

**Kelvin Grove Urban Village –A Case Study
Sustainability Response – Conference Paper**

By QUT in conjunction with Hassell Pty Ltd
August 2002

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EXECUTIVE SUMMARY

The **strategic location** of the site combined with the physical outcomes proposed in the **master plan** has laid a strong sustainability platform for the Village. This is being enhanced through **infrastructure** initiatives currently being designed and implemented. In addition the **Local Area Plan and Design Guidelines**, prepared for the Village, will require developers to deliver practical and affordable sustainable outcomes and, through development bonuses, achieve sustainable outcomes which would otherwise be difficult to justify economically.

There are also opportunities for the Village to build on this sustainability platform during the **building design, construction** and **operational stages** of the project.

1. The **strategic location**:

- facilitates the reuse of a brownfield site;
- capitalises on the existing and proposed transport network to achieve a Transport Orientated Development (TOD);
- enables access to the inner north eastern busway, within walking distance to the site, and the local bus service within the area;
- facilitates a smaller environmental footprint than low density urban fringe areas;
- maximises utilisation of existing physical and social infrastructure; and
- enables the co-location of uses to provide accommodation in close proximity to employment opportunities (including the CBD).

2. The **master plan** provides a coherent and supportive physical framework for the Village which will deliver a memorable urban environment of high quality, including:

- an unusually urban approach, creating a permeable, connected, integrated, adaptable and highly legible layout of built forms, public streets and spaces;
- a central 'main street' or neighbourhood 'high street' acting as the lively central place of the Village; and
- a mixture of uses horizontally and vertically, including more than 700 residential dwellings in a density compatible with the inner city location of the site.

A. Social planning initiatives of the master plan include:

- providing active public spaces, community facilities and unique character which will develop a sense of community;
- responsiveness to community concerns; and
- making available and accessible the diverse facilities of QUT, consistent with its close relationship with industry, with their commitment to life long learning and engagement with the community

B. Environmental initiatives of the masterplan include:

- a site sensitive approach which has built on the natural attributes of the area;
- facilitating a decrease in car travel, by providing a mixed use, walkable and accessible urban environment;
- minimising the use of fossil fuels and hence a reduction in air pollution; and
- ensuring development minimises energy demands, reduces greenhouse gas emissions and provides low energy solutions to achieve adequate comfort levels.

C. Economic initiatives of the masterplan include:

- facilitating a density of development which makes cost effective use of scarce land;
- improving the quality of the site to provide a high standard environment which also improves the return for the development;
- reducing the need for private transport;
- including a mix of housing densities, ownership patterns, price and building types suited to different income levels, life-styles, cultures, and age groups;
- utilising the existing infrastructure; and
- embracing the concept of shared opportunities and synergies within the area, contributing to overall efficiencies.

3.The **infrastructure** will:

- utilise best practice techniques to manage the majority of the soil contamination on site, to minimise impacts within the site and externally;
- remove domestic waste material of concern to the local community;
- encourage the recycling of existing buildings within the site;
- recycle materials from the site;
- use pavement treatment and grading to allow rainwater to percolate through the soil to replenish the underground water table where possible;
- include planting a significant amount of trees and shrubs in streets and parks; and
- provide practical inner urban 'green' ways with managed utility services and stormwater.
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4.The **Local Area Plan**, currently being incorporated into the City Plan, will:

- set high sustainable standards for development within the site which:
 - exceed the requirements of Brisbane City Council's Energy Efficient Code to achieve four star energy rating for residential and commercial buildings;
 - require solar or gas hot water systems, to replace electric, with major reductions in greenhouse gas production;
 - require all buildings to include AAA rated water efficient taps, toilets and showers;
 - require a construction waste strategy;
 - require life cycle analysis of construction materials;
- require all development to prepare a strategy which identifies how it will comply with these sustainable development standards, and demonstrate how compliance will be maintained during the life of the building; and
- entitle development to a bonus of up to 10% in additional gross floor area if it includes sustainability measures.

