WOOD & GRIEVE ENGINEERS

NOW PART OF Stantec

Brewery Yard

Ecologically Sustainable Development Report

Prepared for:

Natali Boskovska
Johnstaff

Prepared by:

Alex Kobler
Project No. 38311
\\WGE.FILES\PROJECTS\38311\PROJECT DOCUMENTATION\SUSTAINABILITY\GENERAL\SU-RE_004_SSDA-UPDATED.DOCX

Date:
18 July 2019

Level 6, Building B, 207 Pacific Highway, St Leonards NSW 2065
T: (02) 8484 7000 **E:** sydney@wge.com.au **W:** www.wge.com.au

Revision

REVISION	DATE	COMMENT	APPROVED BY
1	26/07/2018	Preliminary Issue	**ALK**
2	30/07/2018	Issue	**ALK**
3	11/12/2018	DA Issue	**ALK**
4	18/07/2019	Revised DA Issue	**ALK**

Contents

1. Executive Summary

This Ecological Sustainable Development Report has been prepared for Johnstaff at the instruction of Natali Boskovska for the proposed Brewery Yard in Chippindale, 2008. This report is intended to provide an overview of the proposed ecologically sustainable design (ESD) principles and efficiency measures and is intended to form part of the Environmental Impact Statement (EIS). This is a direct design response to the ESD component of the Secretary's Environmental Assessment Requirements (SEARs), and NSW Environmental Planning and Assessment Regulation 2000, as required by the NSW Environmental Planning and Assessment Amendment Act 2017 No 60.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers)
- Detail regarding specific ecological sustainable development initiatives through all phases of the project.
- Initiatives that would minimise the consumption of resources, water and energy.

Information contained within this report has been prepared in direct response to:

- the Secretary's Environmental Assessment Requirements, June, 2018;
- the NSW Environmental Planning and Assessment Act 1979;
- the NSW Environmental Planning and Assessment Regulation 2000;
- City of Sydney Local Environmental Plan 2012; and
- City of Sydney Development Control Plan 2012; and

In coordination with the above, the project will implement a number of sustainable design principles and includes initiatives designed to mitigate the environmental impact of the following:

- Energy – including improved energy efficiency across the buildings and its associated sources.
- Water Efficiency – including reduced potable water demand and improved storm water quality.
- Passive Design Principles – reducing the development's overall requirement for building services.
- Ecology - Maintaining ecology through landscaping where practical
- Materiality – Considering the whole of life impact of materials and considering their selection to minimise harm to the environment, including efficiency and construction.

The following sections detail the development's specific sustainable design response in more detail.

2. Introduction

The Brewery Yard development is a key component of the Central Park Masterplan. The development will give a second lease of life to the existing Brewery transforming it into a boutique commercial and retail mixed use development.

Figure 1 **- Site overview**
Source: Tzannes Architectural Renders.(left) SixMaps (right)

The proposed development consists of approximately:

Table 1 - Spaces and areas of the proposed development.

Level	Spaces description	Area (m^2)
Ground Floor	• Retail • Commercial Foyer • Outdoor Courtyard	1,147m2 (retail)
Level 01 – Level 06	• Commercial	<5,000m2 total

This report addresses the Ecologically Sustainable Development and efficiency aspects in response to the Environmental Planning Policies for the project. It uses best practice sustainable design principals and borrows elements from external sustainability tools to develop a set of metrics for the site.

2.1 Sustainable Design Initiatives

In pursuit of the ecological design principles, the Brewery Yard development will pursue excellence benchmarked from a number of sources. These include best practice design initiatives from:

- the NSW Environmental Planning and Assessment Amendment Act 2017,
- the NSW Environmental Planning and Assessment Regulation 2000,
- City of Sydney Local Environmental Plan 2012; and
- City of Sydney Development Control Plan 2012; and

2.1.1 SEARs Requirements

SEARs outlines requirements for this development that must be addressed as part of the Environmental Impact Statement. These are:

- include a framework for how the proposed development will reflect best practice sustainable building principles to improve environmental performance, including energy and water efficient design and technology, and use of renewable energy
- outline any sustainability initiatives that will reduce the demand for drinking water, proposed end uses of drinking and non-drinking water, demonstration of water sensitive urban design, connection to the Central
- Thermal Plant and recycled water facility, and any proposed water conservation measures.

The above has been considered, using the EPA 2017, City of Sydney Documentation and the holistic sustainability tool, Green Star, for benchmarking best practice sustainability.

2.2 Environmental Planning and Assessment Regulation 2000

Schedule 2 7(4) of the Environmental Planning and Assessment Regulation 2000 states:

"The principles of ecologically sustainable development are as follows:

a) the precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
   (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
   (ii) an assessment of the risk-weighted consequences of various options,

b) inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,

c) conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

d) improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
   (i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
   (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
   (iii) environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems."

2.2.1 Precautionary Principle

There are no perceived threats of serious or irreversible environmental damage as a result of upgrading the Brewery Yard development at the desired site. The site is an existing development and has outlived its existing life. Updating this

building is extending the working life of the development, extending the embodied carbon invested in its construction for generations to come.

There are no significant perceived threats of serious or irreversible environmental damage as a result of the proposed use of the Brewery Yard as a commercial development. The proposed development is a reuse of the existing site. Therefore, no serious or irreversible environmental damage is expected due to the operation of the building.

The site selection and proposed use of the commercial development are associated with low risks of serious environmental consequences as there are strong similarities with the current building on the site. The current building has had no serious environmental impacts due to its location or use. What's more, the development goes above and beyond accounting for environmental damage by attempting to reduce it with best practice initiatives.

