Sydney International Convention, Exhibition and Entertainment Precinct (SICEEP)

The Haymarket: South-West Plot

Sustainability Report
For Stage 2 State Significant Development Application (SSDA 5)
April 2015

Lend Lease

Document History

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1.0 INTRODUCTION

This report supports a State Significant Development (SSD) Development Application (DA) submitted to the Minister for Planning and Infrastructure pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The Application (referred to as SSDA 5) follows the submission of a staged SSD DA (SSDA 2) submitted in March 2013 to the Department of Planning and Infrastructure that set out a Concept Proposal for a new mixed use residential neighbourhood at Darling Harbour known as 'The Haymarket'. The Haymarket forms part of the Sydney international convention, exhibition and entertainment precinct (SICEEP) Project, which will deliver Australia's global city with new world class convention, exhibition and entertainment facilities and support the NSW Government's goal to "make NSW number one again".

More specifically this subsequent DA seeks approval for mixed use development within the South West development plot of The Haymarket and associated public domain works. The DA has been prepared and structured to be consistent with the Concept Proposal DA.

1.1 Overview of Proposed Development

The proposal relates to a detailed ('Stage 2') DA for a mixed use residential development in the South West Plot of The Haymarket together with associated public domain works. The Haymarket Site is to be developed for a mix of residential and non-residential uses, including but not limited to residential buildings, commercial, retail, community and open space. The South West Plot is one of six development plots identified in the Concept Proposal DA.

Under the Concept Proposal DA, the South-West Plot will accommodate a mixed use podium and three residential buildings (SW1, SW2, and SW3) above and within the podium structure. More specifically, this SSD DA seeks approval for the following components of the development:

- Staged demolition of existing site improvements, including the existing Sydney Entertainment Centre (SEC), Entertainment car park, and part of the pedestrian footbridge connected to the Entertainment car park;
- Associated tree removal and planting;
- Construction and use of a five storey mixed use podium, including:
- retail and IQ Hub floor space and residential lobbies on Ground Level;
- above ground parking; and
- residential apartments.
- Construction and use of three residential buildings above podium:
- Public domain improvements, including:
- provision (part) of a new north-south pedestrian connection (known as the Boulevard) eventually linking Quay Street to Darling Harbour;
- provision (part) of a new east-west pedestrian laneway (known as Dickson's Lane) linking Darling Drive to the Boulevard; and
- upgrade of Hay Street (part) to provide for a pedestrian shareway;
- modification of retained pedestrian footbridge and provision of lift and stair access to the Goods Line;.
- provision of vehicle access to the development from Hay Street;
- Landscaping works and communal facilities to the podium roof level; and
- Extension and augmentation of physical infrastructure / utilities as required.

1.2 Background

The NSW Government considers that a precinct-wide renewal and expansion of the existing convention, exhibition and entertainment centre facilities at Darling Harbour is required, and is committed to Sydney reclaiming its position on centre stage for hosting world-class events with the creation of the Sydney international convention, exhibition and entertainment precinct.

Following an extensive and rigorous Expressions of Interest and Request for Proposals process, a consortium comprising AEG Ogden, Lend Lease, Capella Capital and Spotless was announced by the NSW Government in December 2012 as the preferred proponent to transform Darling Harbour and create the new Sydney international convention, exhibition and entertainment Precinct.

Key features of the Preferred Master Plan include:

- Delivering world-class convention, exhibition and entertainment facilities, including:
  - Up to 40,000m^2 exhibition space;
  - Over 8,000m^2 of meeting rooms space, across 40 rooms;
  - Overall convention space capacity for more than 12,000 people;
  - A ballroom capable of accommodating 2,000 people; and
  - A premium, red-carpet entertainment facility with a capacity of 8,000 persons.
- Providing up to 900 hotel rooms in a hotel complex at the northern end of the precinct.
- A vibrant and authentic new neighbourhood at the southern end of the precinct, called 'The Haymarket', including apartments, student accommodation, shops, cafes and restaurants.
- Renewed and upgraded public domain that has been increased by a hectare, including an outdoor event space for up to 27,000 people at an expanded Tumbalong Park.
- Improved pedestrian connections linking to the proposed Ultimo Pedestrian Network drawing people between Central, Chinatown and Cockle Bay Wharf as well as east-west between Ultimo/Pyrmont and the City.

On 21 March 2013 a critical step in realising the NSW Government's vision for the SICEEP Project was made, with the lodgement of the first two SSD DAs with the Department of Planning and Infrastructure. The key components of these proposals are outlined below.

1.3 Public Private Partnership SSD DA (SSD 12_5752)

The Public-Private Partnership (PPP) SSD DA (SSDA 1) includes the core facilities of the SICEEP Project, comprising the new, integrated and world-class convention, exhibition and entertainment facilities along with ancillary commercial premises and public domain upgrades.

1.4 The Haymarket Concept Proposal (SSD 13_5878)

The Haymarket Concept Proposal SSD DA (SSDA 2) establishes the vision and planning and development framework which will be the basis for the consent authority to assess detailed development proposals within the Haymarket Site.

More specifically the Stage 1 Concept Proposal seeks approval for the following key components and development parameters:

- Staged demolition of existing site improvements, including the existing Sydney Entertainment Centre (SEC), Entertainment Centre Car Park, and part of the pedestrian footbridge connected to the Entertainment car park and associated tree removal;

- A network of streets, lanes, open space areas and through-site links generally as shown on the Public Domain Concept Proposal, to facilitate reintegration of the site into the wider urban context and connection with the broader SICEEP Site;
- Street layouts;
- Development plot sizes, development plot separation, building envelopes (maximum height in RLs), building separation, building depths, building alignments and a benchmark for natural ventilation and solar provision for the precinct;
- Land uses across the site, including residential and non-residential uses;
- A maximum total gross floor area (GFA) across The Haymarket Site of 197,236m^2 for the mixed use development (excluding ancillary above ground car parking), comprising of:
    - A maximum of 49,545m^2 non-residential GFA; and
    - A maximum of 147,691m^2 residential GFA;
- Above ground parking including public car parking;
- Residential car parking rates to be utilised in the subsequent detailed (Stage 2) Development Applications, being:
    - Zero (0) spaces per studio apartment;
    - Maximum one (1) space per two (2) one bedroom apartments;
    - Maximum one (1) space per one bedroom + study apartment, plus one (1) additional space per five (5) apartments;
    - Maximum one (1) space per two bedroom apartment, plus one (1) additional space per five (5) apartments; and
    - Maximum two (2) spaces per 3+ bedroom apartment.
- Design Guidelines to guide future development and the public domain; and
- A remediation strategy.