5.The **building design stage** will implement the initiatives of the Local Plan requiring:

- building contracts which support sustainable development outcomes, by providing a balance for the issues of capital and operating costs, environmental and social outcomes;
- The implementation plan for all future development requires a statement of compliance with the ESD policy and the application of the minimum performance criteria and other principles relevant to the particular lot.:
- The performance criteria relate to several priority areas.
 - Energy Efficiency
 - Transportation
 - Biodiversity

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- Atmospheric Management
- Water Management
- Indoor Air Quality Management
- Waste Management
- Light and Noise Pollution
- Monitoring and Implementation
- In addition, development bonuses may be provided in some circumstances. For example for:
 - facilitating on site wastewater treatment by allowing the separate collection of grey water and black water; and
 - generating electricity through solar photovoltaic cells and use of green energy from the grid, encouraged through development bonuses.

6. The construction stages will:

- require site specific environmental management plans (EMP) to be developed to minimise on and off-site air, noise and water pollution during construction. Possible initiatives could include:
 - keeping dust to a minimum by ensuring large surfaces are kept damp (not wet) and plant or equipment filters are used;
 - ensuring sedimentation control systems are in place and properly maintained throughout the project;
 - using bunding to avoid pollution leaving the site from spills or leaks;
 - comply with all noise-related consent and approval conditions;
 - develop specific site-protection requirements that the contractor should follow and require the contractor to submit plans for meeting them;
 - designate and fence off vegetation that needs to be protected throughout the construction process; and
 - avoid mixing materials which cannot be separated in the future for recycling or reuse.

7. The operational stages of the project should:

- ensure that ownership arrangements do not jeopardise the sustainability initiatives conceived in the early stages of the development and encourage best practice;
- demonstrate a commitment to triple bottom line accounting by placing values on the social and environmental outcomes of the development;
- establish environmental indicators against which the development's strategies can be assessed, to determine if the community is moving towards sustainable development;
- incorporate meters to measure the use of resources such as energy and water to evaluate performance against these indicators.

1. INTRODUCTION

The vision of the Kelvin Grove Urban Village started with the purchase of The Gona Barracks by the State Department of Housing in 2000. The site was former defence land that had a military history of occupation from 1911 to 2000. Contemporaneously, QUT whose Kelvin Grove Campus backed onto the site, was keen to expand and particularly to develop a presence on the busy arterial road, Kelvin Grove Road. Negotiations followed which resulted in the State Government through the Department of Housing, and QUT agreeing to develop a Master Plan for the site. HASSELL were appointed and over a consultation and technical review period of 6 months to December 2000, the Master Plan was produced.

The Department of Housing became involved as a means to develop land that could be sold to support their low income housing schemes on this site and in other areas, and QUT pursued the opportunity of a presence on Kelvin Grove Road as well as the development of creating university facilities integrated with the community, promoting the openness, availability and opportunities in tertiary education.

2. HISTORY AND BACKGROUND

The site is located within 2km of the city Brisbane, surrounded by major roads, public transport and community infrastructure such as the Royal Brisbane Hospital, the new Roma Street Parkland, proposed Lang Park stadium refurbishment and connecting into a new inner city busway to be completed at the end of 2004. For Housing, this strategic location reinforced their development assessment of the city frame land, for QUT it strengthened the existing link to the main QUT campus at Gardens Point within the city. Its crested topography also yielded significant views of city buildings, and Brisbane generally for 360° - another plus for the Department of Housing.

As the master planning progressed, it became obvious that the site, while it represented a prime brownfield site close to the city, it also harboured a number of issues, or challenges as we have come to call them.

- The nature of the ownership meant that the Gona Barracks was zoned 'Special Uses – Defence', the QUT lands were 'Special Uses – Education Reserve', including a remnant Deed of Grant in Trust over the former student residences sites, Brisbane City Council Parkland, road reserve and small allotments of freehold land. Basically the existing zones and uses were as diverse and as far away from the proposed uses as was possible.
- Sections of the site were registered or provisionally registered on the Queensland Heritage register, these are the Gona Barracks site and the student residences site.
- Brisbane City Council were concurrently in a process of developing an LAP for the area.
- The land was registered on the contaminated land register, and required remediation before development could start.
- The topography was not conducive to universal access and in part could be considered very challenging with grades greater than 10%.
- The site is regarded as significant by the local indigenous group, the Turrbals.