2.2.2 Inter-generational equity

The development conserves inter-generational equity through minimizing the consumption of resources whilst providing professional environments which will ensure the health and well-being of occupants into the future. The development will reduce demand for resources by introducing a number of best practice energy and water conservation measures. These initiatives will free up more resources for future generations, instead of their immediate consumption by the current generation.

As the site is already developed and limited environment with biological utility still exists on the site, the state of the environment is maintained. The development includes new landscaping which will maintain pockets of planted environment similar to those currently present on the site. The limited diversity of the environment currently on the site will be maintained by this project.

All base building waste streams will be dealt with in ecologically safe methods; waste water and storm water will be plumbed to the central recycled water plant. In addition, waste water will be lower for this development compared with a standard practice development as low-flow fixtures and fittings will be used to reduce water consumption throughout the building, many served with recycled water from the centralised plant.

The below methods will be considered for implementation on this project and will contribute to a greater sustainable outcome for this generation and those following:

- Use of the Centralised Thermal Plant to provide Heating, Space cooling, electricity and hot water of low carbon intensity.
- Building designed to be capable of achieving 4.5 Star NABERS Energy Base Building rating in operation.
- LED lights, which have longer lives, consume less energy and produce a higher quality light than their counterparts.
- Low-VOC paints and adhesives, which do not emit dangerous volatile components, risking the health of users.
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process.
- Careful use of water and low flow fittings.
- Use of recycled water through the centralised recycled water plant
- A target of 90% of construction and demolition waste will be diverted from landfill.
- Consideration for low embodied energy products, recycled or green rated products, such as GECA or "Global Green Tag". This spans both construction and fitout items.
- Use of insulants in walls that are low or zero ozone depleting (ODP) and low global warming potential (GWP).

Inter-generational equity is realised in the use of energy and water efficiency measures which aim to reduce the consumption of limited resources, preserving these for future generations. The maintenance of the structure pays homage to the history of the development, and extends the life of the embodied carbon. In addition, the design principles outlined in the following sections are for buildings which will be occupied by the next generation. The healthy interior environments which they create will benefit occupants decades from today.

2.2.3 Conservation of biological diversity and ecological integrity

There is limited biological diversity on the current site due to the site being previously developed and occupied. The development will have limited, if any, impact on the current level of biological diversity and ecological integrity as there is limited green landscaping on the current site that will be replaced by built development in this project. Some trees will be removed; however, these are likely to provide limited biological value due to the proximity of these trees to urbanization.

2.2.4 Improved valuation, pricing and incentive mechanisms

This project will consider the integration of a number of initiatives which aim to internalise pollution and other undesirable environmental outcomes. Contractors may be required to provide and abide by an Environmental Management Plan and Environmental Management System which would be in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices and on the contractors to ensure they are held responsible for the environmental management of the building site as they complete their work.

The site is uniquely gifted with proximity to the recycled water and central thermal energy plant. Power (electricity), heat, coolth and domestic hot water will be provided to site more environmentally friendly than traditional utilities. As such, an environmental outcome is complemented and supported by all parties because it's implementation is an economic driver.

The cost to recycle the construction and demolition waste shall be borne by the project team. The construction team may be required to target 90% recycling of construction waste. This would have a greater financial cost to the project, however it provides a more accurate reflection of the full life cycle costs of the materials which were on the site, and the waste from the new materials as a result of the construction. The increased cost of recycling construction materials will also incentivise the purchase of less materials, thereby reducing over-ordering and material wastage.

The team demonstrates these incentive mechanisms and improved valuations through working to receive the utilities from the Central Park's 30MW Central Thermal Plant.

2.3 City of Sydney Local Environmental Plan (LEP) 2012

The City of Sydney LEP has a specific focus on providing ecologically sustainable development through the City of Sydney. In consultation with this community need, the LEP includes specific provisions for developments so they do not have an adverse impact on the surrounding environment. The particular aims of the plan include:

- to support the City of Sydney as an important location for business, educational and cultural activities and tourism;
- to promote ecologically sustainable development;
- to encourage the growth and diversity of the residential population of the City of Sydney by providing for a range of appropriately located housing, including affordable housing; and
- to enable a range of services and infrastructure that meets the needs of residents, workers and visitors.

The Brewery Yard addresses the aims of the LEP through incorporating best practice ESD initiatives throughout. The development maintains a cultural icon of Sydney, while extending the working life of the building. It provides a place for people to meet, while increasing the strength of the commercial market. Further, through the potential use of the central thermal plant, the location allows for reduced carbon emissions relative to other developments, as well as greater education of the impacts and sustainability.

2.4 City of Sydney Development Control Plan (DCP) 2012

Part 3 – General Provisions: 3.6 – Ecologically Sustainable Development supports the LEP in the identification of more detailed sustainability planning controls, these include:

3.6.1 – Energy Efficiency in non-residential developments – Development is to be designed and constructed to reduce the need for active heating and cooling by incorporating passive design measures including design, location and thermal properties of glazing, natural ventilation, appropriate use of thermal mass and external shading, including vegetation.

3.6.2 – Water Efficiency in non-residential developments – to reduce the potable water consumption of the building, through a mixture of reduction and re-use

3.6.3 - Photovoltaic solar panels – To further reduce energy consumption and provide offsets

3.6.5 - Materials and building Components – Encouraging the use of sustainable and low toxicity materials.

The Brewery Yard supports the DCP through incorporation of passive design principles such as maintenance of thermal mass, improved performance glazing where heritage allows, adequate thermal insulation of the building fabric, low carbon energy consumption through the use of the centralised thermal plant and upgrading the entire building to include new high-efficiency equipment and services.

Water efficiency will be addressed through serving amenities via the recycled water plant.

Materials, finishes and building components will incorporate sustainable materials with low VOCs where possible.