This report has been prepared to support a detailed Stage 2 SSD DA for mixed use development and associated public domain works within The Haymarket (SSDA 5), consistent with the Concept Proposal SSD DA.

1.5 Site Description

The SICEEP Site is located within Darling Harbour. Darling Harbour is a 60 hectare waterfront precinct on the south-western edge of the Sydney Central Business District that provides a mix of functions including recreational, tourist, entertainment and business.

With an area of approximately 20 hectares, the SICEEP Site is generally bound by the Light Rail Line to the west, Harbourside shopping centre and Cockle Bay to the north, Darling Quarter, the Chinese Garden and Harbour Street to the east, and Hay Street to the south (refer to Figure 1).

The Haymarket Site is:

- located in the south of the SICEEP Site, within the northern portion of the suburb of Haymarket;
- bounded by the Powerhouse Museum to the west, the Pier Street overpass and Little Pier Street to the north, Harbour Street to the east, and Hay Street to the south; and
- irregular in shape and occupies an area of approximately 43,807m^2.

Figure 1 – Aerial Photograph of the SICEEP Site

The Concept Proposal DA provides for six (6) separate development plots across the Haymarket Site (refer to Figure 2):

1) North Plot;
2) North East Plot;
3) South East Plot;
4) South West Plot;

5) North West Plot; and
6) Western Plot (Darling Drive).

The Application Site area relates to the South West Plot and surrounds as detailed within the architectural and landscape plans submitted in support of the DA.

Figure 2 – Concept Proposal Development Plots

1.6 Planning Approvals Strategy

The SICEEP Project will result in the lodgement of numerous SSD DAs for the various components of the redevelopment project. SSD DAs have already been lodged for the PPP component of the SICEEP Project (comprising the convention centre, exhibition centre, entertainment facility and ancillary commercial premises and associated public domain upgrades), and the Stage 1 Concept Proposal for The Haymarket. Separate 'Stage 2' SSD DAs for the development of the North West Plot and the Western Plot (Darling Drive) and associated public domain works will be lodged concurrently with this application. Future applications will be lodged for the Hotel complex, and the remaining development plots of The Haymarket Site.

2.0 Referenced Documentation

2.1 Architectural

Detailed thermal analysis was undertaken based on project application drawings provided by DCM architects dated May 2013.

Drawing Description	Drawing Number	Revision Number
Site Plan - Proposed	SK002	P8
Ground Level Plan	SK011	P9
Level 01 Plan	SK012	P9
Level 02 Podium Plan	SK013	P9
Podium Roof Plan Level 5	SK014	P8
Typical Tower Plan Level 7	SK015	P8
Roof Plan	SK016	P8
Level 03 Podium Plan	SK019	P9
Level 04 Podium Plan	SK020	P9
Podium – SW1 Levels 1-4	SK040	P8
Podium Roof – SW1 Level 5	SK041	P9
Podium – SW2 Levels 2-4	SK042	P9
Podium Roof – SW2 Level 5	SK043	P9
Podium – SW3 Levels 2-4	SK044	P10
Podium Roof – SW3 Level 5	SK045	P9
Typical Tower Plan – SW1 Levels 6-19	SK050	P11
Typical Tower Plan – SW1 Levels 20-23	SK051	P9
Typical Tower Plan – SW2 Levels 6-7	SK052	P9
Upper Tower Plan – SW1 Level 24	SK053	P11
Typical Tower Plan – SW3 Levels 06-36	SK054	P10
Upper Tower Plan – SW3 Levels 37-39	SK055	P10
North Elevation	SK101	P9
South Elevation	SK102	P10
East Elevation	SK103	P8
West Elevation	SK104	P8
North Podium Elevation	SK111	P8
South Podium Elevation	SK112	P9
East Podium Elevation	SK113	P8
West Podium Elevation	SK114	P9

2.2 Building Services

Information generally provided through services reports as well as general correspondence.

2.3 Limitations

This report is based on documentation supplied to Lend Lease Design as of May 2013. This documentation is subject to change as the design progresses and specific outcomes may be substituted or omitted whilst still targeting the sustainability aspirations for the Haymarket precinct.

3.0 Whole of Precinct ESD Principles

Lend Lease has undertaken an integrated approach to sustainability across the total SICEEP site. In addition to the building based initiatives, a number of whole of precinct initiatives are being investigated which, if provided, will benefit the community including:

3.1 Enhanced connections and public transport links

The master plan design for the precinct lays out a connected and enhanced navigation through the site; enticing the local community as well as visitors through improved walkability and innovative way finding, making public transport the easy and obvious choice for people providing affordable, green and safe travel options;

3.2 Car Share Network

Car Share networks reduce the cost of car ownership and minimise embodied carbon. Electric vehicles reduce carbon emissions and local air pollution. Lend Lease is partnering with GoGet to establish Australia's first Electric Car Share Network for use by the community within the precinct and beyond;

3.3 Passive Signage

Simple material that indicates the sustainability attributes of key items. This could include:

- Labelling of key materials that indicate what it is, where it is from, how much embodied carbon it contains and how it may be recycled – "This bench is made from plantation spotted gum from North Queensland and has absorbed 100kgs of carbon dioxide from the atmosphere";
- Design attributes that support sustainable outcomes – "this landscaped area treats stormwater runoff to reduce pollution into the harbour";
- Directional information such as links to public transport;
- Heritage and Indigenous references to the precinct's past;

