

ECOLOGICALLY SUSTAINABLE DEVELOPMENT REPORT
ISSUE 2

SUMMER HILL FLOUR MILL SITE REDEVELOPMENT

7th March 2011

ARUP

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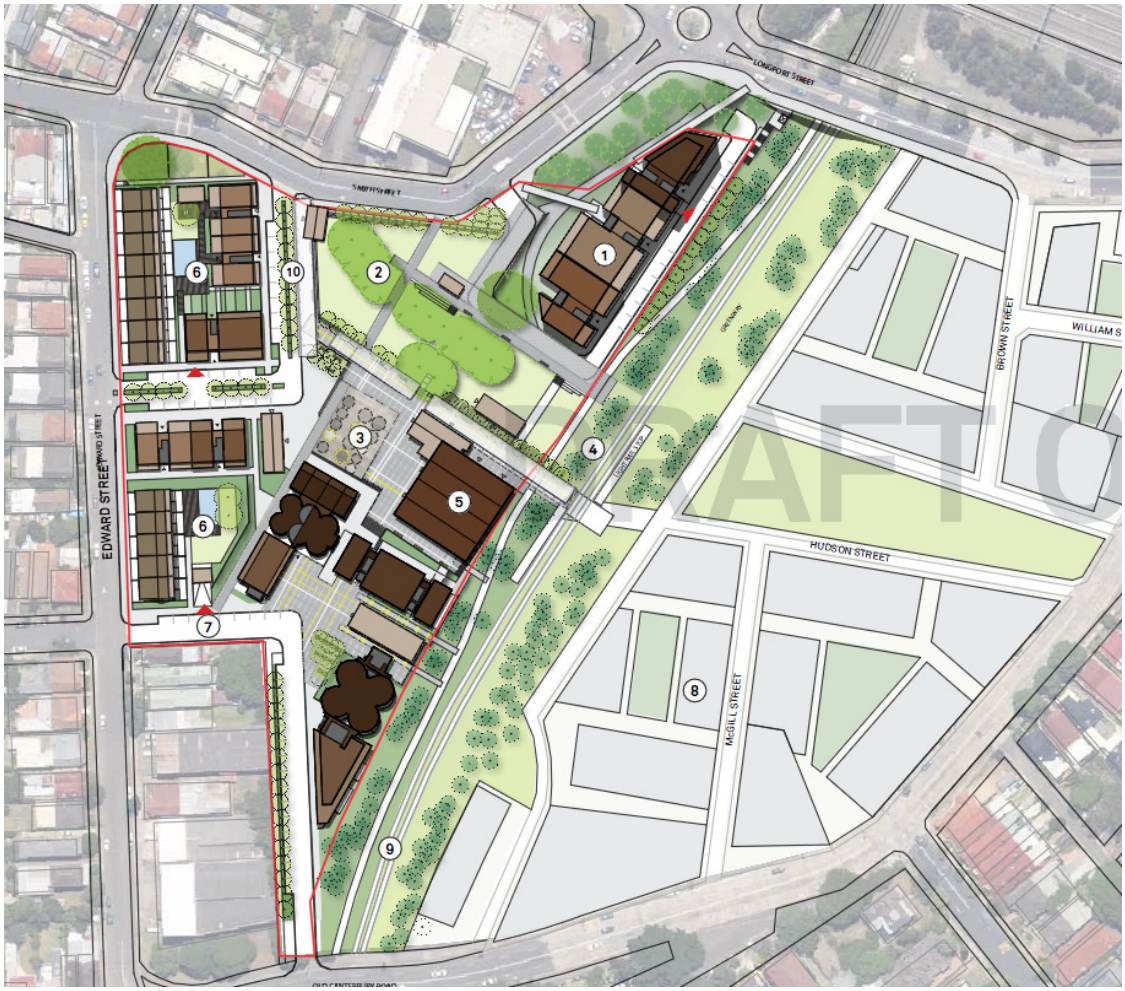


ABOVE Site plan of the proposed development

The Summer Hill Flour Mill Site Redevelopment aspires to be designed based on nationally and internationally recognised benchmarks for sustainable sites and neighbourhoods. This report aims to provide an overview of the current design and to set a framework for future stages of the project.