Through out this QUT was committed to opening a new facility for the Creative Industries Faculty by the end of 2003, even though titling and land transfers were not going to be available until late 2002.

This was the scenario in 2000 with the Department of Housing entering as a developer of land to sell to developers, and QUT possibly being seen as more altruistic, wanting to expand its educational facilities into the community, all on land that presented significant challenges to develop.

The master plan by HASSELL proposed the concept for mixed use development incorporating all the best planning theories and acronyms available. It was to be a TOD development (Transport Oriented Development) using ESD (Environmentally Sustainable Design) and CPTED (Crime Prevention Through Environmental Design) principles. It also proposed strong guidelines for the urban design context, landscape, traffic management and community infrastructure.

A Deed of Co-operation was signed between Department of Housing and QUT in July 2001, setting out the principles for land valuations, and transfers, design review of development proposals and process, and all the normal contractual obligations, but it was as much this document, as the emerging realisation that this development could express and set new benchmarks in ESD strategies that cemented the partnership between the stakeholders.

While the master plan set out lengthy ESD initiatives in its text, the stakeholders were nervous as to what they would cost, whether they could be commercially implemented, and how, beyond the construction of the infrastructure of the roads and lots they could be enforced and maintained. As for many developers of land, or facilities, QUT was not confident of being able to follow through on the high principles set out in the Master Plan.

By the time the Principal Consultants for infrastructure, Connell Wagner were completing design development, with HASSELL continuing in the master planning role earlier this year, a watershed ESD Workshop was held. This was attended by the consultants, Department of Housing and QUT and became the turning point for not just the acceptance of the principles, but lifting the benchmarks. Over the course of the afternoon workshop, we developed a simple table that reinforced our successes to date and drafted strategies for lifting the benchmark for ESD in the Urban Village.

These strategies covered three stages of the project:

- Planning and Design
 - Master Plan
 - Infrastructure Works
 - Buildings and Improvements
- On site Works for
 - Site Preparation
 - Infrastructure Works and Buildings and Improvements
- Post Construction
 - Operations and Maintenance

SUSTAINABILITY RESPONSE

3.1 STRATEGIC OR REGIONAL ISSUES

The Government's initiative to purchase the site for Kelvin Grove Urban Village was due to its strategic location which results in:

- reuse of a **brownfield site**;
- capitalising on the existing and proposed transport network to achieve a Transport Orientated Development (**TOD**) and all the benefits it provides, such as a reduction in private vehicle use and hence a reduction in the reliance on fossil fuels and a reduction in air pollution;
- the site being within walking distance to the inner north eastern **busway** and has excellent access to the local **bus service** within the area;
- a **smaller environmental footprint** than low density urban fringe areas;

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- a resulting decrease in pressure on agricultural land and environmentally valuable sites resulting in the **conservation of land in fringe areas** for other uses;
- maximum utilisation of existing **physical and social infrastructure**;
- the **co-location of uses** to provide accommodation in close proximity to employment opportunities (including the CBD);
- the potential to make **QUT more accessible** to the community;
- **better integration** within Brisbane of and **improved access** to the site and the adjacent isolated housing precinct; and
- **medium density development to provide a realistic return from the site in social, environmental and economic terms.**

3.2 PROJECT PLANNING

In the masterplan there was acknowledgment that physical solutions by themselves will not solve social and economic problems, but neither can economic vitality, community stability, and environmental health be sustained without a coherent and supportive physical framework.

The brief for the preparation of the master plan identified the State Government's intent for the project to become an internationally recognised working model of sustainable urban development through its design, construction, technology and management.

The Village will deliver a memorable urban environment of high quality, including:

- a planning and design approach is unusually urban, creating a permeable, connected, integrated, adaptable and highly legible layout of built forms and formal public streets and spaces;
- a central 'main street' or neighbourhood 'high street' acting as both the link between Kelvin Grove Road and the existing campus and as the lively central place of the Village;
- public spaces which will provide a balanced level of accessibility within the Village; and
- a mixture of uses horizontally and vertically, including more than 700 residential dwellings in a density compatible with the inner city location of the site.