3. ESD Opportunities & Initiatives

The following section identifies Ecological Sustainable Development opportunities and initiatives for potential inclusion within the project. The following examples are to be viewed in response to the conceptual design prepared by Tzannes Architects. WGE note the developed design will be refined with the following concepts going forward. As the design progresses, a number of documented elements may prove unfeasible, as well as undocumented initiatives proving attainable.

3.1 Energy Efficiency

A variety of energy efficiency measures are applicable to the proposed development. These energy efficiency measures shall form the part of the final design and operation of the spaces. The final strategy will always be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy pyramid below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest return on investment.

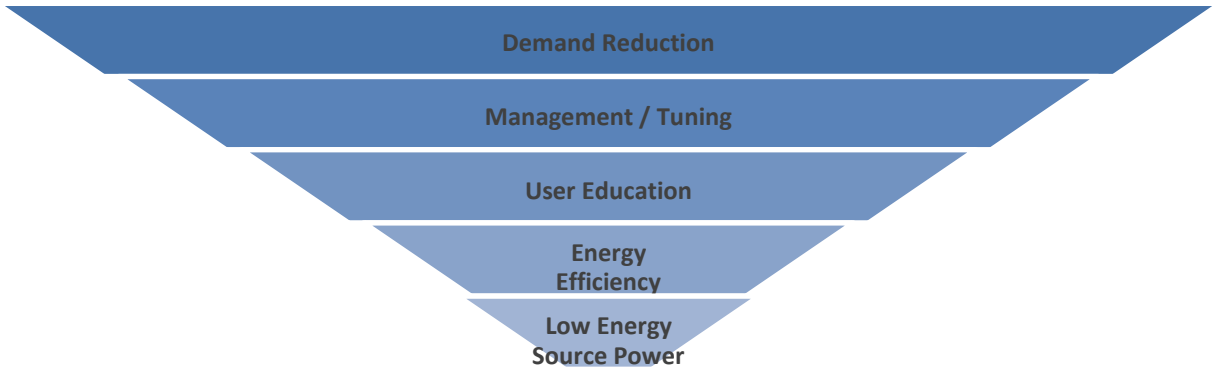

Figure 2 Energy efficiency strategy hierarchy.

3.1.1 Site-wide Strategies

Energy efficiency measures that are able to be captured across the entire site to reduce its energy consumption include:

- Use of the Centralised Thermal Plant for power, space conditioning and hot water
- Efficient lighting e.g. LEDs. This will further reduce the electrical load on the grid for the same electrical output. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials.
- Daylight and motion sensors for lighting.
- Localised shading devices.
- Minimisation of conditioned spaces.
- Designed exterior lighting layout. This ensures safety and security lighting is maintained across the site, but allows minimum lighting to be included only as required. The demand and cost is reduced through appropriate design levels.

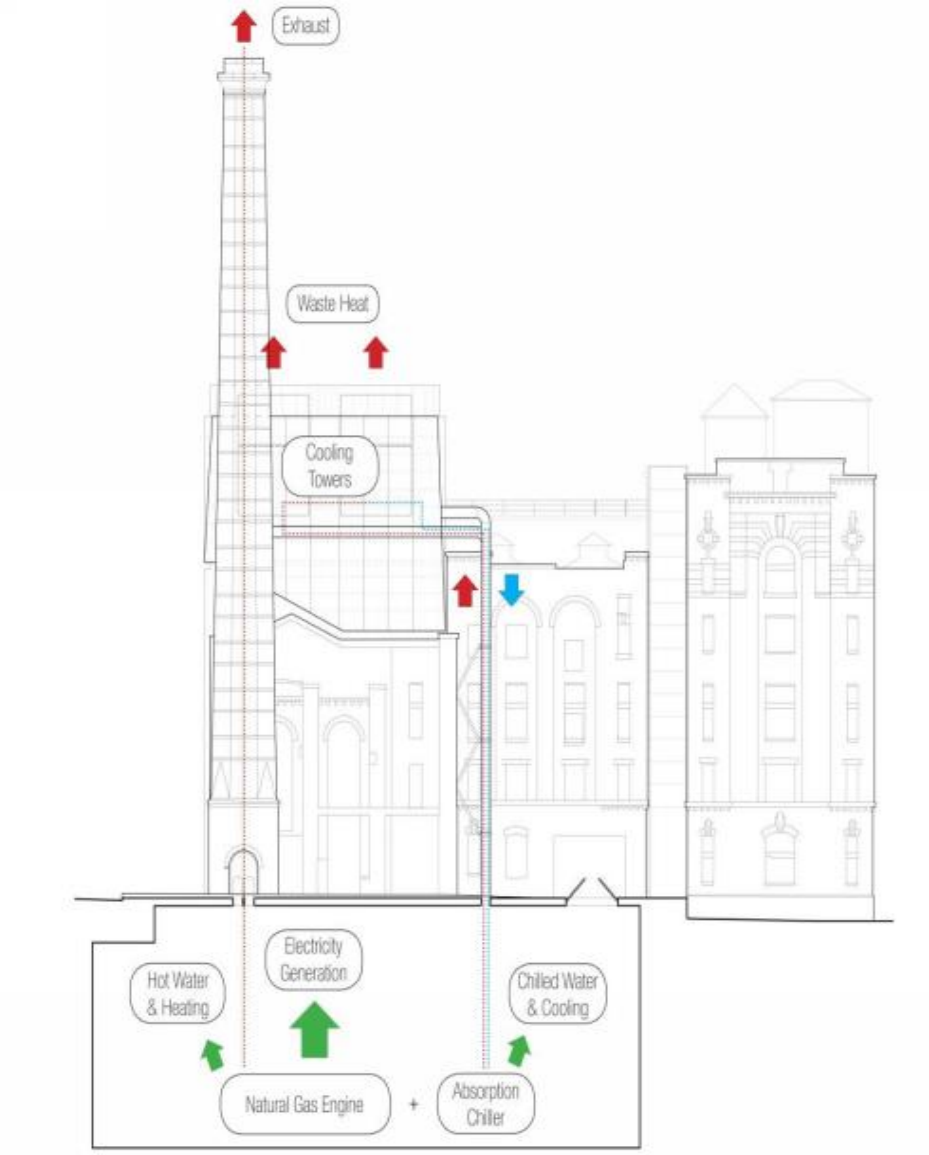

Figure 3 Central Thermal Plant Energy *(source: Tzannes*)