The design targets include high levels of indoor environmental quality for the proposed buildings, environmentally low-impact materials, and efficient waste management. These targets are directed at reducing environmental impacts for the whole life cycle of the buildings within the site and the carbon footprint of the community.

1.0 INTRODUCTION

This report has been prepared by Arup on behalf of EG Funds Management for the Concept Plan Application submission for the Summer Hill Flour Mill Site. The report responds to the Director's General Requirements issued for the project relating to Ecologically Sustainable Development. The site is located at Summer Hill and is split between the Marrickville and Ashfield local government areas in Sydney's inner west. The report summarises initiatives under consideration by the design team to reduce environmental impacts caused by the design, construction and operation of the proposed development.

The design concept focuses on creating a highly energy efficient site that takes maximum advantage of Sydney's climatic conditions for creating efficient, comfortable public spaces and buildings within the site.

The redevelopment is based on adaptive reuse of existing de-activated structures, the construction of new contemporary residential buildings, office and retail spaces and the retention and restoration of significant buildings considered to be of heritage importance. Public spaces will be designed to embrace social sustainability concepts by demonstrating sustainable technology to the general public, creating pedestrian-friendly spaces and stimulating the use of low carbon methods of transport such as bicycle and light rail. Site-wide water efficiency strategies are also part of the holistic sustainable approach to the site.

The design targets include high levels of indoor environmental quality for the proposed buildings, environmentally low-impact materials, and efficient waste management. These targets are directed at reducing environmental impacts for the whole life cycle of the buildings within the site and the carbon footprint of the community.

The site aspires to be a landmark in sustainability. Sustainability strategies and benchmarks have been suggested for the proposed site based on internationally recognised environmental rating tools and best practice guidelines formulated by the Green Building Council of Australia through the Green Star rating tool, from numerous industry sources and Arup experience. It also acknowledges and applies existing building codes and guidelines such as the Building Code of Australia, Basix and NABERS.

The feasibility of key sustainability strategies will be considered on an individual basis at strategic level. This means that to be deemed feasible they must be justified based on specific financial considerations and sound environmental benefits.

2.0 ECOLOGICALLY SUSTAINABLE DEVELOPMENT

REPORT SCOPE

This report is written in response to the Department of Planning Director-General's Requirements for the *Summer Hill Flour Mill Site redevelopment.*

ECOLOGICALLY SUSTAINABLE DEVELOPMENT PRINCIPLES

Ecologically sustainable development aims to sustain and conserve natural resources through *'using, conserving and enhancing the communities' resources so that the ecological processes, on which life depends, are maintained and the total quality of life, now and in the future, can be increased'* (Commonwealth Government of Australia, 1990).

The principles of ecologically sustainable development have been an integral consideration throughout the process of developing the proposed site and assessing its benefits and impacts. In addition, the preparation and exhibition of the environmental assessment in itself contributes to the consideration of the principles of ecologically sustainable development. It makes detailed information about the site upgrade publicly available and assists in the decision on whether the upgrade should proceed.

Definitions of the four principles of ecologically sustainable development quoted below are from the Protection of the Environment Administration Act 1991. The definitions from this act are cross referenced in the Environmental Planning and Assessment Act 1979.

Precautionary principle

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.

