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Sustainability Report

Queen Mary Building Redevelopment Site Compatibility Assessment

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This report has been prepared to present the sustainability issues and opportunities relating to the proposed redevelopment of the Queen Mary Building into Student Accommodation.

The report has been prepared by Modern Jungle, a specialist consultancy focused on creating sustainable urban environments in collaboration with TSA Management, the project manager appointed to the project.



Introduction

Located within the Royal Prince Alfred Hospital precinct, the existing Queen Mary Building is ideally located close to major public transport facilities and importantly the adjacent Sydney University Campus and other nearby universities.

The purpose of this report is to identify the sustainability aspects relating to the conversion of the existing building on the site to a student accommodation facility for 766 students. In addition to the student facilities the project will also include a small commercial and retail space.

The primary objectives are to help the project to ensure it provides a premium quality of space for the students living within the facility and identify any attributes of the site or existing building which may limit the potential of the change in use and compromise the quality of living space, energy, water or other key sustainability considerations.

Sustainability Requirements and Leadership

Government Policy and Regulation

The two main government regulations that influence the sustainability of the project are SEPP 65 and Basix. These two initiatives influence the quality of the building design and the energy and water reductions of the project respectively. In addition, whilst not forming part of the approval process the City of Sydney has established a Development Control Plan for boarding houses. The nature of the redevelopment of the Queen Mary Building generally falls somewhere between that of a boarding house with some shared facilities and an apartment complex within individual private rooms.

SEPP 65 issues have been addressed by the architectural report for the project.

A Basix report will form part of a future stage of the planning approvals process of the project.

Opportunity for Leadership

The project, as is currently being pursued, is unique. It represents an adaptive reuse of a significant existing building that was built initially for the sole purpose of operating as a nurses accommodation facility. The uniqueness of the project is such that traditionally applied tools for measuring performance such as Green Star, NABERS etc are generally not applicable to this specific type of project.

Whilst none of the aforementioned tools provide a direct route to certification they provide the opportunity to inform the design process of the project and the possibility for achieving future certification upon development of suitable tools.

Perhaps the most significant sustainability initiative the project will clearly demonstrate is the major adaptive reuse of the building. This is important as increasingly the trend by developments is to demolish and rebuild structures and facade when a change of use occurs resulting in significant embodied energy impacts and waste to landfill. The project is also capable of taking advantage of existing building attributes. These include narrow floor plates, heavyweight construction and highly effective and energy existing features like a hydronic radiant heating system. These existing attributes combined with modern technologies like energy efficient lighting smart metering and controls will ensure that the project has the potential to have both an initial and lifecycle environmental footprint significantly less than that of an equivalent new build.

Provided the existing building is found to be suitably compatible with the proposed new use as student accommodation, it has the possibility to demonstrate itself as a leader in sustainable adaptive reuse on a significant scale and provide an important reference case for future projects.

Key Initiatives

Energy

Heating and Ventilation

The project is currently being planned to provide comfort to occupants through natural ventilation wherever possible. The primary objective is to minimise demand for mechanical systems. If possible it is intended that the existing radiant hydronic heating system will be restored and used to provide heating to the residences in what is generally recognised as the most efficient and effective way.