The planning of the project has demonstrated a commitment to social elements of urban sustainability. The Village:

- will provide active public spaces and community facilities will develop **a sense of community**;
- relied on the **innovative partnership** of the Queensland Government (through Housing Queensland) with the Queensland University of Technology and the close involvement of the Brisbane City Council;
- utilised a comprehensive multi-disciplinary planning approach and a program of agency, industry and community consultations which demonstrated a clear **commitment to consensus**;
- delivers **cultural heritage outcomes** through careful retention and re-use of important buildings and remnant vegetation and the detailed design of the public realm and the buildings which define it;
- does not create a "gated" community and plans for natural **incremental growth and change over time**;
- is **respectful of existing neighbours** at its edges;
- **encourages diversity** through design policies and guidelines requiring a variety of design languages; and
- will establish **a centre for the Kelvin Grove** neighbourhood, offering a variety of important local services consistent with village intentions, in terms of scale, design and location.

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The planning of the project has also demonstrated a commitment to environmental elements of urban sustainability. The Village:

- is based on a **sensitive site design** which considered, and incorporated where possible, the existing environmental characteristics of the site;
- **facilitates a decrease in car travel**, by providing a mixed use, walkable and accessible urban environment; and
- **minimises the use of fossil fuels** and hence reduces air pollution.

To complete the picture, the planning of the project has also demonstrated a commitment to economic elements of urban sustainability. The Village:

- facilitates a higher density of development which makes **cost effective use of scarce land**;
- includes a mix of housing densities, ownership patterns, price and building types suited to **different income levels, life-styles, cultures, and age groups**;
- includes the delivery of **affordable housing** by Housing Queensland in partnership with the private sector;
- embraces the concept of **shared opportunities and synergies** and contribute to overall efficiencies; and
- includes QUT's health sciences and creative industry initiatives, **stimulating new community and economic opportunities**.

3.3 INFRASTRUCTURE

The infrastructure initiatives which enhance the sustainability of the project include:

- using best practice techniques to **manage the majority of the soil contamination on site**, to minimise impacts within the site and externally;
- the **removal of domestic waste** material of concern to the local community;
- the **reuse of on-site contaminate materials**, with the ash fill material being used as road base;
- using pavements and grading **to allow rainwater to percolate** through the soil to replenish the underground water table where possible;
- using **overland flow**, where possible, for the disposal of stormwater;
- encouraging the recycling of existing buildings within the site;
- recycling materials from the site and buildings;
- **delaying and managing stormwater on-site**, where possible to prevent erosion and flooding;
- planting a significant amount of trees and shrubs in streets and parks;
- practical inner urban 'green' ways with managed utility services and stormwater;
- reusing existing concrete slabs by crushing and using as road base and fill;
- mulching trees which need to be removed and reusing the mulch to reduce the requirements for water plants.

3.4 LOCAL AREA PLAN

The Local Area Plan for the Village will require developers to deliver practical and affordable sustainable outcomes and, through development bonuses, achieve sustainable outcomes which would otherwise be difficult to justify economically. In addition, Energy Efficient Code encourages practical design solutions which assist in creating comfortable living environments and reducing energy requirements.

The Brisbane City Council, through the development of a Local Area Plan, is incorporating the Village into the City Plan. The Local Plan is a performance based statutory control with principles and acceptable solutions for development within the Village. There are principles and associated acceptable solutions to maximise the sustainability of project, refer to appendix one.

The Local Plan requires all development to prepare a strategy which identifies how it will comply with sustainable development principles, and demonstrate how compliance will be maintained during the life of the building. Proposals must address, but not be limited to:

- **energy efficiency;**
- **greenhouse gas reduction**
- **water efficiency;**
- **waste recycling;** and
- **life cycle analysis** of building materials and products.

The Local Plan will require a sustainability strategy to be developed for each building which - identifies targets; proposes technology, design techniques, infrastructure and maintenance; identifies monitoring processes; allows for improvement initiatives; and includes a management structure which will ensure the continued operation of the strategy.

The Local plan sets high sustainable standards for development within the site which:

- exceeds the requirements of Brisbane City Council's Energy Efficient Code to achieve four star energy rating for residential and commercial buildings;
- require solar or gas hot water systems, to replace electric, with major reductions in greenhouse gas production;
- require all buildings to include AAA rated water efficient taps, toilets and showers;
- requires a construction waste strategy; and
- requires life cycle analysis of construction materials.

