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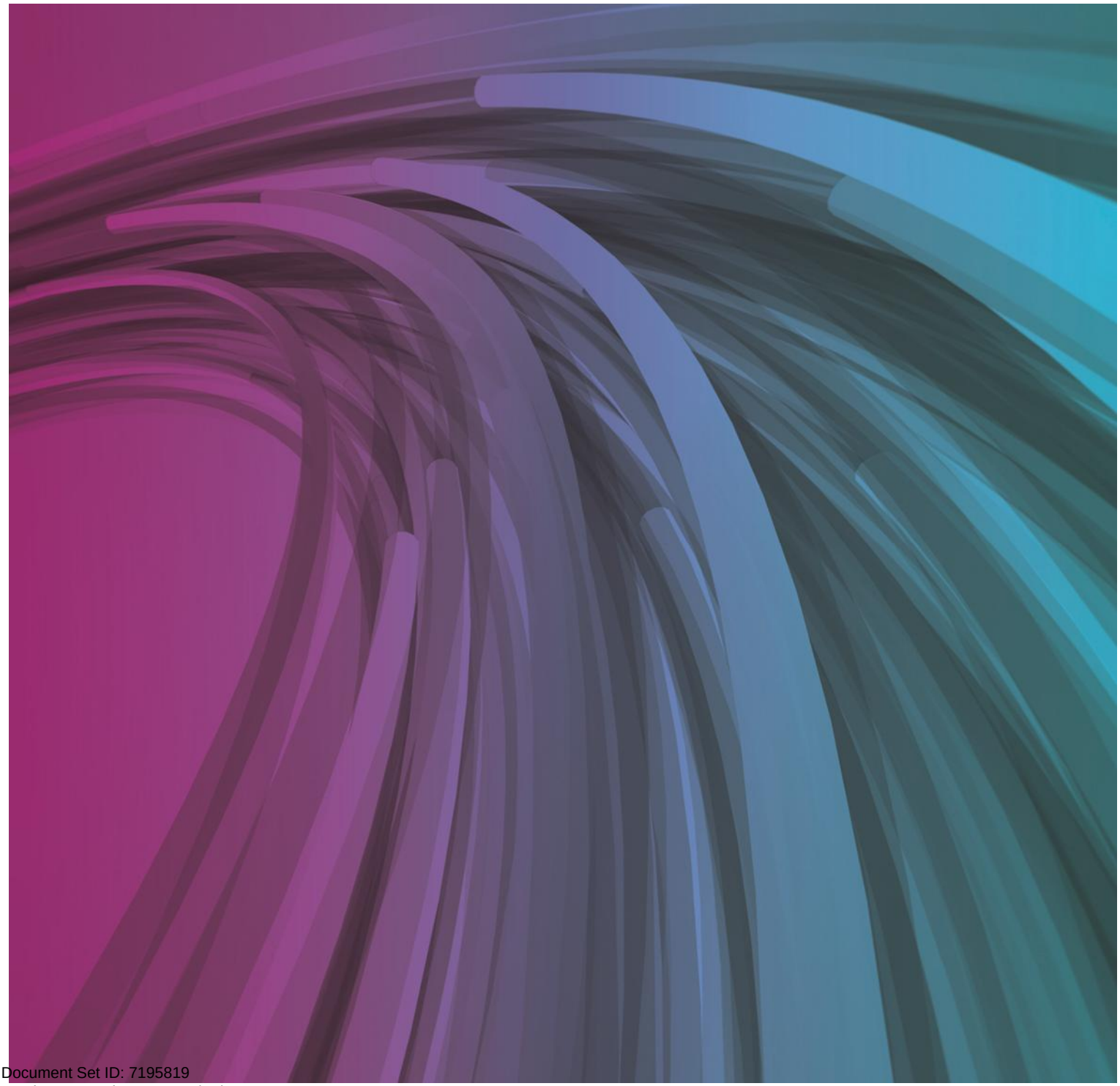
ESD Initiatives Report for Proposed Hotel

St Marys Rugby League Club



ESD Initiatives Report for Proposed Hotel

St Marys Rugby League Club

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Executive Summary

This report identifies the various Environmentally Sustainable Design (ESD) initiatives that will be considered for the design & construction of the proposed Hotel development located at the St Marys Rugby League Club.