3.4 Dynamic Informatics Systems and Technology

- Online and mobile phone applications that provide more detailed information about the sustainability credentials of the precinct that can be automatically activated by proximity or scanning QR codes with a smartphone;
- Digital pods in the public domain that offer Wi-Fi hotspots;
- Interactive signage and lighting, in combination with augmented visuals on smart devices, to highlight physical building elements; and

3.5 Other Aspirational Initiatives

In addition to the above, the following additional aspirational initiatives are being investigated:

Recycled Water

Lend Lease is in the unique position to facilitate a potential option of bringing recycled water produced at the nearby Barangaroo South Treatment plant to the Facilities and Haymarket buildings. The recycled water plant would result in a significant reduction in mains water use throughout the whole of precinct with recycled water being potentially provided to toilets, washing machines, cooling towers and irrigation; and

Precinct Thermal Plant

Beyond the centralised thermal plant for the Convention and Exhibition Facilities, there are also opportunities to expand the thermal plant into the Haymarket precinct. The Precinct plant would take advantage of the diversity of uses across the whole of precinct resulting in electrical infrastructure and greenhouse gas emission savings.

4.0 South West Plot Specific ESD Principles

The South West Plot aims to deliver a sustainable residential project, with reduced operational energy consumption, reduced potable water use, minimisation of waste to landfill and appropriate materials selection while at the same time maintaining a high level of indoor environmental quality through appropriate mechanical design, façade configuration and materials selection.

The residential development will be committing to 4 Star Design and As-Built Green Star ratings under the Green Star Multi-Unit Residential v1 tool. Initiatives targeted within this Green Star tool will ensure significant sustainability principles will be incorporated into the design, appropriate management practices are applied through the construction period and facilities and resources are provided to ensure the delivery and operation of the building achieves the sustainability objectives. Initiatives currently proposed enable the minimum NSW sustainability performance requirements set by BASIX to be met.

Given initiatives currently proposed annual greenhouse gas emissions from the proposed development are expected to be reduced by 25% when compared to the Green Building Council's benchmark. As required by BASIX, the development will be designed and delivered with the potential to achieve a 40% reduction in potable water consumption when compared to an average NSW existing benchmark. This section describes how these targets are proposed to be achieved. Strategies with regards to Management, Materials, Transport and Ecology etc are described in detail in section 4.0.

4.1 Energy and Greenhouse Gas Emissions

The following summarises the technologies essential to ensure that the project's greenhouse emissions reductions are achieved.

- Fluorescent or LED light fittings: Will be used throughout common areas and within dwellings.
- Ventilation and lighting controls: Controls will be provided to ensure that lighting and ventilation is provided only when required. Controls will be provided in common areas and in addition a 'kill switch' will be provided near the entry doors of apartments to enable occupants to switch of all non-essential power uses prior to leaving their homes unoccupied.
- Common area Ventilation: Common areas will not be conditioned and will be provided with ventilation air (filtered outside air) only. The provision of ventilation air only is not a significant energy impact and is essential to ensure air quality within common areas and pressurisation throughout the buildings.
- Energy Efficient Appliances: Where appliances are provided, they will be selected with energy ratings as high as practically reasonable.
- Energy and water metering: Energy and water metering will be provided to monitor common energy and water uses. In addition metering of electricity, water and hot water will be provided to each dwelling with information regarding their energy and water consumption to assist occupants manage and reduce their consumption. Information will be provided to tenants via smart metering which will provide real time consumption and functions to analyse data including greenhouse gas emissions.
- Heating and Cooling: Heating and cooling within the majority of dwellings will be serviced by ducted split system units. A single fan coil unit will service living and bedrooms with day/night zone control between living and bedrooms. Units will be selected to be within 1 star rating of the highest available. While the type of heating and cooling system to some units may change, the overall efficiency of any proposed systems will be assessed to ensure that BASIX and Green Star targets for the project are not negatively impacted.

4.2 Water Conservation and Management

To ensure the project achieves its 40% water reduction a target a number of initiatives are currently proposed. These include the selection of fittings, fixtures and appliances with flow rates as low as practically possible to reduce potable water demand.

Given the height of the proposed towers, the collection of rainwater is limited given the small ratio of roof area to the number of apartments. Regardless it is proposed to collect rainwater from roofs to reduce the potable water consumption associated with the irrigation of the landscaped podium area. The landscaped podium area will incorporate low-water use species wherever possible.

In addition fire services test water will not be directed to the sewer or to stormwater. While some test water will be recirculated via a break tank, other test water which has to be drawn from the mains will be diverted to the rainwater tank. The size of the rainwater tank will therefore be increased to minimise the possibility of overflow when the fire services are tested.

Given the existing site condition and the proposed landscaping associated with the proposed development, stormwater flows are not expected to be increased post development.

4.3 Third Party Certification and Regulatory Compliance

The residential development will be committing to a 4 Star Design and As-Built Green Star ratings under the Green Star Multi-Unit Residential v1 tool. This will be independent certification of the project's sustainability commitments. Commitment to a Green Star rating confirms the projects commitment to deliver a development in accordance with current best practice standards. The initiatives relevant to Green Star are discussed in section 4.0 of this report and address numerous sustainability issues such as management, materials and waste, transport, ecology etc.

In addition to Green Star, the project will also achieve BASIX compliance which ensures that the project will be capable of providing significant reductions to both energy and water consumption. BASIX is further discussed in Section 5.0 of this report.

5.0 Green Star Multi-Unit Residential Tool

The Green Star rating scheme, a voluntary national sustainable design rating tool set up and managed by the Green Building Council of Australia (GBCA) is being used to guide the design process. The Green Star scheme is a comprehensive rating system that evaluates the environmental design and construction of buildings and communities - 4, 5 and 6 Star ratings can be awarded by the GBCA.

The Green Star Multi-Unit Residential Tool was first released as a Pilot scheme in mid 2008 and version 1 has since been released.