Development, which includes sustainability measures, will be entitled to a development bonus of up to 10% in additional gross floor area.

3.5 BUILDING DESIGN

The outcomes required through the Local Area Plan will be delivered through the design of the buildings within the Village.

The project has adopted the following policy for sustainable development:

A more sustainable solution to the development of the Kelvin Grove Urban Village, which is both desirable and feasible, is currently being implemented. It is an environmentally progressive, socially responsible and commercially viable response to a range of matters that arise from the planned development of this site.

All parties that intend to develop, redevelop, carry out improvements to or erect buildings upon a site or any part of a site shall only do so whilst using reasonable endeavours to advance current industry best practise with regard to all elements of SD.

All development plans and proposals submitted to the Project Control Group (PCG) for approval should include a statement concerning the manner and extent to which the proposals meet the SD principles and objectives.

The implementation plan for all future development requires a statement of compliance with the ESD policy and the application of the minimum performance criteria and other principles relevant to the particular lot. It shall be by way of completion of a compliance checklist and a written report as part of the design documentation approval process.

At a minimum, the report should identify that the design, construction and operation and maintenance stages of the building life cycle comply with the minimum performance criteria. It should also highlight how the particular development exceeds these minimum requirements in any particular area or manner.

The project participants want to enhance current ESD 'best practice' in Australia today, whilst acknowledging practical or economic restrictions or limitations. Generally, sustainability initiatives have only been included as minimum performance criteria if they are relatively affordable and demonstrate a good internal rate of return.

The tables below are intended to take the broader community sustainability principles and translate them into specific practices to be adopted in the design and construction of the individual buildings. The minimum performance criteria in these tables will be continually revised to reflect changing practices and further contribute to the community sustainability goals.

The performance criteria relate to several priority areas.

- Energy Efficiency
- Transportation
- Biodiversity
- Atmospheric Management
- Water Management
- Indoor Air Quality Management
- Waste Management
- Light and Noise Pollution
- Monitoring and Implementation

Sustainability strategies for each of these categories are defined, along with minimum performance criteria. Also identified are the methods of demonstrating compliance with these criteria with the Expression of Interest submission. Where compliance can be demonstrated via plans which are appropriate for this initial stage, these should be supplied. Otherwise a commitment from the developer to comply with the criteria is sufficient. The developer will need to provide evidence of this commitment at later stages of the design process.

ESD STRATEGY	MINIMUM PERFORMANCE CRITERIA	CONCEPT STAGE COMPLIANCE
1. ENERGY EFFICIENCY		
1.1 Building Envelope - Multi-storey residential buildings All multi-unit residential buildings must be designed to maximise thermal performance, thermal comfort and energy efficiency	All multi-residential buildings must achieve a 4 star BERS or NatHERS rating – in multi-unit development select typical sample units as a representative example.	Energy Performance Statements submitted with each development submission.
1.2 Building Envelope - Commercial buildings All commercial buildings must be designed to maximise thermal performance, thermal comfort and energy efficiency.	All commercial office buildings must achieve a 4 star energy rating in accordance with AGBRS. Other commercial buildings achieve an equivalent to 4 star rating or within the range 70-100kWh/m ² /annum.	Energy Performance Statements submitted with each development submission.
1.3 Hot Water Systems Hot Water Systems must meet hot water demands but also reduce reliance on supply infrastructure and minimise greenhouse gas generation.	All buildings must be installed with energy efficient gas or solar hot water storage systems.	Commitment from developer
1.4 Lighting Buildings should be designed to maximise use of natural light and minimise energy use for lighting.	Buildings must be designed so that lighting consumes no more than 3 watts/m ² averaged over the whole building through the use of good design and energy efficient lighting.	Commitment from developer
1.5 Natural Lighting To improve the health and comfort of building residents by providing natural light to interiors.	Buildings must achieve an average daylight factor of 2.5% of the external ambient light across 60% of the living areas in residential buildings.	Commitment from the developer.
1.6 Space heating and cooling Buildings should be designed to reduce the need for heating or cooling and ensure that any mechanical heating or cooling will be energy efficient.	Heating/cooling systems must target only critical spaces and be zoned for maximum efficiency .	Strategy submitted with each development submission.

