BEST PRACTICE an uRBAN vILLAGE KEW BRIDGE LONDON

Dedicated to my sister and brothers; Nadine, Warrick, and William

BEST PRACTICE an uRBAN vILLAGE KEW BRIDGE LONDON

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DESIGN PROJECT DISCOURSE SUBMITTED IN FULFILMENT OF PART
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SUMMARY

Shelter is one of mans most basic needs and the progression of its development over time has had to deal with an ever increasingly complex world that even now places renewed demands on the way we build, live, and work.

The location of the site is at Kew Bridge, London, United Kingdom. It is at the important landmark junction of Kew Bridge north circular road and Kew Bridge road, with the immediate context consisting of 3 to 4 storey high built fabric to the north and west boundaries of the site. The Kew Bridge road slipway forms the eastern boundary of the site adjacent Kew Bridge, and the River Thames forms the southern boundary of the site.

The aim of the project is to evaluate the existing condition of high-rise residential developments and to compare this to leading environmentally sensitive projects, which utilise sustainable development strategies and renewable energy sources. These strategies and energy sources will be applied in the residential high-rise typology in the form of the Kew Bridge Urban Village.

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1:0 INTRODUCTION

The following document is the culmination of research into the possibilities of employing sustainable principles and new technologies to improve the way high-rise apartment blocks are designed. The Client is Saint Georges Homes of London. [Best Practice - Urban village - Kew bridge London - brief documentation 2003.]

The design is intended to meet a growing market share that is becoming increasingly aware of the environmental impacts of modern living. Triple bottom line principals have been employed in the design decision making process and can be viewed in the form of the Baseline criteria report and the Technical report which is part of this thesis documentation. [Best Practice - Urban village - Kew bridge London - technical report & baseline criteria 2003.]

2:0 LOCALITY

Fig - 2:01

Fig - 2:02

Fig - 2:03

The site is situated at Kew Bridge southwest of London.

Fig - 3:01

3:0 QUALITY ENVIRONMENTS

3:0 QUALITY ENVIRONMENTS

James Lovelock 1972 introduced the concept that all the life forms on the planet contribute to its continuing homeostasis. The principles of life supporting life and the theories of interconnectedness are vast and can be perceived in all forms of life.

The ever-increasing strain on the environment has been placed under the spotlight in recent years and this has led to an awakening in the architectural profession in terms of environmental concerns; sustainable strategies are taking centre stage in the decision making process of the built environment.

"As the century draws to a close, environmental concerns have become of paramount importance. We are faced with a whole series of global problems, which are harming the biosphere and human life in alarming ways that may soon become irreversible. We have ample documentation about the extent and significance of these problems.

The more we study the major problems of our time, the more we come to realise that they cannot be understood in isolation. They are a systemic problem, which means that they are interconnected and interdependent. For example, stabilising world population will only be possible when poverty is reduced worldwide. The extinction of animal and plant species on a mas-

Fig - 3:02

sive scale will continue as long as the Southern Hemisphere is burdened by massive debts. Scarcities of resources and environmental degradation combine with rapidly expanding populations to lead to the breakdown of local communities, and to the ethnic and tribal violence that has become the main characteristic of the Post-Cold-War era.

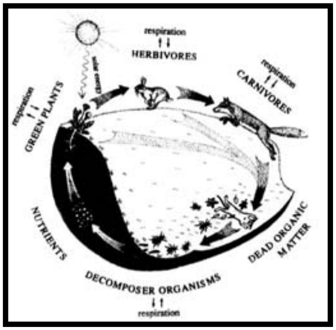
Ultimately, these problems must be seen as just different facets of one single crisis, which is largely a crisis of perception. It derives from the fact that most of us, and especially our large social institutions, subscribe to the concepts of an outdated worldview, a perception of reality inadequate for dealing with our overpopulated, globally interconnected world.

There are solutions to the major problems of our time; some of them even simple. But they require a radical shift in our perceptions, our thinking, our values. And, indeed we are now at the beginning of such a fundamental change of worldview in science and society, a change of paradigms as radical as the Copernican Revolution. But this realisation has not yet dawned on most of our political leaders. The recognition that a profound change of perception and thinking is needed if we are to survive has not yet reached most of our corporate leaders either, nor the administrators and professors of our large universities.