The report has been prepared to support the Development Application submission to Penrith City Council for approval of the proposed Hotel.

The report is structured around the environmental categories and credits of the Green Star Design and As Built rating system that fall within the following Green Star categories:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use & Ecology
- Emissions
- Innovation

The ESD initiatives to be considered for the new development are consistent with an aspirational 4 star Green Star Design and As Built equivalent level.

1.0 Introduction

The following report has been prepared to identify the Environmentally Sustainable Design (ESD) initiatives that will be considered and explored for inclusion in the design, construction and ongoing operation of the proposed Hotel located at the St Marys Rugby League Club (SMRLC). This report supports the Development Application (DA) submission to Penrith City Council for the approval of the proposed Hotel development.

The proposed Hotel has 6 storeys of occupied space with reception/lobby/administration space on the ground floor and 123 guest rooms across Levels 1 to 5. The Hotel building is classified as National Construction Code (NCC) Class 3.

The St Marys Rugby League Club is committed to evaluating environmentally sustainable outcomes for pursuit across both the existing building and the proposed Hotel. The design and construction of the proposed Hotel is intended to be consistent with “best practice” Environmentally Sustainable Design (ESD) initiatives. During the detailed design phase the viability of the proposed ESD initiatives will be explored in detail and initiatives will be included as appropriate/viable.

1.1 Penrith Development Control Plan 2014

The Penrith Development Control Plan 2014 (DCP) outlines the principles, objectives and associated control requirements applicable to development within the Penrith Local Government Area (LGA) that includes requirements for sustainable design.

A general design objective of the DCP is that development is undertaken in a sustainable manner to be demonstrated through the application of a sustainability rating system. Green Star is a nominated rating system in the DCP for non-residential development with a construction cost of $1 million or more to target a rating of 4 stars.

The Green Star Design and As Built rating system is the current sustainability rating system administered by the Green Building Council of Australia (GBCA) for voluntary application to building development. The Design and As Built rating system is scaled to a star level from 0 to 6 stars based on the percentage score achieved for applicable credits across the following environmental categories:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use & Ecology
- Emissions
- Innovation

A 4 star rating requires a minimum percentage score of 45 and is considered consistent with “best practice” environmentally sustainable design.

1.2 Development ESD Initiatives

The following report sections identify the ESD initiatives to be explored for the proposed Hotel design and construction, in order to ensure that the development is undertaken in a sustainable manner in accordance with the general objectives of the Penrith DCP. ESD initiatives have been selected that are consistent with an aspirational 4 star Green Star Design and As Built equivalent level.

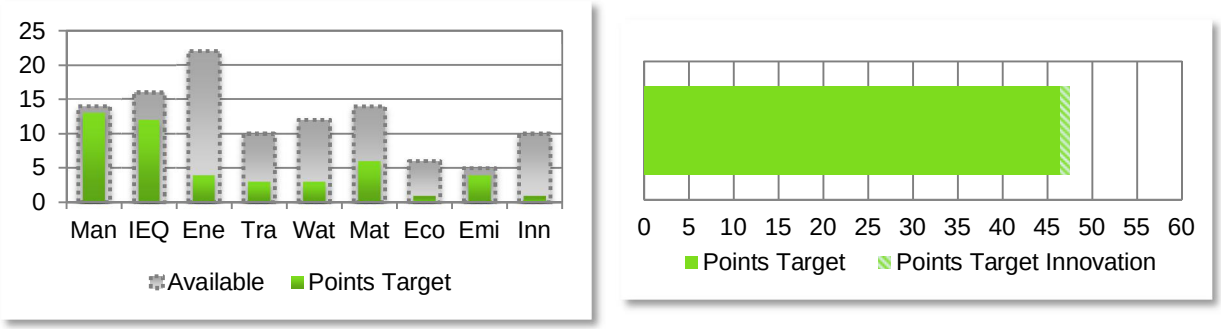

Figure 1 Distribution and Total Score of Targeted ESD Initiatives within the Green Star Design and As Built Rating System

2.0 Management Initiatives

The following initiatives encourage the implementation of environmental principles including commissioning, tuning and operation of the building and its systems. Design and construction management initiatives will ensure systems within the hotel development operate to their intended design potential during its life cycle.