Intergenerational equity

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations

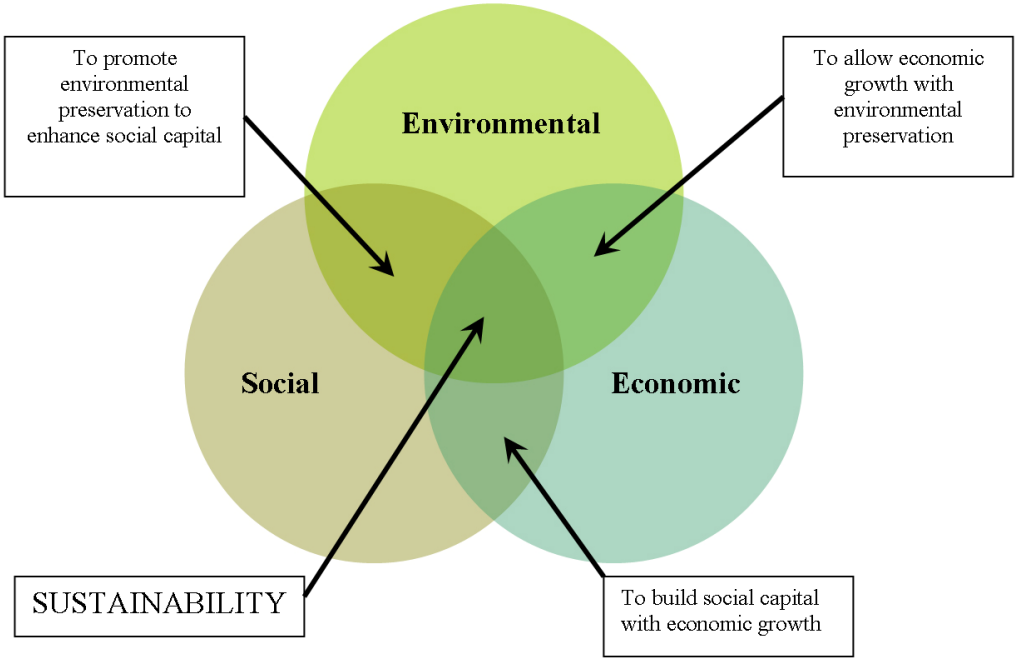
Conservation of biological diversity

Conservation of biological diversity and ecological integrity should be a fundamental consideration.

Improved valuation, pricing and incentive mechanisms

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,



ABOVE The fundamental tenets of sustainability include the balanced consideration of environmental, social and economic issues. This approach will underpin the entire design strategy proposed for the new site.

(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.

3.0 KEY SUSTAINABILITY STRATEGIES




'Australia's population is expected to rise by 60 per cent by 2050, reaching almost 36 million people. Most of us – nearly 85 per cent - will choose to live in cities. This trend in growth will challenge us and be influenced by ecological limits and natural resource constraints, particularly diminishing supplies of oil worldwide, a changing climate, pressures on water supplies, reduction in arable land, the growing need for employment and access to affordable, liveable and enjoyable places. We are, however, in the enviable position of being able to shape the progress of our existing and future communities'. ('Green Star Communities– National Framework', The Green Building Council of Australia)

The sustainability strategy for the proposed site hinges on two approaches—Base Strategies and Active Strategies. The **Base Strategies** concern the overall sustainability aspects of the Concept Plan and its relationship with transport networks, density and land use, heritage aspects, water sensitive urban design, the overall orientation, massing and proposed layouts of the buildings on the site to encourage solar access, natural ventilation, water and energy efficiency, and renewable energy generation potential.

The **Active Strategies** concern the aspirational design features considered for individual buildings and structures, setting a framework for achieving environmental and energy ratings targets. While the Base Strategies inform the proposed Concept Plan and can be incorporated into the architectural model developed by Hassell Architects, the Active Strategies can remain open to further refinement during the design, construction and operation of individual buildings.

The selection of key sustainability technologies can be considered under a Life Cycle Cost approach at a strategic level. This aims to provide the team with sound environmental, economic and financial solutions over the life cycle of the development to inform the design decisions.

Sustainability strategies have been suggested for the proposed Summer Hill Flour Mill Site Redevelopment based on the tenets of internationally recognised environmental benchmarks and best practice guidelines formulated by the Green Building Council of Australia through the Green Star rating tool, from numerous industry sources and Arup experience. The redevelopment also acknowledges and applies existing building codes and guidelines such as the Building Code of Australia, Basix and NABERS.