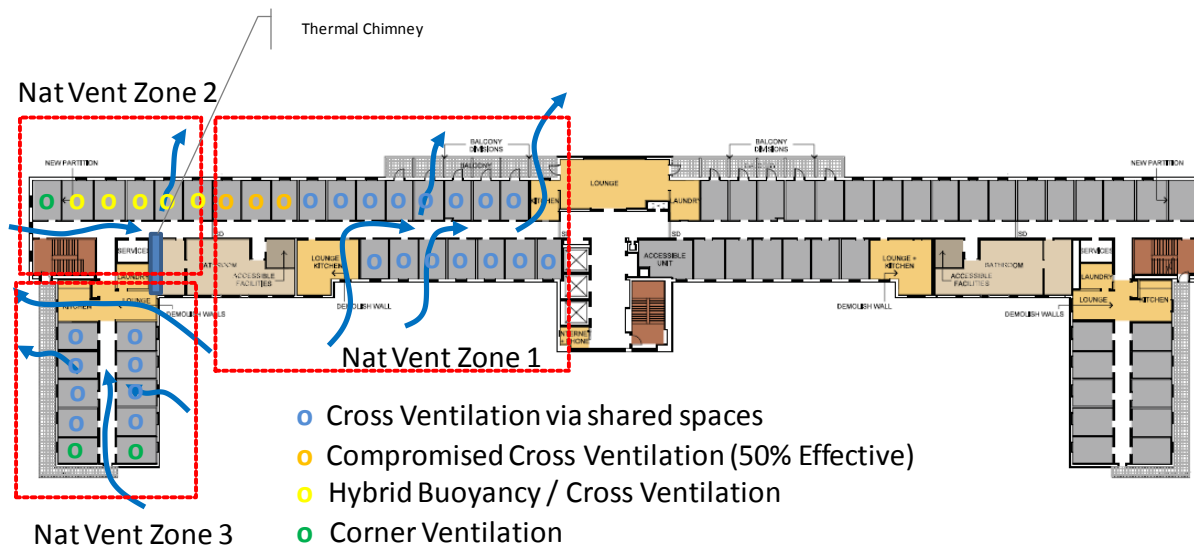
Natural Ventilation

Effective natural ventilation is a critical element of every residential style project as it greatly enhances the quality of life within the building and provides a more energy efficient building. The project, being the adaptive reuse of an existing building, is somewhat constrained with a typical floor section having a room on each facade and a central corridor.

In order to achieve cross ventilation as a first preference and buoyancy ventilation where cross ventilation is not possible, it is proposed to establish each of the corridors as an automatically controlled breezeway. This will enable each apartment to independently, manually control their own indoor thermal environment by means of a window and damper arrangement. The corridors themselves will be automatically controlled to protect from extreme weather conditions and rain.

The breezeway style corridors will also facilitate the natural ventilation of the shared facilities on each floor.

In addition to the ventilation of the living spaces, it is also critical that effective natural ventilation be provided to the common facilities on the lower floors. Current planning allows the majority of these to be effectively cross ventilated to take advantage of increased ceiling heights to improve performance.



Based on the proposed design solution it is expected that all apartments will be naturally ventilated. Approximately 10% of these will have a compromised performance in some wind conditions. The majority (>60%) will be effectively cross ventilated without relying on other private spaces.

Passive Design

Whilst the envelope of the facility is largely fixed, the passive design features of the building will serve to enhance comfort and reduce energy consumption. The relatively narrow floor plates, high ceilings and heavyweight facade and structure can all be used effectively and combined with the natural ventilation, heating and ventilation systems to enhance their performance. The concept of the automatically controlled breezeway corridors will facilitate a night purge to enable the benefit of the thermal mass to be maximised and where necessary in discrete areas the facade can be supplemented with additional screening and performance films on the glass.

The project also proposes a number of green roof areas. This will provide a thermal benefit to the spaces below and reduce heat reflected into any living spaces above.

The existing building, whilst constrained in orientation, is ideally suited to providing an optimised passive design strategy for the intended use.

Solar Hot Water

As a major energy demand in a residential facility, there is the opportunity to implement a solar hot water system on the roofs to help offset demand for gas heating within the building. It will be possible to offset a significant component of these loads and provide a greenhouse gas reduction. This initiative will be implemented in accordance with the requirements of Basix.

Water

Water Conservation

Best in market WELS rated fixtures and fittings for showers and basins and selection of appliances aligned with the requirements of Basix will provide a significant water demand reduction.

Non-Potable Water Supply

It is proposed that the water cycle of the building will be future proofed by providing a secondary non potable water system to toilets. This will enable toilets to be flushed using harvested rainwater and in the future direct connection of a possible citywide recycled water network in accordance with any Basix compliance requirements.

Rainwater Harvesting

Rainwater will be harvested from the roofs of the project and stored in a basement located rainwater tank. This water will be used for both irrigation and toilet flushing on the site and help reduce potable water demand. This will be provided in line with the requirements of Basix.

Stormwater Treatment

The majority of rainwater falling on the site will be harvested, or collected by the green roof systems. Any water that will flow into the stormwater system will be treated in line with best practice guidelines using gross pollutant traps.

Materials

Façade Reuse

Current design planning for the project is focused on retaining the existing facade and where necessary supplementing it's performance through addition of shading, improvement of seals to reduce uncontrolled infiltration and the installation of spectrally selective performance films to the glass. The resulting facade will minimise demand for new resources and rejection of waste to landfill. The embodied energy savings achieved through reductions in new glass, aluminium, concrete and block work will be minimised towards zero.

Reuse of Structure

It is proposed to use the existing building structure with minor alteration either through addition or demolition where the current system provides appropriate performance. Like the façade, this will greatly reduce the embodied energy impact of the project by minimising carbon intensive materials like concrete and steel.

Reuse of Mechanical Systems

The current building incorporates a hydronic radiator heating system. In the Sydney climate, and with appropriate passive design, active cooling systems are not generally required to maintain good comfort levels in residential facilities however a good heating system is generally a necessity.

The existing radiator heating system provides the opportunity to implement what is generally the most appropriate and efficient heating system in a residential style facility cost effectively.