The project team will aim to investigate the following management related ESD initiatives:

2.1 Commissioning and Tuning

2.1.1 Services and Maintainability Review

SMRLC facilities management staff will be involved in the Hotel development design process by conducting design documentation reviews and providing feedback to the project team on the adequacy of access for on-going maintenance, cleaning of the building services and cleaning of external building features. This will allow for on-going future maintenance to be conducted easily as required.

2.1.2 Building Commissioning

Figure 2 Commission all building services for optimal building operation

Commissioning is essential to ensure that all building services can operate to the optimal design potential. The project team will develop a rigorous commissioning plan and implement pre-commissioning, commissioning and quality monitoring for mechanical, electrical, hydraulics and automatic controls (Building Management) systems.

2.1.3 Building Systems Tuning

Building tuning is an integral part of ensuring optimum occupant comfort and energy efficient services performance throughout the year. The project team will conduct building services tuning (particularly for mechanical and BMS services) for 12 months after building handover, as part of the Defects Liability Period.

2.2 Adaptation and Resilience

To be resilient to the impacts of potential future climate changes over the lifespan of the building the project team will investigate potential risks from climate change scenarios applicable to the project location. Solutions will be included within the building design to address any risks identified as high impact to the project or occupants.

2.3 Building Information

2.3.1 Building Operations and Maintenance Information

The project construction team will provide the building owner with all As-Built drawings, commissioning reports, Operations & Maintenance (O&M) manuals and provide sufficient training for building management to operate the development effectively.

2.3.2 Building User Information

Figure 3 User-friendly Building Guides for staff and patients

Building guides will assist and enable building users to optimise the building's environmental performance. The project team will develop an easy-to-use Building User's Guide (BUG) for building users and occupants. The Building Users Guide will provide information on building services, transport facilities, operational waste management policies, and expansion & refit considerations.

2.4 Commitment to Performance

2.4.1 Environmental Building Performance

Targets will be set for the building regarding environmental performance to measure against and report on-going performance. Performance will be set and measured for at least two environmental metrics such as greenhouse gas emissions, potable water usage or operational waste.

2.5 Metering and Monitoring

2.5.1 Energy and Water Metering

Electricity and gas sub-metering will help facilitate on-going management of energy consumption for the Hotel. The energy sub-metering will be provided to comply with the requirements of the NCC Section J Part J8.3. This includes separate energy metering for air-conditioning, lighting, power, central hot water supply, internal transport devices and other ancillary plant.

Figure 4 Energy sub-meters to provide energy monitoring[1]

[1] http://www.phoenixcontact.com.au/signal-level-matching/242_63908.htm

2.5.2 Water Metering

Water metering will be incorporated to help facilitate on-going management of water consumption for the Hotel. Pulse water meters will be fitted to all major water uses, such as bathroom water consumption and irrigation.

Figure 5 Pulse water meters to monitor water usage of building components[2]

2.5.3 Monitoring

The viability of a Building Management System (BMS) or meter monitoring head end system to provide a means of monitoring and reporting energy and water consumption of the Hotel will be investigated. The investigation will consider energy and water sub-meters being connected to the system for monitoring building performance and providing reports.

2.6 Construction Environmental Management

2.6.1 Environmental Management Plan (EMP)

The selection of a head contractor will be undertaken considering environmental awareness. The engaged head contractor will be required to develop and implement a project specific Construction Environmental Management Plan (CEMP) in accordance with Section 4 of the NSW Environmental Management System Guidelines requirements. All sub-contractors will be required to adhere to the requirements of the CEMP.

2.6.2 Formalised Environmental Management System

The engaged head contractor will also be required to have a formalised Environmental Management System that has been independently audited and certified to be in compliance with ISO 14001.

2.7 Operational Waste

Adequate dedicated space will be provided for storage and collection of recyclable waste generated during operation of the development. This will assist in reducing the amount of operational waste being directed into landfills. Waste storage facilities will be based on the projected building waste streams and will be designed to meet the access requirements of 'Policy for Waste Minimisation in New Developments' (NSW, 2004).