Not only do our leaders fail to see how different problems are interrelated; they also refuse to recognise how their so-called solutions affect future generations. From the systemic point of view, the only viable solutions are those that are "sustainable". The concept of sustainability has become a key concept in the ecology movement and is indeed crucial. Lester Brown of the Worldwatch Institute has given a simple, clear and beautiful definition: "A sustainable society is one that satisfies its needs without diminishing the prospects of future generations." This in a nutshell, is the great challenge of our time: to create sustainable communities, i.e. social and cultural environments in which we satisfy our needs and aspirations without diminishing the chances of future generations." [Fritjof Capra 1997.]

3:1 CONNECTIONS

The theories of interconnectedness fall down almost immediately when one comes to the implementation of actual projects on actual sites. The notion of a site in isolation is the first problem because no site is completely isolated in terms of function. However, they are parcelled and packaged as such to developers who have very little interest in anything other than the site boundary lines in which they have to work. Urbanity is determined by criteria set forth by the respective town planning guidelines, and connections between buildings or site related functions are not con-



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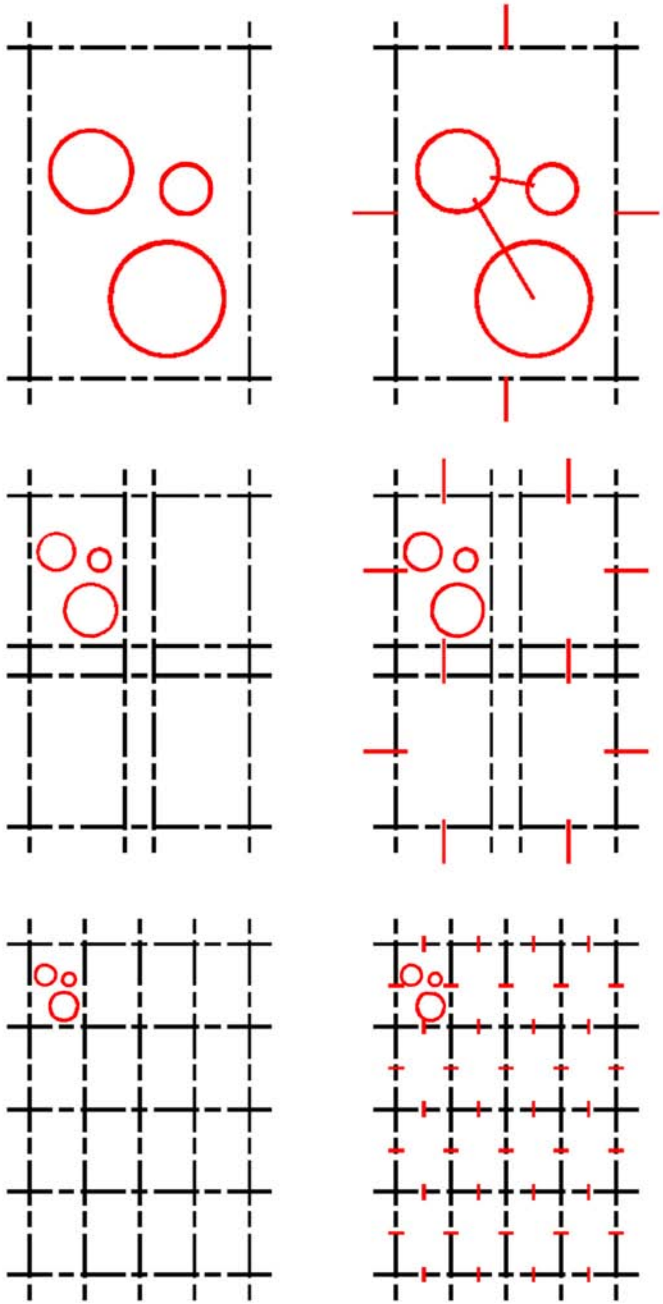


Fig - 3:04 Convention site connections vs ideal connections

sidered beyond commercial or retail opportunities. The connections that buildings and their users have with the immediate context in which they find themselves are of particular interest in that there is great potential for multi functioning on various levels, particularly in terms of environmental and energy use concerns, between sites. But this is as yet a largely underexploited resource for buildings and the way people use them to play a far more supporting role to one another. Perhaps the problem lies with the governing bodies where compensation or an awards system could be implemented for developers who do more than only that which is required by local authorities.