3.1.2 Demand Reduction Strategies

Demand reduction strategies are intended to provide the greatest benefit for reducing overall energy consumption of the site. This can be achieved through incorporation of passive design principles that provide the following benefits:

- Lower operational energy demand via improved thermal performance;
- Reduce the requirements for artificial lighting & power;
- Reduce the buildings' reliance on HVAC systems;
- Potentially reduce the areas that require air conditioning; and
- Improve the project's ability to deliver a responsible development.

The passive design principles to be implemented in the design are discussed below.

1 **Optimisation of the building fabric** through the following design elements:

- Window to wall ratio designed to maximise natural light, while still achieving thermal comfort and allowing efficient mechanical systems.
- Replaced windows will be replaced with high performance façade elements.
- Installation of adequate insulative & thermo-active materials to opaque elements of the building fabric to maintain internal temperatures that are suitable for summer & winter solar exposure;
- Use of light-coloured roofing to minimise solar absorption

The above will be limited by the need to maintain the heritage constraints on the site

2 **To minimise the use of artificial lighting**, natural daylight will be harnessed through the roof and reflected to achieve ambient levels. This will be supplemented with high quality LED lighting systems, strict zoning and BMCS controls to limit excess lighting.

3 Design to achieve minimum 4.5 NABERS Energy

4 **Minimise the need for conditioned space**s and increase the efficiency of the HVAC systems. The use of HVAC and its efficiency will be commensurate with a building capable of achieving a high NABERS outcome.

3.1.3 Management and Tuning

The following management and tuning measures will be implemented to ensure that energy consumption is further reduced:

- Implement energy targets for retailers through use of rental agreements;
- Installation of all building fabric to exceed the NCC, with consideration given to thermal bridging and build quality;
- Ensure that a building tuning and commission plan is implemented prior to construction completion to ensure the building is fine-tuned and operating as designed.

3.1.4 User Education

User Education is considered to be an effective means to ensure that building users are aware of ways in which they can interact with the building to minimise or avoid energy waste. The following strategies could be implemented to avoid energy consumption associated with usage:

- Provide tenants and the building services manager with a Building Users Guide;
- Provide tenants with a Tenant Fitout Guide to ensure that any systems they install are within the building sustainability requirements;
- Set up information kiosks for the general public that illustrates the various systems in which the building reduces energy consumption (both for passive and active systems)

3.1.5 Energy Efficient Strategies

A number of energy efficient measures can be implemented to reduce the overall energy consumption across the site. These measures are generally active design strategies that still require energy use, but with increased efficiency through optimal design of systems. Energy efficient strategies are discussed in the following sub-sections.

Lighting

High-colour, high CRI, warm LED lighting will be incorporated exclusively throughout the development. This will reduce the electrical load on the grid for the same electrical output. LED globes have a longer life, reducing replacement periods and less maintenance. Lighting controls including timing, occupancy and daylight sensors will be incorporated into the design to reduce the demand on the lighting system.

Exterior lighting will operate on timing switches to reduce unnecessary energy consumption. This also ensures safety and security lighting is maintained across the site.

A target lighting density will be set at 4W/m2 average across the development, in line with the targeted 50% reduction in energy against NCC limits. Lighting will be controlled by the BMCS, tracked and zoned to limit energy consumption and reduce lighting areas that do not require it.

3.1.6 Central Thermal Plant

Central Park has its own low-carbon natural gas power plant, producing thermal energy for its residents and workers.

In the first stage of its development, a two-megawatt (MW) tri-generation energy plant, run on natural gas, produces low-carbon thermal energy, providing heating and cooling for 3,000 residences and 65,000 sqm of retail and commercial space in 14 buildings at Central Park. The stage one tri-generation energy centre supplies low-carbon electricity to the Brewery Yard building.

Tri-generation is twice as energy efficient as a coal-fired power plant. Environmental consultants and design engineers have forecast that Central Park's two-megawatt plant could reduce greenhouse gas emissions by as much as 190,000 tonnes over the 25-year design life of the plant. This has the same effect on greenhouse gas emissions as removing 2,500 cars off the roads every year for 25 years.