The South West Plot project is targeting a 4 star Green Star rating under Green Star Multi-Unit Residential v1which is considered to be best practice.

The South West Plot will be committing to 4 star Design and As-Built Green Star ratings under the Green Star Mulit-Unit Residential v1 tool. Green Star is a holistic assessment scheme, which assesses the sustainability features of a development within 8 different categories.

- Management
- Indoor Environmental Quality
- Energy
- Transport
- Water
- Materials
- Land Use and Ecology
- Emissions

Credits are awarded based on meeting criteria in each of the categories and the credits are summed and weighted according to their environmental importance and totalled to give a star rating. There are 105 Credits available. A score of 45-59 Credits is equal to 4 Stars (Best Practice), a score of 60-74 Credits is equal to 5 Stars (Australian Excellence) and a score of 75 or more credits is equal to 6 Stars (World Leadership).

The following sections outline in some detail how the sustainability initiatives within The Haymarket can be recognised under the Green Star tool.

5.1 Management

Lend Lease has a proven track record in the management of sustainability in its projects. Many credits relate to the way in which the project is delivered and Lend Lease Project Management and Construction (PMC) have in place the necessary controls and procedures to achieve the outcomes targeted.

MAN-1. Green Star Accredited Professional. The majority of Lend Lease's sustainable design personnel are Green Star Accredited Professionals and the ESD consultant on the Haymarket has been accredited since 2005 and served in many Green Star working groups, assessments and peer reviews.

MAN-2. Commissioning Clauses. The design consultants will provide documentation that outlines the design intent and contractors will be required to ensure they commission systems in accordance with the appropriate CIBSE and ASHRAE standards.

MAN-3. **Building Tuning**. The contractors will be required, during the first 12 months post completion, to tune the base building (strata) systems that are sometimes left operating inefficiently. This may include systems such as common area lighting, hot water systems and car park ventilation.

MAN-5. **Building User Guide**. The design team will be responsible for producing a user guide that gives the residents important information about how the building works and how to use the facilities most efficiently. During construction the guide will be updated in collaboration with the construction team.

MAN-6. **Environmental Management**. The construction team will operate the site using a Site Environmental Management Plan which is accredited/recognised against industry best practice, such as the NSW Environmental Management System Guidelines 2007 and ISO 14001.

MAN-7. **Waste Management**. The construction team will aim to recycle at least 80% of construction and demolition waste using a waste contractor that can sort and direct waste for recycling. It is anticipated that this 80% target will be easily exceeded.

MAN-16. **Metering**. Sub-metering will be provided for all water, electricity and gas end-uses. In addition each dwelling will be individually metres for electricity, water, hot water and chilled water. An in-home display will be provided which will display consumption and financial cost information to occupants.

5.2 Indoor Environmental Quality (IEQ)

The overall planning and design of the apartments has been developed to maximise IEQ outcomes. This is a process of balancing good environmental outcomes with the contradicting issues of energy and materials efficiency. Increased daylight, air movement and the use of environmentally friendly materials has been encouraged wherever possible.

IEQ-5. **Thermal comfort**. While unlikely to achieve this high level of thermal performance, proposed dwellings are designed to have good thermal performance which meets BASIX requirements.

IEQ-8. **Volatile Organic Compounds**. Lend Lease engaged with its supply chain some time ago to deliver finishes products that were low VOC without significant cost impost. This includes paints, adhesives & sealants, floor coverings and wall & ceiling coverings.

IEQ-9. **Formaldehyde Minimisation**. The biggest challenge for residential developments will be sourcing kitchen and bathroom cabinetry that doesn't utilise formaldehyde based binding agents. These products are available and Lend Lease will continue to drive suppliers to deliver these products cost effectively.

IEQ-13. **Electric Lighting Levels**. The lighting design within the apartments will deliver at least 300 lux levels at working surfaces such as the kitchen sink, cooktop and bathroom vanity.

IEQ-21. **Dwelling Ventilation**. Every apartment will have dedicated and separate kitchen exhaust systems which improve air quality within the apartment.

IEQ-22. **Natural Ventilation**. While specific criteria for Green Star will not be achieved, units are designed to enable natural ventilation to all units. Operable areas achievable with proposed windows will be assessed during design development to maximise the natural ventilation opportunity.

5.3 Energy

The design of The Haymarket prioritises energy efficient and cost effective solutions. The need for air conditioning will be minimised through good passive design and demonstrated through the use of the NatHERS Energy Star Ratings calculated for each apartment type. However, air conditioning will be provided in the form of energy efficient air cooled split units utilizing environmentally friendly refrigerants.

ENE-1. **Conditional Requirement/Greenhouse Gas Emissions.** Green Star and The Building Code of Australia all set minimum standards for NatHERS – the energy rating method for apartments. The apartments will be designed to exceed regulatory requirements and to meet the thermal performance requirements of Green Star. As well as minimising heating and cooling loads the apartments will utilise energy efficient

ducted split system units with day night zoning, have energy efficient lighting fittings and hot water will be delivered from a centralised gas fired storage system. Common area energy consumption will be reduced through efficient lighting and appropriate controls of lighting and any ventilation requirements.

ENE-7. Unoccupied Areas. Each apartment will have a hotel-style entry/exit switch that can isolate the power used by lighting and air conditioning. All public areas and car parks include motion sensing controls to minimise energy consumption associated with lighting and ventilation/air conditioning as well as time schedule and day lighting control where appropriate.

ENE-12. Peak Electricity Demand Reduction This is achieved through the provision of split system units which are within 1 star of the highest energy rating available.

5.4 Transport

The Haymarket will benefit from an ideal location at Sydney's Darling Harbour. All commercial and residential buildings, including the Haymarket, within the precinct will include a portion of retail tenancies giving residents access to a variety of services. Public transport facilities including trains, buses and ferries will also be readily accessible.

TRA-3. Cyclist Facilities. Bicycle storage will be provided for residents via storage cages as required. Visitors to the building will also be able to access bike parking.