Figure 6 Recycling Waste Storage facilities will be provided based on projected building waste streams[3]

[2] http://www.instrumart.com/products/24873/seametrics-mj-series-pulse-water-meter

3.0 Indoor Environment Quality (IEQ) Initiatives

The following initiatives promote enhanced building occupant internal comfort and well-being. The IEQ initiatives will address how the HVAC system, indoor lighting, acoustics and use of daylight can contribute to a more comfortable environment. Initiatives related to health such as minimisation of finishes containing formaldehyde and volatile organic compounds are also addressed.

The project team will aim to investigate the following IEQ related ESD initiatives:

3.1 Indoor Air Quality

3.1.1 Provision of Outdoor Air

Increased levels of outdoor air ventilation have the potential to provide for a healthier environment for building occupants by counteracting the build-up of indoor pollutants.

To minimise the build-up of indoor pollutants within the Hotel spaces the mechanical system will investigate where feasible exceeding the minimum requirement of outdoor air by AS1668.2-2012.

Additionally the build-up of occupied space indoor pollutants from air movement dead spots will be minimised through efficient supply/outside air distribution in the occupied spaces. The mechanical design of the Hotel will aim to deliver high quality air to all occupants through the uniform distribution of ventilation and avoid short circuiting of airflow delivery. The supply air diffusers will be located with consistent overall spacing appropriate to the space type for uniform air delivery distribution as far as practical from return air points to maximise flushing of all space air and avoid old stale air build-up.

3.2 Acoustic Comfort

The Hotel will be designed to provide appropriate and comfortable acoustic conditions for all occupants through addressing the following items.

3.2.1 Internal Noise Levels

Sufficient noise control features will be incorporated within the Hotel design for the ambient internal noise to be at a suitable level for the space type between satisfactory & maximum sound levels as stipulated within AS/NZS2107:2000.

3.2.2 Reverberation

Space design within the Hotel will be carried out to reduce the persistence of sound to a suitable level and keep the reverberation times as recommended within AS/NZS2107:2000.

3.2.3 Acoustic Separation

Internal walls and partitions between occupied spaces of the Hotel will be designed to reduce noise transmission to minimise crosstalk disturbance.

3.3 Lighting Comfort

3.3.1 Minimum Lighting Comfort

All light fittings selected for the development will be flicker free to avoid potential occupant discomfort from eye strain & headaches and will have high colour rendering index (CRI) to address the perception of colour for occupants.

3.3.2 General Illuminance & Glare Reduction

The lighting system of the Hotel will be designed to meet the best practice general illuminance levels appropriate to the space type per Australian Standards and glare will be reduced from fitting selections that obscure the direct light source from occupants.

[3] http://video.planetgreen.discovery.com/go-green/recycling/recycling-numbers-stats.html

3.3.3 Surface Illuminance

The lighting system of the Hotel will include a combination of direct lighting and lighting of surfaces to provide visual interest to occupants through the use of some wall mounted fittings in the guest rooms.

3.3.4 Localised Lighting Control

The Hotel lighting system will be designed to provide lighting switching & zoning that will allow building occupants to only light occupied areas. All individual or enclosed spaces will have individual light switches which are clearly labelled and easily accessible to building occupants.

3.4 Visual Comfort

3.4.1 Glare Reduction

The Hotel design will include internal blinds/curtains for the guest spaces to allow occupants control direct glare and sun penetration and minimise any associated discomfort.

3.4.2 Daylight & Views

The glazing arrangement and building layout of the Hotel design will provide for good levels of natural daylight and provide an external view maximising visual comfort for occupants.

3.5 Indoor Pollutants

3.5.1 Paints, Adhesives, Sealants & Carpets

Low Volatile Organic Compound (VOC) products for interior paints, adhesives, sealants, carpets, and resilient finishes will be selected for the Hotel to reduce the potential detrimental impact on occupant health from emission of internal pollutants.

Figure 7 Minimisation of VOCs in interior finishes products such as paints and carpets

3.5.2 Engineered Wood Products

Low formaldehyde emission level composite wood products for doors, partitions, joinery and flooring will be selected for the Hotel to reduce the potential detrimental impact on occupant health from emissions of internal pollutants.

3.6 Thermal Comfort

The Hotel development will be designed to maximise occupant thermal comfort with considered mechanical design appropriately zoned and optimised to achieve comfort conditions.

The mechanical system controls for the Hotel will be designed to monitor internal conditions of the occupied spaces and adjust the supply conditions as appropriate to maximise occupant comfort.