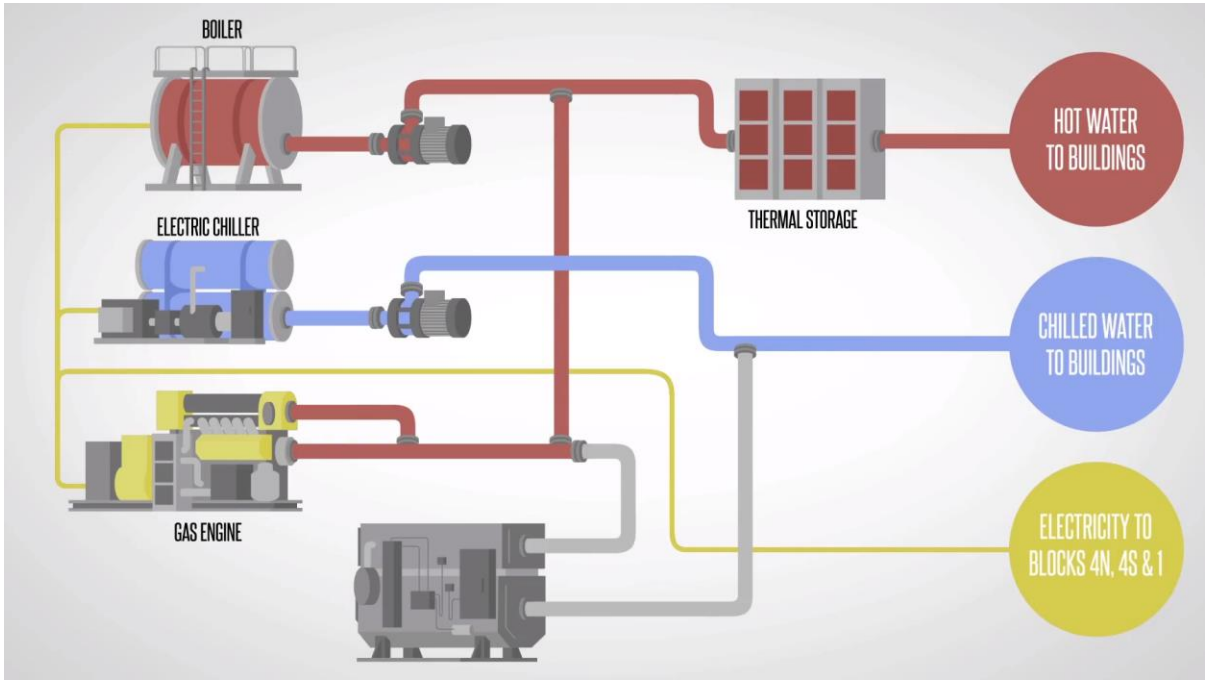

Figure 4 Central Thermal Plant Arrangement

The use of the central thermal plant provides hot water, electricity, chilled water and domestic hot water to the development with a far lower carbon intensity than traditional grid power.

Source: Centralparksydney.com

Equipment

The tenants will be encouraged to use only energy efficient appliances (with appropriate Energy Star Ratings, where relevant) and equipment.

HVAC Systems

Efficient and bespoke HVAC systems with high COPs will be appropriately designed and sized for the development. This will include high efficiency centralised plant, economy cycle mode, CO_2 monitoring or temperature band fluctuation control to increase energy efficiency in the design. Where practical, natural ventilation or mixed mode will be implemented to enable delivery of high levels of fresh air to spaces and reduce the energy consumption associated with HVAC systems.

3.2 Water Efficiency

A variety of water efficiency measures are applicable to the proposed development. These water efficiency measures aim to go far further than a typical office building, thanks in part to the availability of infrastructure on site.

To the extent capacity allows, non-potable water from Central Park will be provided by the Centralised Recycled water system. Water comes from a number of sources:

- Rainwater from roofs
- Storm water from impermeable surfaces/planterbox drainage
- Groundwater from basement drainage systems
- Sewage from an adjacent public sewer
- Sewage from all buildings within the Central Park community
- Irrigation water from all greenwalls
- Drinking water from the public water main

The Flow Systems purification process meets strict Australian Guidelines for Water Recycling set out by Federal and State Governments. Wastewater is cleaned to the highest Australian standards, undergoing eight extensive filtration and purification processes including Membrane Bioreactor (MBR), Ultraviolet (UV) and Reverse Osmosis (RO).