TRA-4. Commuting Mass Transport. The SICEEP precinct has good access to public transport including Central station trains, buses within the CBD and ferries.

TRA-5. Trip Reduction - Mixed Use. Given the significant retail components of the Haymarket precinct, occupants will have access to a wide range of amenities including restaurants, bars, convenience stores, retail shops, groceries, ATMs etc

5.5 Water

The Haymarket will be targeting a high level of reduction in potable water through the selection of fixtures and fittings and the use of non-potable water for irrigation.

WAT-1. Occupant Amenity Water. This credit relates to the efficiency of the water fittings provided and the availability of any non-potable water sources. The development will be provided with highly water efficient fittings including dual flush toilets and low-flow taps and showerheads.

WAT-3. Landscape Irrigation. The communal landscaped areas will be designed to minimise water consumption. Rainwater captured from rooftops will be used to provide irrigation.

WAT-4. Heat Rejection Water. Ducted split system units will be utilised to provide cooling to apartments. The development will therefore not utilise water based heat rejection.

WAT-5. Fire System Water. Fire services test water will not be directed to the sewer or to stormwater. While some test water will be recirculated via a break tank, other test water which has to be drawn from the mains will be diverted to the rainwater tank.

WAT-8. Swimming Pool. Potable water consumption associated with the proposed swimming pool will be reduced by 70% through the re-use of backwash water.

5.6 Materials

In addition to providing waste recycling facilities, materials will be specified and selected to ensure minimal environmental impact. Alternative materials will be investigated for all constructions and these alternatives employed wherever practical.

MAT-1. Recycling Waste Storage. Waste handling within The Haymarket follows best practice principles regarding facilities to be provided to tenants for recycling of waste. Each common lobby on each floor will have waste chutes to enable both the disposal of general waste and recycling to be easily accessible. A diverter system will enable general waste and recycling to be disposed of through the same chute. Oversized items, including expanded polystyrene packaging, will be stored within a dedicated central waste area to enable reuse by other occupants or for diversion to re-use centres or for recycling as appropriate.

MAT-4. Concrete. The reduction of Portland cement is proposed which will reduce the embodied carbon associated with the development.

MAT-5. Steel. Steel will be sourced from 'responsible steel makers' in accordance with GBCA requirements. In addition reinforcement steel will be procured from a supplier who produces steel using energy reducing processes during its manufacture.

MAT-6. PVC. Revised credit criteria have been developed by the GBCA to recognise environmental improvements in PVC manufacture. The Haymarket will utilise PVC that complies with the Green Building Council Best Practice guidelines, or alternatively use alternatives to PVC.

MAT-7. Sustainable Timber. All timber to be sued on the project will be either certified under the FSC or PEFC schemes or reused timber.

MAT-11. Floor Coverings. It is proposed to select flooring which has a reduced environmental impact. Where possible this reduced environmental impact will be ensured through the use of products certified by independent third parties.

MAT-12. Joinery. It is proposed to select joinery which has a reduced environmental impact. Where possible this reduced environmental impact will be ensured through the use of products certified by independent third parties.

MAT-14. Internal Walls. It is proposed to select joinery which has a reduced environmental impact. Where possible this reduced environmental impact will be ensured through the use of products certified by independent third parties.

5.7 Land Use and Ecology

The Haymarket site benefits from its position as a brownfield district with potential for land re-use rather than developing new land. For this reasons the site meets the conditional requirement that it has not been of prime agricultural value, contained old growth forest and has not been a wetland.

ECO-2. Re-use of Land. The site is currently developed. Redeveloping the site for apartments is a clear re-use of land.

ECO-4. Change of Ecological Value. The predevelopment condition of the site was hard standing. Significant planting is proposed for the communal podium area which will improve the ecological value of the site. The potential to achieve Green Star credits will however be dependent on final selection of species.

ECO-5. Outdoor Communal Facilities. The communal podium area will incorporate numerous communal facilities including a sun shaded area, pool, outdoor gym, seating, outdoor dining and BBQ facilities.

5.8 Emissions

The Haymarket emissions will be minimised as far as possible. By using environmentally friendly refrigerants and insulation and eliminating light spill and cooling tower emissions any negative impact of the building can be significantly reduced.

EMI-1. Refrigerant ODP. The air-conditioning units will utilise refrigerants with zero ozone depleting potential. These HFC based gases are controlled substances which, if accidentally leaked, will not damage the ozone layer. The refrigerants associated with the project are located within the district cooling plant.

EMI-4. Insulant ODP. The fabric and services insulation specified at The Haymarket will be of a type that does not use any material with Ozone Depleting Potential in its manufacture or composition.

EMI-7. Light Pollution. The design of the external lighting system will ensure that light does not spill upwards to the sky or beyond the boundary. This can be a nuisance to adjacent properties, particularly residential neighbours.

EMI-8. Legionella. Given that air cooled plant is proposed, the risk of legionella is eliminated.

6.0 Regulatory Compliance – BASIX

The Building Sustainability Index (BASIX) sets energy reduction, thermal comfort and water reduction targets for new residential developments based on the average energy and water consumption of dwellings in NSW. Achievement of the BASIX targets is the minimum regulatory sustainability requirement for residential dwellings in NSW. The reduction targets range from 20 to 40%, depending on the type and location of the development. For buildings with 6 or more stories such as the R8 and R9 developments, a 20% reduction in energy, and a 40% reduction in water use is required to pass.

For Thermal Comfort, BASIX requires a "pass" score based on heating and cooling "caps" set by BASIX; however the thermal performance of a development will affect its energy score. For example, a development that has excellent thermal performance reduces its reliance upon air conditioning, and is therefore awarded in BASIX with a positive contribution to its energy score.

The following table summarises the BASIX targets required to be achieved for the South West Plot development and also the BASIX scores achieved. As seen below, given the sustainability initiatives to be included within the project, the BASIX targets for both energy and water are achieved.