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ESD STRATEGY	MINIMUM PERFORMANCE CRITERIA	CONCEPT STAGE COMPLIANCE
1.7 Appliances Buildings should be installed with energy efficient appliances that minimise greenhouse gas generation.	Minimum energy performance requirement standards must be 4 stars.	Commitment from developer
1.8 Gas Reticulation Buildings should be reticulated with gas.	Gas must be reticulated to kitchens to enable the choice of gas rather than electric cooktops.	Commitment from developer
1.9 Carparks Ensure that mechanically ventilated car parking facilities within the development minimise energy consumption.	Use natural ventilation where possible and provide any carpark mechanical ventilation systems with CO monitoring & variable speed fans.	Submit a ventilation strategy.
2. TRANSPORTATION		
2.1 Cyclist Facilities To maximise bicycle use by the community.	Bicycle facilities shall conform with Brisbane City Council Bicycle and Cyclist On-Site Facilities Code. In addition secure bicycle parking must be provided centrally in all residential multi-unit accommodation, at a rate of 1 bicycle space per dwelling.	Building and site plans must clearly indicate the central bicycle accommodation.

3. BIODIVERSITY		
3.1 Building Materials Plantation Timber Buildings shall exclude the use of rainforest and old growth timbers and encourage sustainable plantations and recycled timber.	Use only timbers that are supplied from sustainable plantation sources or recycled timber.	Commitment from developer
4.0 ATMOSPHERIC MANAGEMENT		
4.1 Zero CFC's Do not use CFC's.	Demonstrate complete avoidance of CFC based refrigerants.	Submit an equipment strategy with each development submission.

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ESD STRATEGY	MINIMUM PERFORMANCE CRITERIA	CONCEPT STAGE COMPLIANCE
4.2 No HCFC's and Halon Avoid the use of HCFC's in new developments.	Demonstrate complete avoidance of HCFC based refrigerants and Halon fire suppression systems	Submit an equipment strategy with each development submission.
5. WATER MANAGEMENT		
5.1 Water Conservation Reduce the demands on potable water supplies and infrastructure by reducing the peak demand and annual usage within the development.	AAA-rated flow restricted showerheads and taps must be installed in all developments. Timers and soil moisture sensors must be used on all irrigation systems. Infrared Sensor Activated urinals must be used. Ensure that 50% of plants introduced to landscaped areas are native to SE Queensland.	Submit a Water Conservation Strategy with each development submission.
5.2 Stormwater Management Reduce the demand on town stormwater systems during peak stormwater flows and reduce the demand on the town water supply by collecting and reusing stormwater on site.	Use porous pavements where pavement is unavoidable and where possible direct the run off to gardens, storage or retention basins.	Submit a Stormwater Management Strategy with each development submission.
6. INDOOR AIR QUALITY MANAGEMENT		
6.1 Indoor Air Quality Provide high indoor air quality and also minimise energy use.	All living areas in residential buildings must be naturally ventilated with opening windows and cross ventilation maximised.	Submit an Indoor Air Quality Strategy with each development submission
6.2 Low Off-Gassing Paints and Adhesives Use paints with low pollution emittance on building interiors.	Use zero-VOC paints on internal walls (ie. no volatile organic compounds (VOC's) added in the manufacturing process). Use only products and adhesive compounds with no or low VOC's. Use floor finishes with no or low VOC's.	Commitment from developer
6.3 Indoor Pest Control Use mechanical means rather than chemicals to exclude pests from buildings.	Ensure that the buildings are sealed, caulked and points of entry are protected by adequate mechanical means from insect and pest entry. Provide properly fitting door seals on all exterior and hallway doors. Cover all ventilation openings, including openable windows with insect screens.	Commitment from developer
7. WASTE MANAGEMENT		