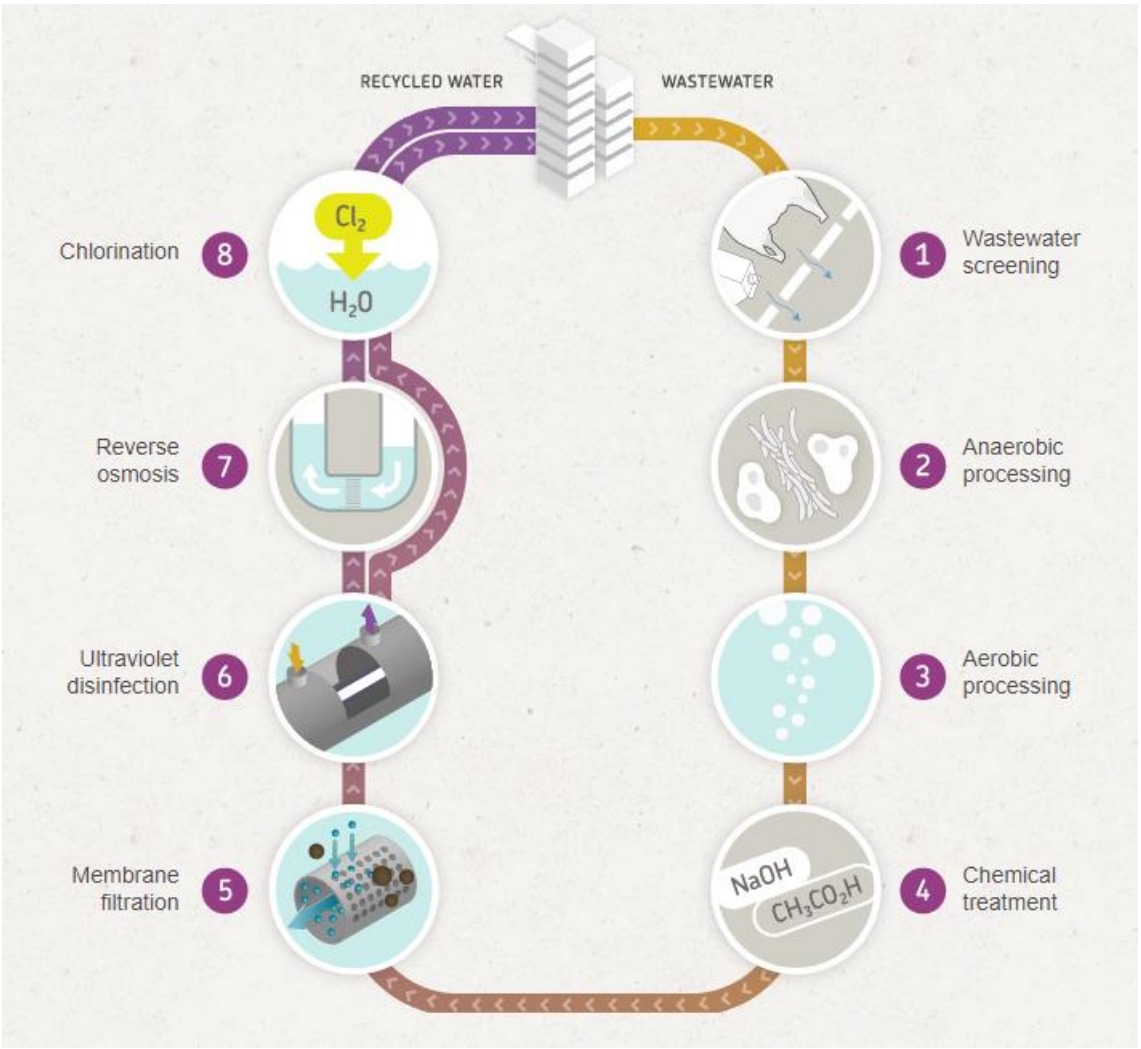

Figure 5 - Recycled Water System at Central Park *Source: Flow Systems*

Water efficiency measures which will applied to further reduce water consumption include:

- **Water efficient fixtures and fittings**. By implementing low-flow water fixtures, the consumption associated with amenities can be reduced.
- **Water monitoring systems**, which can identify leaks and amend losses before greater loss occurs.
- **Water education plan** to provide information to users regarding their water consumption
- **Anticipated use of the Central Thermal Plant for Chilled Water** which will reduce the evaporation losses in typical cooling towers for equivalent office developments

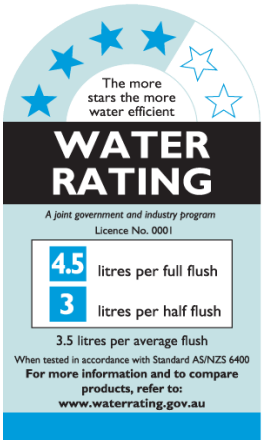

Figure 6 - Water Efficient Fittings

3.3 Central Park Water

The use of Central Park's Recycled Water System includes:

Reduces drinking water - Central Park apartments, offices and shops connected to our recycled water network are reducing drinking water use by 40 to 70 per cent. Wastewater is harvested from kitchens, bathrooms, laundries indoors and from groundwater, stormwater, rainwater, irrigation and runoff outdoors. It is then purified at our local Central Park Water Centre and returned for use on gardens, lawns, the green wall, for air cooling, washing down equipment outdoors and for toilet flushing and clothes washing. These uses can make up between 40 and 70 per cent of water consumption in the community.

Recycled water frees up drinking water supplies so they can be used to improve environmental flows. Drinking water reserves, such as Warragamba Dam, can improve their environmental flows into the Hawkesbury and Nepean Rivers, if their supply levels stay high.

The more communities using recycled water, the more water can be saved in these water reserves, which feed into our precious river systems across Sydney and NSW. Without recycled water systems, homes and communities pump millions of litres of wastewater out to sea every year. This waste receives minimal treatment before it is pumped into our oceans and seas.

Instead, recycled water harvests this wastewater, purifying it and reusing it on site to enhance gardens, lawns and sporting fields and creating a secure water source for non-drinking uses in the home or workplace. The reuse of a waste product is a positive solution that eliminates several major environmental pollutants. The more communities and households can reuse their waste, the more we can improve our environment and secure a sustainable future.

Source: centralparkplus.com.au

3.4 Resource Efficiency

Resources besides water and energy are consumed by a development. These include the building materials in the initial builds, the goods bought and sold through the retail stores, through to the food eaten by the building occupants. The following resource efficiency measures are intended to influence the architecture in finalising the design and operation of the spaces. Due to design constraints which enter as the design progresses, not all of the below efficiency measures will be implemented in the final design.

3.4.1 Construction materials

Construction materials are a highly carbon intensive component of any development. They often involve very energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development. However, there are a number of environmentally friendly practices starting to become accepted by the construction industry. Depending on the materials selected for the constructions, and the options available in the area, the following shall be adopted for material selections.

The Brewery Yard development significantly reduces its carbon footprint by upgrading and restoration of the existing superstructure. This saves tonnes of CO2-equivalent emissions, and gives the existing building a longer life than it was previously designed for. This saving is the single greatest material saving available to the development.

Additional elements may be considered in the new components and upgrade works, including:

- Recycled content in steel, concrete.
- Reduction in Portland cement.
- Materials (including paints, engineered wood products, sealants, adhesives and carpets) with low VOC and formaldehyde emissions, which do not emit dangerous volatile components, risking the health of users and compromising the internal air quality.
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process.
- Consideration for low embodied energy products, recycled or green rated products, such as GECA or “Global Green Tag”. This spans both construction and fitout items.
- Minimisation of excess wasted material.
- Quantification of materials in the planning stages to reduce the risk of over ordering materials.

3.4.2 Operational materials

The major waste streams from commercial developments are comprised of paper, mixed glass and plastics recyclables from food items, and organics from consumption. Recycling will be encouraged for the tenants.

The development will provide operational waste facilities in accordance with City of Sydney waste removal guidelines. This allows comingled recycling to reduce the impact.