Category	Requirement	Score Achieved
Water	40% reduction	41% reduction
Thermal Comfort	Pass	Pass
Energy	20% reduction	20% reduction

The BASIX summary report which includes the design initiatives resulting in the above scores has been attached as an appendix.

7.0 Conclusion

The South West Plot residential development will achieve the sustainability aspirations set for The Haymarket precinct. This project aims to deliver a sustainable residential building, with low operational energy consumption, reduced potable water use, minimisation of waste to landfill and appropriate materials selection while at the same time maintaining a good level of indoor environmental quality through appropriate mechanical design, façade configuration and materials selection.

The residential development will be committing to a 4 Star Design and As-Built Green Star ratings under the Green Star Multi-Unit Residential v1 tool. Initiatives targeted within this Green Star tool will ensure significant sustainability principles will be incorporated into the design, appropriate management practices are applied through the construction period and facilities and resources are provided to ensure the delivery and operation of the building of the building has the potential to achieve the sustainability objectives. Initiatives currently proposed will also enable the minimum NSW sustainability performance requirements set by BASIX to be met.

A) Appendix – BASIX Summary Report

1.0 Introduction and Summary

This report summarises the assumptions made for the BASIX assessment of the SICEEP Residential development at Haymarket Sydney.

The Building Sustainability Index (BASIX) sets energy reduction, thermal comfort and water reduction targets for new residential developments based on the average energy and water consumption of dwellings in NSW. The reduction targets range from 20 to 40%, depending on the type and location of the development. For buildings with 6 or more stories such as the SICEEP developments, a 20% reduction in energy consumption, and a 40% reduction in water use is required to pass.

For Thermal Comfort, BASIX requires a "pass" score based on heating and cooling "caps" set by BASIX; however the thermal performance of a development will affect its energy score. For example, a development that has excellent thermal performance reduces its reliance upon air conditioning, and is therefore awarded in BASIX with a positive contribution to its energy score.

To complete a preliminary assessment of the project using BASIX, certain assumptions have been made. Based on the assumptions listed in this report result, the development receives the following scores:

Category	Requirement	Score Achieved
Water	40% Reduction	41%
Thermal Comfort	Pass	Pass
Energy	20% Reduction	20%

The assumptions and commitments included within this summary should be reviewed in detail as they can have a significant impact on the overall BASIX score.

The following require careful consideration during the next phase of design to ensure that the project's BASIX commitments are achieved:

- Flow rates of fixtures and fittings will need to be carefully considered in the next stage of design. The flow rates stated within the report are the maximum flow rates to ensure that the BASIX water target is achieved. If these cannot be achieved the provision of washing machines may need to be considered to some apartments.

- Many units are very close to the maximum cooling load requirements set by BASIX as part of the thermal performance requirements. While glazing types and sizes have been carefully considered through the DA process, all changes will have to be carefully monitored as well as window opening types which can affect natural ventilation. This is particularly the case for small single sided apartments without external shading.

2.0 Assumptions and Commitments

Assumptions included in this section should be reviewed by the project team as any variances to what is intended could impact the performance of the development in relation to the BASIX targets.

2.1 Project Areas

The following areas have been measured from drawings issued in April 2012 by Dentor Corker Marshall.

Site Details		
Site area	m^2	5,072
Total roof area (for all buildings)	m^2	2,043
Podium roof	m^2	3,005
Non-residential floor area	m^2	17,211
Residential car spaces	No.	396

Common Areas			
Space Type	SW1 Areas (m^2)	SW2 Areas (m^2)	SW3 Areas (m^2)
Car park	3684	614	7982
Retail	1200		
IQ Hub	726		
Storage	611	46	558
Lift motor room	30	0	47
Switch room	46		
Garbage room	63	63	62
Comms room	28		
Water meter room	27		
Gas meter room	10		
Pump room	Combined with WMR		
Grease trap	19	18	17
Ground floor common areas / Lobbies	317	154	492
Corridors / Lobbies	1298	187	2407

In addition to the above there is a gas heated swimming pool assumed to be 12x6x1.5m. There is no communal spa or gymnasium in the development.

Dwelling Details - SW1 and 2			
Unit Type	Quantity (i.e. total number of unit types)	Apartment Area (m^2)	Area of Private garden and lawn (m^2)
Studio	12	40	0
1 Bed	91	50	0
1 Bed + Study	10	60	0
2 Bed	89	75	0
3 Bed	3	105	0

Dwelling Details - SW3			
Unit Type	Quantity (i.e. total number of unit types)	Apartment Area (m^2)	Area of Private garden and lawn (m^2)
Studio	0	0	0
1 Bed	111	50	0
1 Bed + Study	70	60	0
2 Bed	133	75	0
3 Bed	19	110	0

2.2 Central Systems

Central systems refer to components of the development which service numerous dwellings. The inputs for these systems contribute to the estimated water and energy consumption which determine the BASIX score for the development.

Central Systems Summary				
System	SW1	SW2	SW3	Notes
Swimming pools, Spas, Saunas	1			Shared swimming pool of dimensions 12 x 6 x 1.5m
Number of residential lifts	2	1	3	One lift per lift core.
Central on-site recycled/alternative water supply	No	No	No	No recycled water
Rainwater tank	Yes			Assume a single shared tank used for irrigation. Tank size will still to be finalised is likely to be approximately 100kL
Central domestic hot water systems	Yes	Yes	Yes	A single gas-fired boiler is assumed for each building.
Central cooling system	No	No	No	Split units proposed
Central heating system	No	No	No	Split units proposed
Fire sprinkler system	Yes	Yes	Yes	Test water will be recirculated back to a break tank or where it is drawn from the mains reticulated to the rainwater tank.

2.3 Water

This section outlines the assumptions made for the water consumption and water supplied by the central systems. The preliminary landscape concept indicates significant lawn and garden areas. While native or endemic species should be targeted to minimise water consumption, it is anticipated that the majority of garden planting will be exotic to enable a more 'lush' landscape to be provided.