ESD STRATEGY	MINIMUM PERFORMANCE CRITERIA	CONCEPT STAGE COMPLIANCE
7.1 Recycling Facilities Recycling of solid waste will reduce additions to landfill, and reduce the depletion of non-renewable resources.	Separated waste sorting facilities must be indicated on all plans. Separate rubbish shutles and waste recycling holding areas must be provided in multi-storey development for residential use and retail use with adequate access to the street (typically in loading areas).	Commitment from developer
7.2 Construction Materials Building designers must consider the environmental effects of construction materials and products over their whole life cycle, and incorporate these considerations as part of a sustainability strategy.	Construction materials and products must be selected based on balancing the following environmental criteria: recyclability; sustainable sourcing; low embodied energy (the energy used in their manufacture); low pollution from manufacturing; low transport costs; minimal environmental impact; durability and minimal maintenance; non-hazardous; and eco-labelling and certification.	Commit to the preparation of building materials and implementation and monitoring strategy with the design development submission.
7.3 Construction Waste Reduce the amount of construction waste and conserve resources through reuse or recycling to reduce the environmental impact from material manufacturing and transport.	Implement an on-site recycling system for waste materials including separating waste (timber for reuse, concrete and bricks for crushing and steel and copper for recycling). Reuse or recycle demolition materials. Recycle cardboard, metals, concrete, brick, asphalt, beverage containers, clean dimensional wood, plastic, glass, gypsum board, and carpet.	Commitment from developers to prepare a Site Management Plan when submitting Design Development drawings.
8. LIGHT AND NOISE POLLUTION		
8.1 Light Spill Reduce light pollution from the development onto adjacent residential properties and the local environment.	Light spill must be controlled so that a minimum is directed beyond the site boundaries or upwards.	Commitment from the developer
8.2 Noise Pollution Reduce the impact of noise generated within the development.	Ensure that sources of noise, such as car parks, are not directed towards the neighbouring properties. Attenuate noise of the source and locate noisy activities remotely from residential areas, in particular.	Commitment from the developer.
9. MONITORING AND IMPLEMENTATION		

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ESD STRATEGY	MINIMUM PERFORMANCE CRITERIA	CONCEPT STAGE COMPLIANCE
9.1 User information Inform tenants of the sustainability measures included within their unit and what they can do to help minimise energy consumption and waste.	Provide future owners and tenants with a user pack or brochure which includes information on use and maintenance of the sustainability measures. This should also explain functions and benefits.	Commitment from the developer to prepare a tenant/owner guide.
9.2 Monitoring Provide quantitative data for on going research and refinement of the sustainability measures.	The water and energy consumption of each unit/tenancy within the development must be capable of being measured by separate meters.	Commitment from the developer

3.6 CONSTRUCTION

The Property Council of Australia suggests that avoiding on and off site pollution reduces legal liability and can avoid discord with local communities. Pollution prevention not only saves time, money and reputations but also the environment.

Site specific environmental management plans (EMP) should be developed to ensure that all contractors and subcontractors comply with the environmental conditions of the approval and that environmental risks are properly managed or avoided. The EMP should minimise on and off-site air, noise and water pollution during construction. The Property Council of Australia suggests the following initiatives.

Air Pollution

- Keep dust to a minimum by ensuring large surfaces are kept damp (not wet) and plant or equipment filters are used.
- Cover skip containers and plant-out stock piles.
- Ensure vehicles, plant and equipment are not polluting through smoky exhausts or uncovered loads.

Water Pollution

- Identify any sensitive water ecosystems in the area and consider these appropriately when dealing with water run-off from the site.
- Ensure sedimentation control systems are in place and properly maintained throughout the project.
- Provide proof that the water quality of any discharge meets regulatory guidelines, and this proof must be kept on site.
- Use bunding to avoid pollution leaving the site from spills or leaks.
- Provide cleaning bays to wash construction vehicles prior to entering public roads and ensure run-off does not contaminate stormwater or surrounding waterbodies.

Noise Pollution

- Consider the impact of any noise activity or machinery and when these are used.
- Engage the community to discuss noisy work.
- Comply with all noise-related consent and approval conditions.
- Regularly monitor noise levels.

Site

- Develop specific site-protection requirements that the contractor should follow and require the contractor to submit plans for meeting them.
- Specify requirements for site utilisation.
- Designate and fence off vegetation that needs to be protected throughout the construction process.
- Specify requirements for site access.
- Specify requirements for site clearing and grading.