Figure 7 Waste Streams

3.5 Sustainable Transport

Central Park does not have a public car park, to encourage sustainable transport. Its central location guarantees it is well connected to many forms of transport.

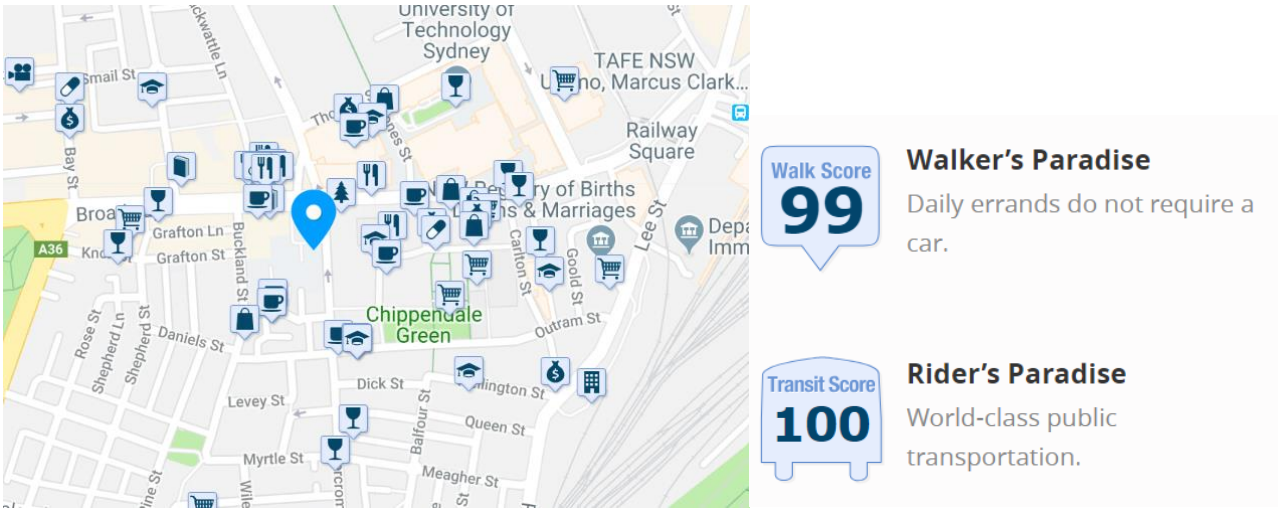

Figure 8 - Public transport options close to the Development.
Source: Walkscore (www.walkscore.com)

The following transport advice is from *centralparksydney.com:*

- **Train** - Central Station is the largest railway station in Australia, located at the southern end of the CBD between Broadway and Elizabeth Streets. Trains from Central to the city run every few minutes, and connect Central Park in every direction to Sydney's most popular attraction
- Bus - From Broadway or Central Station, buses run directly into the city, south towards Newtown, Glebe, Balmain and the inner-West, and east towards Bondi Junction, Clovelly and Coogee. www.sydneybuses.info
- **Bike or Walk** - The City of Sydney is working with renowned Danish architect, Professor Jan Gehl, to create a walking and cycle network that will link up Sydney's inner-city neighbourhoods. Central Park is at the heart of this infrastructure revolution, and is building its own network of roads and cycle paths to interlink with the City of Sydney's.
- **Car Share** - If you need a car but don't own your own, Central Park has its own convenient car-share program. Simply book online, collect your car from dedicated car spaces within Central Park, and drive away. It's the perfect solution for people who don't need a car every day and a quiet contribution to a greener Sydney. Some of Central Park's street parking bays will be dedicated to car share for public use, with the balance located underground to service residents and workers based at Central Park, and the wider community. www.goget.com.au
- **Light Rail -** Sydney's Light Rail network connects Central Light Rail Station to the Sydney Fish Markets, Star City Casino, Darling Harbour and Chinatown and inner-western suburbs including Glebe, Rozelle and Lilyfield. http://www.transdevsydney.com.au/
- **Taxi** - A taxi rank is located a 5 minute walk toward Central Train station. From Central Park, a taxi ride to the CBD should cost less than $10 – less than $15 if you're heading uptown. Sydney Airport is also less than 30 minutes away by taxi.

3.6 Environmental & Building Management

Via the implementation of industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project will seek to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning & Tuning Procedures –** (prior to practical completion / 12 months post practical completion). By implementing this via project contract documents the project ensures operational efficiency & building operation is optimised in accordance with the intended building design.
- **Energy Metering –** sub-metering will provide real-time data for the use & management of building staff. Ensures operational efficiency is maintained.
- **Waste provisions –** appropriate waste provisions are to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

3.7 Indoor and Outdoor Environmental Quality

Improved indoor environment quality is a by-product of sustainable building design. The architectural design Tzannes Architects will give significant consideration to the incorporation elements within the project intent to improve indoor environment quality.

The following design features are considered with the intent to improve indoor environmental quality.