4.0 Energy Efficiency Initiatives

The following initiatives aim to reduce the overall greenhouse gas (GHG) emissions associated with building energy consumption. Energy efficient building and services design will help reduce energy use within the building.

The project team will aim to investigate the following energy related ESD initiatives:

4.1 Energy / Greenhouse Gas Emissions

The design of the development will be carried out to maximise passive design elements reducing the requirement for active technology and build on this sound base with high efficiency active services designs as detailed below.

4.1.1 Building Envelope and Glazing

The building envelope of the Hotel will be designed to utilise the available climate whist minimising the loads placed on the services equipment. The fabric and glazing where feasible/viable will be selected to exceed the requirements of NCC Section J Part J1 & J2 and minimise thermal loads whilst optimising the use of available daylight reducing artificial lighting requirements.

4.1.2 Lighting

The internal lighting system of the Hotel where feasible/viable will be designed to be energy efficient and exceed the minimum requirements of NCC Section J Part J6 in lighting power density. Guest rooms will be provided with accessible switching for occupants to only light areas as required and will incorporate an automatic power shutdown system disengaging lighting (and HVAC systems) power supply when a room becomes unoccupied. Automated lighting control utilising occupant detection and daylight dimming will be employed in transient internal spaces and areas where appropriate that are adjacent natural lighting sources.

The external lighting system for the Hotel will also be designed to be energy efficient using fittings that have a high source efficacy (light output (lumens) per energy input (watt)) and use time-switch control as a minimum. Where possible, photo-electric daylight sensors will be utilised to switch external lighting and reduce the use of artificial external lighting when sufficient daylight exists.

4.1.3 Heating Ventilation & Air Conditioning (HVAC)

The HVAC systems of the Hotel where feasible/viable will be designed to be energy efficient exceeding the minimum performance requirements of NCC Section J Part J5 with a target 15% reduction in overall energy consumption. Air-conditioning systems will be selected with high Energy Efficiency Ratios (EER) and pump/fan systems circuits will be designed with reduced system resistance & high efficiency equipment to surpass Part J5 requirements. Guest rooms will incorporate an automatic power shutdown system disengaging HVAC system (and lighting) power supply when a room becomes unoccupied.

5.0 Sustainable Transport Initiatives

The following initiatives encourage building users to utilise more environmentally friendly modes of transportation.

The project team will aim to investigate the following transport related ESD initiatives:

5.1 Access by Public Transport

The SMRLC is highly accessible from public transport facilities that will encourage the use of mass transport reducing reliance on motor vehicles and the associated negative environmental impacts. Mass transport services including bus stops and the St Marys train station are available in close proximity to the site.