Although it is important for a site to explore the potential for connection to its immediate surroundings and of these surroundings to other areas and these areas to greater zones and so on, it is also important that the site begin this process within these boundaries set by the local council. In other words the interconnectedness must begin with the smallest detail, and if this is achieved the concept can be explored throughout and extended beyond the boundary.

The exploration of connections within the boundaries of the site must begin with the user, with what the requirements are and with how these requirements can be fulfilled.

Fig - 3:05

Fig - 3:06

The thesis project on the Kew Bridge site deals with a mixed-use development, which is predominantly residential, and as such the focus is placed on creating a quality living environment for the inhabitants. The question of quality living environments is a subjective and emotive topic: what may be seen as quality by one person may not be seen as such by another, so the question must then be that of an accepted norm or standard that is seen by the greater majority as representing quality.

3:2 QUALITY AND VALUE

Similarly, value has many different meanings and the answer that one receives depends largely on whom you ask. In the architectural context and in particular with a project the size of the Kew Bridge development there are several players; the developer, the architect and the end user are the most obvious ones. The developer has the money, the architect the design and the end user the demand.

The question of value when asked of the developer would provide the answer that one must ensure a building that is of high quality, that has a good return on capital investment: a monetary value is associated with a product.

The same question to the user would provide the answer: a high quality living environment for an acceptable price, once again a monetary value associated with a product but with a far more personal interest attached. When asked of the architect the answer will be: to provide a quality building architecturally, that is responsible in terms of environmental impact and in the best interests of the public, as well as being a marketable product.

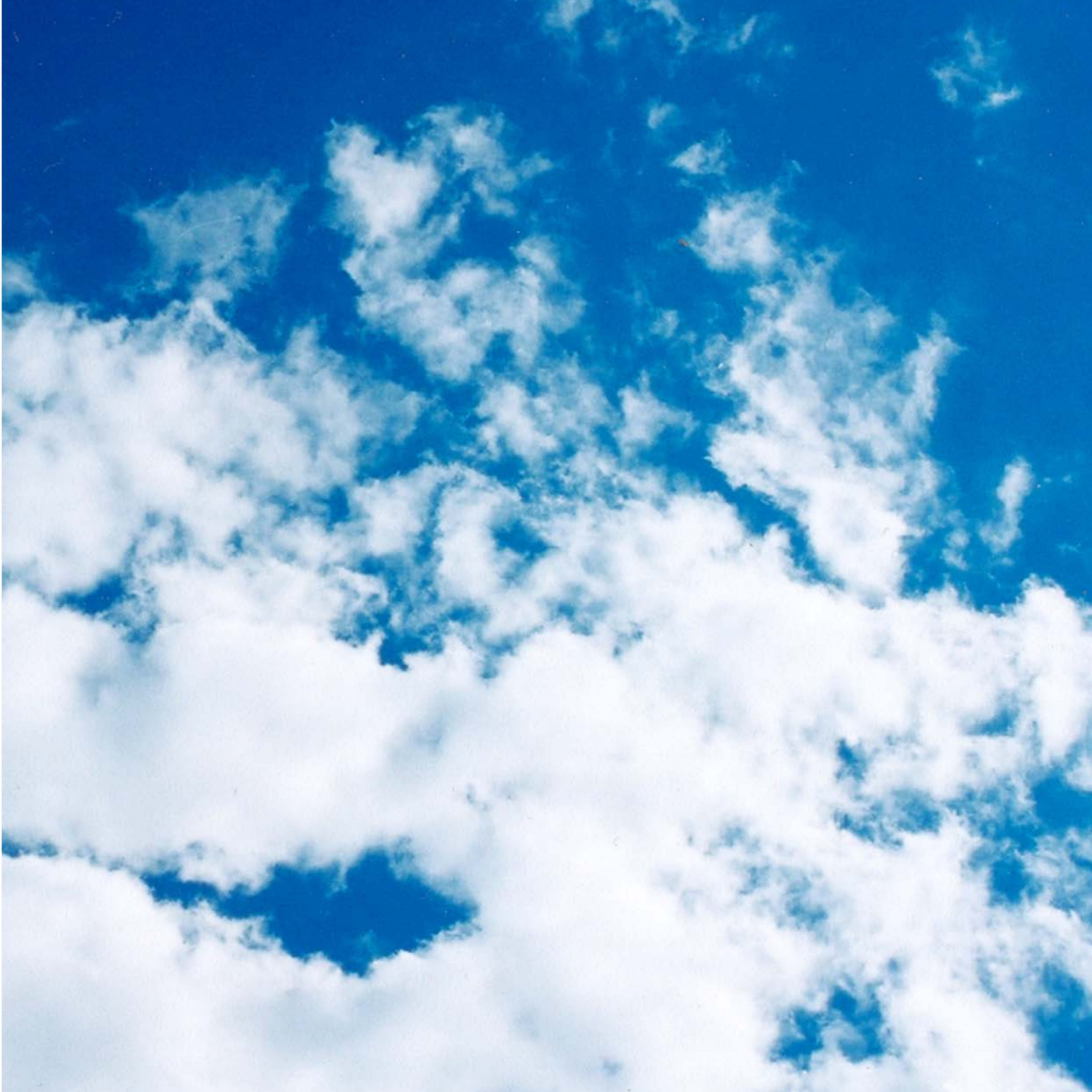
The answers to the questions of value and quality are largely different for the various parties, and the glue that binds the players can be a little thin in places depending on the extent of the differences between their opinions.