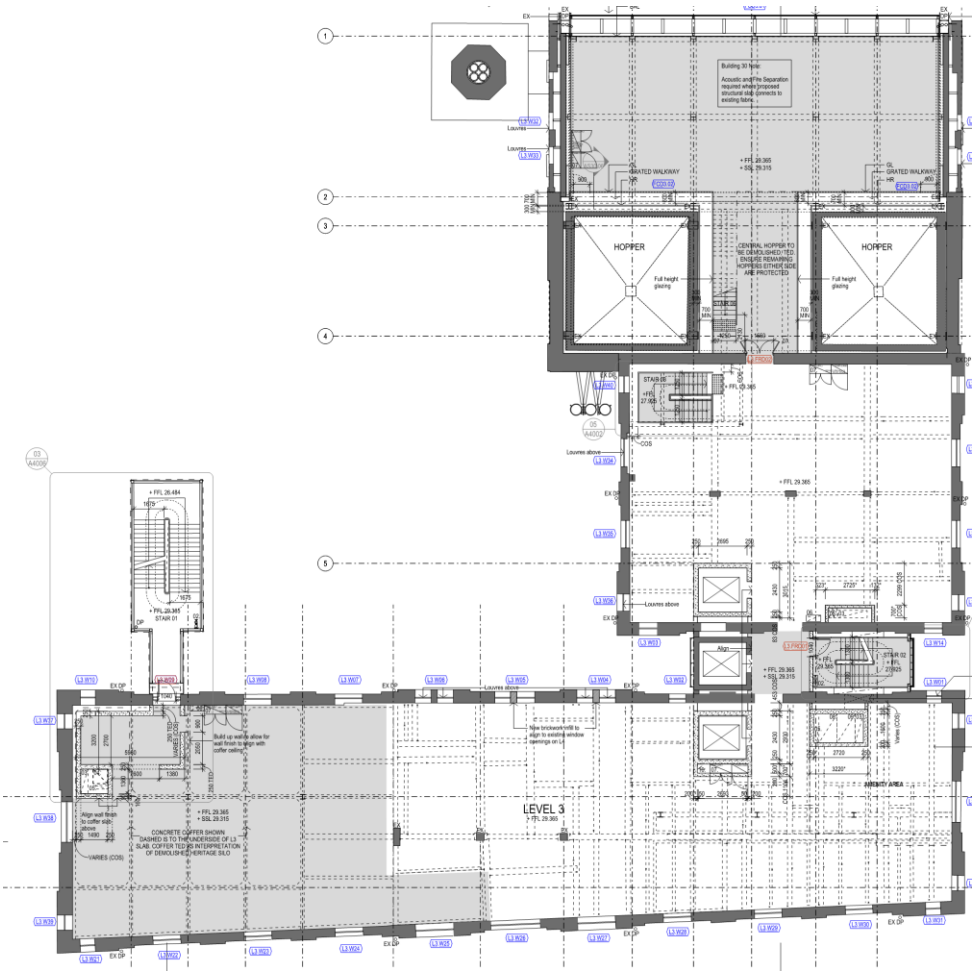

Figure 9 – The building shape allows for connectivity, flexibility, great views and access to natural daylight.
Source: Tzannes

- **Views** have been considered for the development to optimise the access of the building occupants to green or environment enhancing vistas. The layout encourages this with shallow floor plates and great access to light
- **Thermal comfort** is expected to be provided in line with the expectations for commercial buildings, while maintaining energy efficiency throughout the design. Comfort will be capable of being achieved from appropriately sized mechanical systems capable of maintaining strict space conditions.
- **Glare and radiant temperature control** through the use of space for operable blinds on each window.
- **Artificial Lighting Design –** will be able to be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. This includes general illuminance and glare reduction in accordance with best practice standards, optimised surface illuminance for building users and localised occupant lighting controls.
- **Acoustic comfort –** will be optimised to ensure building appropriate internal noise and reverberation levels are achieved in accordance with best practice standards. Examples include optimised internal materials and finishes to reduce reverberation, such as partitions sound insulation capacity, ceiling type and acoustic panels.
- **Material Selections –** will focus on reducing volatile organic compounds (VOC) levels and minimise formaldehyde impacts. Paints, sealants, adhesives, carpets, floor and material finishes will all comply with best practice VOC criteria via the architectural specification and design intent.

4. Summary

Ecologically Sustainable Design continues to be a driving consideration in the ongoing development of the Brewery Yard Development. The development will incorporate a number of ESD initiatives, borrowed from industry best practice, including Green Star Design and As Built Rating to complement the initiatives undertaken to reduce the greenhouse gas emissions, potable water consumption and material resources of the site.

The ESD initiatives outlined in this report are intended to summarise the design elements of the development. The specific initiatives that will be installed across the precinct may be subject to further feasibility analysis, including that of the final use and layout. The initiatives will comply with the guidelines set out by the relevant authorities.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- Energy & greenhouse gas emissions reduction
  - Use of on-site Central Thermal Plant, for low energy electricity, heating and cooling
  - Efficient lighting e.g. LEDs
  - Daylight and motion sensors for lighting
  - Architectural shading devices
  - Minimisation of conditioned spaces
  - Operable windows (where acoustics allow)
  - Design to 4.5 Star NABERS Standard
- Potable water reduction
  - Water efficient fixtures and fittings.
  - Use of the central recycled water plant to serve toilets and irrigation.
  - Water monitoring systems, which can identify leaks and amend losses before greater loss occurs.
- Minimising waste to landfill
- The indoor environment
  - Acoustic comfort will be optimised to ensure building appropriate internal noise and reverberation levels are achieved in accordance with best practice standards.
  - Material Selections will focus on reducing volatile organic compounds (VOC) levels and minimise formaldehyde impacts.
  - Natural Cross Ventilation through the installation of operable louvres, this will improve thermal comfort of students and reduce energy consumption related to the HVAC system.
- Occupant amenity and comfort
  - Outdoor covered walkways which offer a connection to nature that indoor corridors cannot provide, and are a less carbon intensive option than indoor conditioned corridors.
  - Access to quality views
  - Thermal comfort is provided in line with the expectations for a commercial A-Grade Development, while maintaining energy efficiency throughout the design.
  - Artificial Lighting Design will ensure the optimum lighting comfort is achieved.
- Emissions
- Building management
  - Waste provisions – appropriate waste provisions are to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.
  - Building Commissioning & Tuning Procedures.
- Embodied Carbon
  - Maintenance of the existing superstructure, including its upgrade to meet current standards. This will expand the life of the building and divert a significant amount of waste from landfill.

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the Brewery Yard Development.