Specify equipment mechanical services with a low Total System Direct Environmental Impact as a result of refrigerant type, mass, ODP and GWP levels