2.3.1 Alternative Water Supply

A common rainwater tank shared between all 3 buildings will be provided to satisfy the landscape irrigation requirements. The capacity of this tank will be increased beyond what is required to satisfy the landscape demand to ensure that there is capacity to ensure fire services test water which cannot be recirculated is diverted back to the rainwater tank to assist in meeting the irrigation demand.

2.3.2 Common Area Water Consumption

The following table summarises all of the common areas where there will be water consumption.

Common Area – Water Consumption				
Water Use	Units	SW1	SW2	SW3
Common Landscape				
Common area lawn	m^2	879		
Common area garden	m^2	823		
Area of garden assumed indigenous or low water use species[1]	m^2	165		
Other common area water uses				
Taps	L/min WELS rating	None assumed		
Showerheads	L/min WELS rating	None assumed		
Car washing bays	no.	None assumed		
Sprinkler test system[2]	-	Closed system		

1) Advice from the landscape consultant suggests that 20% of the garden area will be indigenous or low water use species.
2) While only some of the fire services test water is recirculated, the remainder is diverted to the rainwater tank. As the BASIX tool has no option for diverting to the rainwater tank the selection of a closed system was deemed the most appropriate as opposed to a system which diverted water to the sewer.

2.3.3 Dwellings Water Consumption

The assumptions listed below have been made for the water fixtures and fittings installed for all dwellings in the SW1, SW2 and SW3 developments. As dishwashers are proposed to be installed an average WELS rating of 3 stars has been selected to allow for some flexibility in selections.

Dwellings – Water Consumption			
Fittings and Fixtures	Water supply	L/min	WELS rating
Showerheads	Potable mains	7.5	3 star (> 6 L/min and ≤7.5 /min)
Toilets	Potable mains	3.5L/flush average	4 star
Kitchen taps	Potable mains	4.5	6 star
Bathroom taps	Potable mains	4.5	6 star
Dishwashers	Potable mains	-	4 Star
Clothes Washer	Potable mains	Not provided	
Landscape Irrigation	Potable mains	n/a	n/a

Flow rates of fixtures and fittings will need to be carefully considered in the next stage of design to avoid the need to provide water efficient washing machines in some dwellings. The flow rates stated above are the maximum flow rates to ensure that the BASIX water target is achieved.

2.4 Thermal Comfort

BASIX sets maximum heating and cooling loads to be achieved by each apartment as well as average heating and cooling loads throughout the development. To achieve a 'pass' in the thermal comfort section, individual apartments must not exceed the maximum load requirements and the development must not exceed the average load requirements set by BASIX.

Below are the significant construction assumptions which will impact the thermal performance assessment.

Constructions		
Building Element	Construction	Detail / Properties
Windows	Type 1: Single Low-e clear glazing with aluminum frames Type 2: Single Low-e grey glazing with aluminum frames Type 3: Double Glazed low-e high performance glazing with aluminum frames	Type 1 - U Value[1] = 4.5 W/m2.K; SHGC = 0.58; - Operable areas of windows have been estimated given each proposed window type and necessary safety requirements to restrict opening widths. Operable areas of doors to balconies have been taken as per the plans are therefore generally 25-67% of the total glazed areas. - This glazing is applied throughout SW3 (with the exception of east and west facing windows) as well as throughout SW2 and throughout all podium units. Type 2 - U Value[1] = 4.5 W/m2.K; SHGC = 0.40; - Operable areas of windows have been estimated given each proposed window type and necessary safety requirements to restrict opening widths. Operable areas of doors to balconies have been taken as per the plans are therefore generally 25-67% of the total glazed areas. - This glazing is applied throughout SW1 and to the east and west facing windows of SW3. Type 3 - U Value[1] = 3.5 W/m2.K; SHGC = 0.21; - Operable areas of these double hung windows are assumed to be equal to 40% of the total area of glazing. - This glazing is applied to the studio apartments facing west on the SW1 tower. - To achieve this SHGC a double or triple low-e coat may be required to ensure that VLT is maintained.
External Shading		▪ Balcony overhangs provide shade throughout. No other fixed or operable shading provided.
External walls	Internally insulated	▪ Minimum R 1.0 added internal insulation

Constructions		
Building Element	Construction	Detail / Properties
	insitu concrete panel (200mm)	▪ Dark colour with solar absorptance of approximately 0.85.
Internal walls – within units	Plasterboard on studs	
Internal walls – between units	Insitu concrete panel (150mm)	
Floors	Concrete	▪ Tiles in bathrooms and laundries; timber to living areas and carpet covering to bedrooms
Ceilings	Plasterboard	▪ Suspended plasterboard ceiling (R3.0 insulation to top level units) ▪ Floor to ceiling height assume to be 2.4m in bathroom and laundry; height assumed to be 2.7m in all other spaces
Roof	Concrete	▪ R 3.0 + Foil added internal insulation ▪ Medium colour with solar absorptance of approximately 0.5.

The following table summarises the BASIX average heating and cooling load requirements with those achieved on the proposed project. As seen in the table, the heating load is comfortably achieved however the project is close to the BASIX cooling load requirement. While this indicates that there is some contingency in the analysis, many units are very close to the maximum individual cooling load requirements set by BASIX. While glazing types and sizes have been carefully considered through the DA process, all changes will have to be carefully monitored as well as window opening types which can affect natural ventilation. This is particularly the case for small single sided apartments without external shading.

BASIX Thermal Comfort Results		
	BASIX Average Load Requirement (MJ/m2)	BASIX Average Loads (MJ/m2)
Heating	40	10.7
Cooling	32	26.5

2.5 Energy

The energy section of BASIX calculates a percentage reduction in expected greenhouse gas emissions compared with an average NSW dwelling. As the SICEEP development has over 6 storeys above ground, the project must achieve a BASIX energy reduction of at least 20%. It considers the energy demands of the central systems, as well as the energy demands of the common areas and dwellings from the domestic hot water system, the HVAC system, lifts, lights and appliances.