In addition, there is the possibility to use the radiators through summer by passing slightly cooled water through them and allowing them to act as a heat sink further enhancing the overall quality of the internal environment with very little, if any, energy impact on the project.

Healthy Internal Materials

New materials installed within the building will be selected to minimise or eliminate off-gassing of Volatile Organic Chemicals (VOC's). This will primarily affect selections of composite wood products (to use low-or-no-formaldehyde bonding), paints, adhesives, sealants and floor coverings.

Waste

Construction Waste

By reusing the existing structure and facades the project will achieve a significant reduction in construction waste associated with demolition. General construction waste will be separated on site wherever possible and a minimum rate of recycling of 90% is planned to be achieved.

Recycling

Recycling of operational waste will be managed by the provision of discrete bins for bottles and cans, paper, organics and general waste in each of the common facilities in the building. This waste will be collected regularly by building management and placed in separated storage facilities in the basement for collection by the waste disposal services.

Facilities for bulky item recycling will be provided in the basement.

Composting

It is intended that any collected organic waste will be directed in the first instance to an on site composting facility or worm farm sized to meet the requirements of any onsite shared food gardens. Surplus organic waste will be collected by the waste services provider for processing offsite.

People

Fresh Air

The provision of fresh air to occupants within residential facilities is critical to providing a high quality of space. In addition, and a direct benefit to the proposed use as student accommodation, fresh air is known to help with learning rates of students. The previously described natural ventilation system is expected to provide a significant amount of fresh air to the occupants throughout the year.

Natural Light and Views

The planning of the facility and relatively shallow floor depths ensure that rooms will typically have substantial natural light provided. In addition, the planning of the corridors as breezeways for the natural ventilation system will also aid in the introduction of natural light. This will help reduce energy consumption and enhance the indoor environment quality of the building.

Breakout Spaces

Breakout spaces will be provided on each floor and feature natural light, natural ventilation and views. In addition, outdoor breakout spaces will be incorporated on the ground floor and the green roof spaces (incl Level 1 and Level 11 roof space) to provide a private and secure outdoor environment for the students to study in.

Shared Gardens

The green roofs, in addition to acting as breakout spaces also provide the students with the opportunity to have a shared garden space to grow vegetables and herbs. This provides both internal community benefits to the students and health benefits in having access to fresh food on site.

Natural Environment

Green Roofs

The provision of Green Roofs to the project has a number of benefits, documented throughout this report. Their primary benefit is by providing additional natural environment within the project and precinct generally. These benefits include less microclimatic impact from the building, increased biodiversity and provision of habitat for native bird species with the appropriate plant selection.

Transport

Access to Public Transport

The Queen Mary Building is located within the RPA hospital precinct and is close to both the City Road and Parramatta road main bus routes into the city. The rail stations at Newtown and Redfern are also within walking distance.

Mixed Use Development

The development is currently proposed to include a retail and commercial facility. This will help ensure the student population of 766 are not required to travel to purchase incidentals and will provide a greenhouse benefit through reduced transport demand. It importantly helps in breaking the habit of driving to the shops unnecessarily.

Proximity to key facilities

As student accommodation, the project is importantly located adjacent to the University of Sydney precinct. It is expected that the primary mode of transport for the students to the university will be either walking or cycling.

In addition, the shopping districts of Newtown and Broadway are both within walking or cycling distance. The project is ideally located to help ensure the need for occupants to own and use cars is greatly minimized.

Carparking Minimisation

Carparking on site has been minimized and the project has been designed to prioritise other modes of transport.

Cyclist Facilities

The design proposal allows for the conversion of a significant section of the basement to cyclist facilities and associated storage. As a minimum 1 dedicated space for every 3 occupants will be provided and it is anticipated that every occupant will have access to either a dedicated cycle space or storage facility.

On grade facilities will be provided for visitors bicycles.

Key Observations and Recommendations

1. The existing building façade and structure appears to be readily adaptable to providing a high quality of environment for the student residents the project will house.
2. The vast majority of rooms within the project will be able to be naturally ventilated by either cross ventilation or buoyancy ventilation without the reliance on opposing rooms or mechanical assistance. This will provide a healthier and lower energy building.
3. The reuse of the existing building structure will avoid over 300,000 kg of Greenhouse Gas emissions in embodied energy alone when compared to a new build student accommodation.
4. The operational facility is expected to achieve GHG savings of over 400,000kg annually compared to a typical facility.
5. Water consumption is expected to be reduced by approximately 5,000 kL annually compared to a typical facility.

Based on the items reviewed in this report it is considered that from a sustainability perspective the change in use of the building to student accommodation is appropriate and the project will be able to achieve exemplary environmental performance in all areas considered.