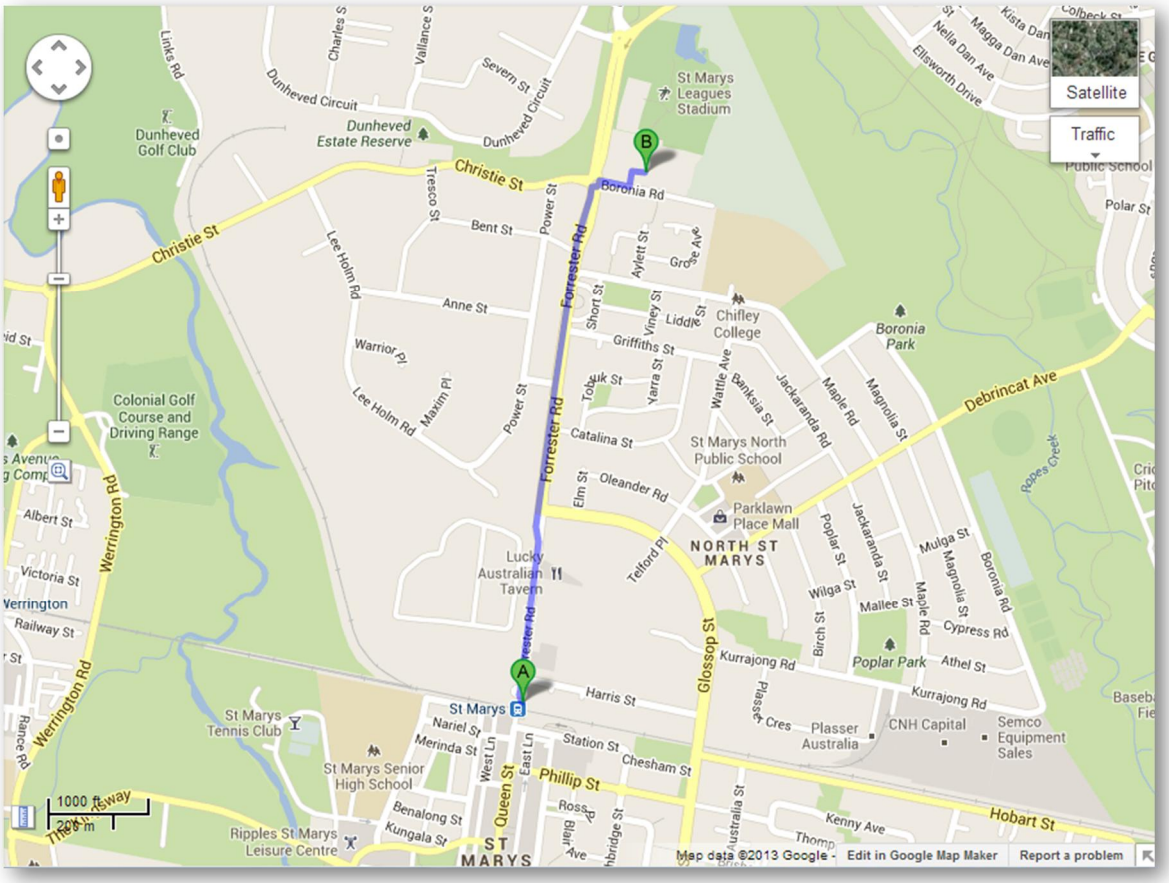

Figure 8 The SMRLC is located near public transport facilities [4]

5.2 Low Emission Vehicle Infrastructure

The car park design dedicated to the Hotel will incorporate adequate numbers of small car spaces and motorcycle parking spaces to encourage users to utilise smaller fuel efficient vehicles as part of their commuting.

5.3 Active Transport Facilities

Cyclist facilities will be provided on the wider site for use by Hotel building staff. Secure bicycle storage space will be made available for building staff along with access to showers and changing space.

[4] http://goo.gl/maps/xHB3S

6.0 Water Efficiency Initiatives

The following initiatives aim to reduce overall water consumption of building development. The implementation of water efficient features such as the installation of efficient hydraulic fixtures and fittings and drip irrigation systems will help reduce water consumption.

The project team will aim to investigate the following water related ESD initiatives:

6.1 Sanitary Fixture Efficiency

The Hotel development will reduce overall potable water use by installing water efficient high WELS (Water Efficiency Labelling & Standard scheme) rated hydraulic fixtures and fittings throughout.

Figure 9 High WELS rated hydraulic fixtures and fittings will be used

6.2 Heat Rejection

To avoid the significant water consumption that can be associated with water based evaporative heat rejection systems, the air-conditioning design for the Hotel will utilise only air-cooled plant. Air-cooled plant also contributes to the control of microbial growth (see Section 9.3).

6.3 Landscape Irrigation

The landscape irrigation system for the Hotel will be designed to be water efficient with drip systems, timers and rainwater sensor override where appropriate.

7.0 Sustainable Materials Initiatives

The following initiatives aim to reduce overall consumption of resources and the environmental impact of obtaining and working materials for building development. Material related initiatives include utilising manufactured sands with recycled water for concrete mixes, steel manufactured using energy reducing technologies, sustainably sourced timber products and using certified recycled products within the building.

The project team will aim to investigate the following materials related ESD initiatives:

7.1 Life Cycle Impacts

7.1.1 Concrete

Concrete mixes across the development will be selected to utilise manufactured sand content where possible to reduce the further mining of natural sand resources and utilise reclaimed/recycled water in the mixes to reduce potable water consumption.

7.2 Responsible Building Materials

7.2.1 Reinforcing Steel

Concrete reinforcement steel utilised for the development will be selected to meet a high strength grade and be sourced from a manufacturer that utilises energy reducing processes in manufacture. High strength reinforcing steel use will reduce the overall quantity required compared to lower strength products and the GHG impact from production energy will be reduced due to the production processes employed. Additionally structural and reinforcement steels utilised for the development will be sourced to contain a high percentage of post-consumer recycled content reducing the need for mined raw materials to produce the steel.