SUSTAINABILITY FRAMEWORK

The design of the site embraces the key aspects of a framework developed by the Green Building Council of Australia that can be applied to new developments with similar characteristics to the new site (Green Star Communities, still to be developed in its pilot version). The design adopts the key principles of the tool for structuring sustainability actions and ideas for projects, which are:

Enhance liveability;

- Providing a diversity of dwellings, buildings and facilities, for all ages, abilities and cultures with easy and safe access to local services and transport;
- Supporting walking, cycling and outdoor living through effective urban design and landscape architecture;

Create opportunity for economic prosperity;

- Enabling community and business connectivity and attracting investments for local business opportunities;

Foster environmental responsibility;

- Protecting and restoring natural and cultural heritage;
- Promoting biodiversity;
- Reducing greenhouse gas emissions through the appropriate design of individual structures;

Embrace design excellence;

- Designing for mixed use and creating urban structures and connectivity between places, buildings and transport networks;
- Creating opportunities to retrofit existing buildings and revitalise existing sites;
- Reinforcing a sense of place and community identity;

Demonstrate visionary leadership;

- Incorporating performance evaluation, feedback to the community aiming continual improvement through recognised environmental rating tools;

The following sections present the Base and Active Strategies to be considered for the project. They are divided into 5 main areas: Water Sensitive Urban Design; Energy and Environmental Comfort; Sustainable Transport; Materials and Waste Management; Social Sustainability. All the applicable Environmental Standards and Codes are also discussed.

3.1 WATER SENSITIVE URBAN DESIGN

It is common knowledge that water is perhaps the leading issue influencing much sustainable design in Australia. The Green Star rating tool includes an entire section devoted to limiting water use. When scarce water resources are conserved, reducing the need to dam rivers, less waste water is produced and treated at sewage plants and greenhouse gas emissions are reduced.

Water recycling is a key component of the total water cycle management and integrated water resource management. Water recycling is fundamental to manage and balance all of the components of the hydrological cycle (rainwater, stormwater, wastewater, groundwater, surface water and recycled water) to secure a range of social, economic and environmental benefits. The effective and safe implementation of water recycling strategies can help to reduce inputs of nutrients and other contaminants to surface water, conserve potable water and provide economic and social benefits to local communities.

The design of the water systems encompasses the philosophy to:

- **Attenuate peak flows** throughout the site by identifying and maximising available storage across the site and identifying opportunities for **infiltration to ground**;
- **Reuse, recycle and reduce** the amount of water being utilised according to each individual building's and the site's capabilities;

3.1.1 Base Strategies

The following measures are considered as Base Strategies concerning the overall sustainability aspects of the Concept Plan:

STORMWATER

Bio-retention swales and treatment systems will be considered for green spaces; these would detain and treat storm water to ensure that peak storm water flows are properly controlled. The design team will target that all stormwater leaving the site has been treated in accordance with the *Urban Stormwater Best Practice Environmental Management Guidelines* (CSIRO 1999) and *Australian Runoff Quality, A Guide to Water Sensitive Urban Design* (Engineers Australia, 2006).
Swale systems also retard and filter runoff and pollutants, and in particularly remove coarse to medium-sized pollutants.

WATER INFILTRATION

The use of hard stand areas would be minimised by limiting these to roads, pedestrian walkways, urban plazas and the surroundings of proposed buildings.
Permeable paving has been recommended on some roadways.

SITE IRRIGATION

Where feasible, the site will use vegetation with minimal or no irrigation requirements for public landscape areas. The design team will investigate systems with the goal to minimise potable water for irrigation purposes.

3.1.2 Active Strategies

The following measures are considered as Active Strategies concerning overall sustainable aspects of individual buildings and structures open for refinement during the design.

RAINWATER HARVESTING

The Concept Plan includes, amongst the proposed buildings, relatively large roof areas capable of collecting rain water for toilet flushing, cooling tower make-up, and irrigation purposes. Where appropriate, the development of individual buildings will consider incorporation of dual-reticulation of hydraulics services to enable the use of non-potable water sources in buildings.

WATER MONITORING

Water meters will be considered for all large-scale water uses within the site including cooling towers, hot water services, and kitchen facilities, facilitating the identification of malfunctioning water systems and preventing leakage. The feasibility of installing water monitoring shall be evaluated on an individual basis under financial and environmental considerations.

Figure 6 | Stormwater Concept Plan

APP

Legend

- GPT
- RWT
- Bioretention
- Stormwater drainage pipe system
- Permeable paving
- Vegetated buffer (grass)

Location of stormwater drainage, permeable paving, vegetated buffers, and potential areas of bio-retention, which would also be beneficial to maximise water infiltration.