2.5.1 Central Systems

Central Domestic Hot Water System

It has been assumed that a gas-fired boiler will be installed for each building to meet the domestic hot water and heating hot water demands. The hot water reticulation system will be continuous flow, eliminating the heat losses associated with storage systems. Insulation for both the external and internal hot water pipes has been provided with thermal resistance values as follows:

- Piping external to building: no external piping
- Piping internal to building: R 1.0 m^2K/W

Central Cooling and Heating Systems

Variable refrigerant volume units have been selected for both a central cooling and heating system. The following details have been input into the BASIX tool.

Central Cooling and Heating Systems		
	Cooling	Heating
System Type	Variable refrigerant volume units	Variable refrigerant volume units
Energy Source	Electric driven compressor	Electric driven compressor and air sourced evaporator
Heat Rejection Method	Air cooled condenser	-
Unit Efficiency	Low – COP<3.5	Low – COP <3.5

While BASIX does not require a minimum efficiency of the VRV system, the project's Green Star commitment will require a system with a high efficiency to be selected. While the exact efficiency requirement is still to be determined a cooling COP of at least 3.5 is anticipated.

Alternative Energy Supply

It has been assumed that a 65kW roof top photovoltaic system will be installed on this development. The position on this system is under reviewed; it may be removed and each apartment will be fitted with 2.5 star refrigerator to ensure that the energy target is met.

Lifts

The plans indicate that there are 6 lift shafts in total, where all lifts are gearless traction lifts with Variable Voltage Variable Frequency Drive (VVVF) motors. The number of levels each lift services has been interpreted from the plans and elevations.

Lifts				
	SW1	SW2	SW3	Notes
Number of lifts	2	1	3	Lifts assumed to have regenerative brakes
Levels served	25	9	40	

Other Central Systems

The following details of central systems are additional fields required by BASIX:

Other Central Systems	
Item	Details
Building Management System (BMCS)	Not installed
Active power factor correction (PFC)	Not installed

2.6 Common Areas

2.6.1 Common Area Ventilation

The following table summarises the common areas requiring ventilation, the ventilation type and the efficiency or control measure currently proposed. Control measures should be considered to any of the areas currently listed with continuous ventilation.

Common Area Ventilation		
Area	Ventilation System Type	Efficiency Measure
Car park	Ventilation exhaust only	CO monitors + VSD fan
Lift motor room	Ventilation exhaust only	Continuous
Switch room	Ventilation exhaust only	Continuous
Garbage room	Ventilation exhaust only	Time clock or BMS controlled
Water meter room	Ventilation exhaust only	Continuous
Gas meter room	Ventilation exhaust only	Continuous
Pump room	Combined with WMR	Continuous
Grease trap	Ventilation exhaust only	Continuous
Ground floor common areas / Lobbies	Ventilation supply only	Time clock or BMS controlled

Common Area Ventilation		
Area	Ventilation System Type	Efficiency Measure
Podium common areas / Lobbies	Mechanically ventilated	Time clock or BMS controlled
Corridors / Lobbies	Ventilation supply only	Time clock or BMS controlled
Storage	Ventilation exhaust only	Time clock or BMS controlled
IQ Hub (Comms Room)	Air conditioning system	Time clock or BMS controlled

2.6.2 Common Area Lighting

The BASIX tool requires inputs for the primary lighting type in each zone, where the primary lighting type is defined as the lamp type fitted to 80% or more of the light fittings to be installed. The following fittings have been assumed for the common areas:

Common Area Lighting		
Area	Lighting Type	Efficiency Measure
Car park	Fluorescent	Time clock and motion sensors
Lift cars	LEDs	Connected to lift call button
Lift motor room	Fluorescent	Motion sensors
Switch room	Fluorescent	Motion sensors
Garbage room	Fluorescent	Motion sensors
Comms room	Fluorescent	Motion sensors
Water meter room	Fluorescent	Motion sensors
Gas meter room	Fluorescent	Motion sensors
Pump room	Fluorescent	Motion sensors
Grease trap	Fluorescent	Motion sensors
Storage units	Fluorescent	Motion sensors
Ground floor common areas / Lobbies	Compact fluorescent[1]	Time clock and motion sensors
Corridors / Lobbies	Compact fluorescent[1]	Time clock and motion sensors

1. Compact fluorescents are included in the BASIX assessment as there is currently on option for LEDs. It is anticipated that LEDs be utilised in these locations and wherever else appropriate.

Similar to the common area mechanical ventilation system, it is assumed that a lighting control system or connection to the BMCS via motion sensors or a time clock will be installed as a controls mechanism to ensure that lighting energy is not consumed where there are no occupants. Furthermore, it is assumed that the lighting controls in the lifts are triggered by the lift call button to avoid wasting energy in these spaces.

2.7 Dwellings

2.7.1 Ventilation

Ventilation within dwellings is provided for bathrooms, kitchens and laundries. Individual exhaust fans are provided for bathroom, kitchen and laundries which are ducted to the façade.

2.7.2 Lighting

The BASIX tool also takes into account energy consumption from lighting based on the lighting strategy. For each dwelling, the BASIX tool awards the number of bathrooms and kitchens that are naturally lit by either a window or skylight. BASIX awards the rooms which are primarily lit by fluorescent or LED lamps as these are more energy efficient lighting options; and further awards projects where these fittings cannot be replaced by alternatives.

It was assumed that for all rooms the primary lighting type is LEDs, and that these fittings will be specific to LEDs preventing occupants from replacing them with less efficient lamps. While the BASIX certificate will permit fluorescent or LED fittings, LEDs will be required to achieve the lighting energy targets required by Green Star.

Current floor plans indicate that the majority of bathrooms and kitchens will not have access to natural light.

2.7.3 Appliances

The project intends to install dishwashers and clothes dryers to all apartments and refrigerators to 50% of apartments.

The following table includes the energy rating of appliances to be installed.

Dwelling Appliances	
Appliance	Input
Stovetop	Gas
Oven	Electric
Dishwasher	3 star energy rating
Clothes dryer	1.5 star energy rating
Refrigerator	2.5 star energy rating (to 50% of apartments only)