7.2.2 Timber Products

All timber material for use within the development will be sourced from certified sustainable sources, such as Forest Stewardship Council (FSC) or the Australia Forestry Standard (AFS), which ensures these products are not taken from areas that contribute to deforestation.

7.2.3 PVC Content of Pipes, Flooring, Blinds & Cables

Pipe, conduit, wire & cable, flooring and resilient wall coverings products for use in the development will be selected to meet the Green Star Best Practice Guidelines for PVC in the Built Environment or not contain PVC. Products that meet the Best Practice PVC requirements have been sourced from a manufacturer certified to produce the PVC utilising techniques that avoid disposal of hazardous by-products and minimise the impact on the environment.

7.3 Sustainable Products

7.3.1 Flooring and joinery materials

Products will be selected for flooring of the development that have been independently assessed and certified across multiple criteria to have low environmental impact.

7.4 Construction and Demolition Waste

Figure 10 Implement construction waste management practices on-site

The selected head contractor will be required to implement on-site construction waste management practices that will minimise the amount of demolition and construction waste going to disposal. A Construction Waste Management Plan (CEMP) will be developed that will include minimum targets for re-use/recycling of demolition and construction waste for diversion from land fill.

8.0 Land-Use & Ecology

The following initiatives aim to reduce potential negative impacts on ecological systems and biodiversity from building development.

The project team will aim to investigate the following land-use & ecology related ESD initiatives:

8.1 Sustainable Sites

8.1.1 Re-use of Land & Minimise Change of Ecological Value

The Hotel development will re-use existing land owned by the SMRLC that already been utilised entirely as a car park and therefore will not disrupt any areas with high ecological value. Overall the ecological value of the site will be maintained or improved.

9.0 Emissions

The following initiatives aim to address the environmental impacts of the physical emissions from building development.

The project team will aim to investigate the following emissions related ESD initiatives:

9.1 Stormwater

Stormwater across the project site will be managed to reduce the flow demand placed on the in-ground stormwater infrastructure. The peak stormwater discharge from site will be controlled to reduce the flow rate to the in-ground system below that of pre-development outflows during heavy storm events.

9.2 Light Pollution

The external lighting system will be designed to minimise light pollution to the night sky and neighbouring properties. The external lighting design will be compliant with the requirements of AS4282 ‘Control of the Obtrusive Effects of Outdoor Lighting’. Light fittings used externally will be selected to have an upward light output ratio no greater than 5%.

9.3 Microbial Control

To avoid the potential harmful impacts of microbes that can grow in water based evaporative heat rejection systems, the air-conditioning design for the Hotel will utilise only air-cooled plant. Air-cooled plant also contributes to the development water saving strategy (see Section 6.2).

9.4 Refrigerant Impacts

The mechanical air-conditioning equipment selected for the Hotel will only utilise zero ODP refrigerants and that have a low Total System Direct Environmental Impact (TSDEI) such as R134A.

Figure 11 Low Total System Direct Environmental Impact refrigerant R134A with zero ODP and low GWP

10.0 Innovation

The following initiatives aim to address other sustainability issues outside the scope of the credits within the Green Star Design and As Built rating system.

The project team will aim to investigate the following innovative ESD initiatives:

10.1 Innovation Challenge: Contractor Education

Training will be provided to project contractors/sub-contractors on the benefits of sustainable building practices including topics regarding global warming, climate change & health impacts of minimum building practices, sustainability solutions & initiatives incorporated into the project, targets and contractor roles in achieving them. Site inductions for all contractors will contain a short training presentation covering these items.

11.0 Conclusion

This report has identified the various Environmentally Sustainable Design (ESD) initiatives that will be considered for the design & construction of the proposed Hotel. ESD initiatives to be explored for the proposed Hotel design and construction have been selected to ensure that the development is undertaken in a sustainable manner in accordance with the general objectives of the Penrith DCP. The ESD initiatives to be considered for the new development are consistent with an aspirational 4 star Green Star Design and As Built equivalent level.

12.0 References

[1] Green Star Design and As Built v1.1, Green Building Council of Australia (GBCA)

[2] National Construction Code 2015 Volume 1