These procedures will need to be specified and/ or to require the contractors to define how they intend to manage the site via a site specific environmental management plan (EMP).

The Property Council of Australia suggests that careful material selection can have an environmental impact as well as a financial benefit. When selecting materials the following should be considered:

Raw Material Selection

- Determine whether resources manufactured from waste materials are available.
- Determine whether reusable materials are available, either on or off site, that could be used instead of new materials.

- Determine what materials are manufactured locally to reduce transport requirements.
- Select new materials, that come from renewable, recyclable or reusable sources.

Selecting Materials

- Select material options that can be reused rather than discarded after one use.
- Avoid using materials which have been treated in some way that prohibits further use.
- Select materials appropriate for their use.
- Avoid materials that may cause contamination upon disposal, such as copper chromium arsenic treated timber.

Ordering Materials

- Order materials according to the manufactured sizes and or quantities.
- Consider packaging options of suppliers – can it be returned, recycled or reused and has packaging been minimised, for example using metal strapping instead of shrink wrap.
- Consider the delivery method of the material to site to minimise extra handling.

Using Materials

- Minimise off-cuts (primarily through design).
- Separate any on-site waste that can be reused or recycled.
- Use fixing and construction methods that will facilitate the reuse and recycling of materials, for example screw fixings instead of adhesives and conventional carpet laying instead of direct stick.
- Avoid mixing materials which cannot be separated in the future for recycling or reuse.

3.7 OPERATIONAL MANAGEMENT

It is critical that the ongoing management of the buildings and surrounds within the Village does not jeopardise the sustainability initiatives conceived in the early stages of the development.

This can be achieved through the Body Corporate and Community Titles Act which allows a combination of freehold title with common ownership and the associated responsibilities.

The Village provides an opportunity to establish environmental indicators against which the development's strategies can be assessed, to determine if the community is moving towards sustainable development. There may be an opportunity to incorporate meters to measure the use of resources such as energy and water to evaluate performance against these indicators.

KGUV demonstrates a commitment by the stakeholders to triple bottom line accounting. Further investigations could be appropriate to place values on the social and environmental outcomes of the development. The economic analysis could be based on cyclic patterns and a whole systems approach to planning.

The public spaces within the Village provide opportunities for markets and festivals, organised by the community and cooperatives. Private sector initiatives such as the successful Farmers Markets could also operate within these areas.

There is an opportunity to base a housing and urban exhibition within the KGUV. Europe has a long history of international housing and urban exhibitions including the European Housing Expo in Malmö, Sweden this year which involved the examination of ecological, social, technical and human sustainability.

There are opportunities for advanced communication systems to be included within the development to monitor the development's strategies. They could meter the use of resources and the generation of waste by the development.

There are shared opportunities to inform the community of the sustainability outcomes of the project. These could include:

- involving the students from the adjoining, primary, secondary and tertiary institutions to monitor and test the implementation of the Village; and
- include a display within the development which identifies the intentions of the KGUV in relation to urban sustainability and a record of its achievements.

4.0 FUTURE CHALLENGES AND OPPORTUNITIES

QUT and the Department of Housing are now moving forward with the development of the individual sites within the Kelvin Grove Urban Village.

We have in place a robust set of Design Guidelines incorporating high level ESD initiatives for developments on the site, that will ensure adherence to the principles strived for by the stakeholders.

Certainly, the commercial reality of the ability to deliver on these initiatives is about to be tested by the market through the tender of the first of the lots by the Department of Housing. While this process is underway, Department of Housing and QUT are preparing initiatives for a sustainable community infrastructure, incorporating the services of a community development manager, and an IT backbone that will service and strengthen the links between the occupiers of the Urban Village.

From separate corners, QUT and the Department of Housing are striving together to achieve a triple bottom line outcome for public development:

- environmental conscious design and building outcomes
- economic vitality through development of the sites
- social equity through involvement and development of innovative strategies both in the planning and operational outcomes

All the sites within the Kelvin Grove Urban Village will not be sold until at least late 2005, so we have a long way to go, but the strength to maintain and even improve upon our ideals is still strong, wish us well.