The question that is then asked is; who determines the standards and quality of development?

Various precedents have been selected in order to assist in establishing the meaning of value and quality, as it exists in the built environment. These include; Habitat 67 by Moshe Safdie 1967, BedZED by Bill Dunster Architects 2002, and the proposed development on the Kew Bridge Site by Broadway Malyan Architects 2002. These precedents have been selected here.

Fig - 4:1:01

4:0 PRECEDENTS

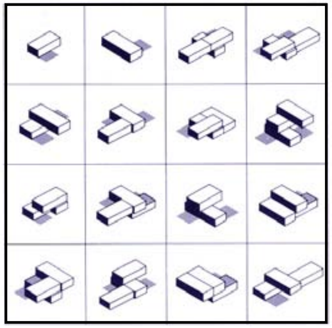


4:1 HABITAT 67 MONTREAL

Projects such as Moshe Safdie's Habitat 67, which when constructed was considered highly controversial and the success of which was doubted, now stand as a brilliant example of quality living environments with contented residents. The project came into being primarily in a social paradigm intended to fulfil the needs of the low-income groups.

"Habitat questioned the validity of the closely stacked high-rise apartment building - whether poor people in publicly constructed towers or rich people in Trump-style towers - could enjoy the pleasure of living in "houses in the air" [Architectural Record 1992.]

In the July issue of Architectural Record 1992 Safdie looks back on the successes and failures of Habitat 67. Habitat was not intended to be just another building; it was intended to be a model that could be duplicated as an ideal for urban living, the ideas for which went as far back as Le Corbusier's 1922 apartment structure called "Immeubles Villas". This scheme involved stacking of dwelling units, allowing for the creation of gardens in the sky, as did Marseilles Unité d?Habitation; which was a further exploration of Le Corbusier's utopian ideals.



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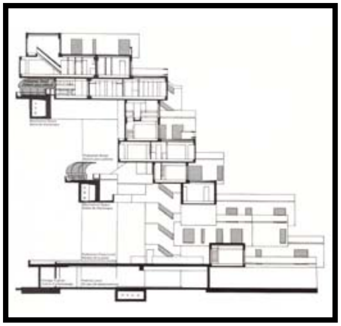

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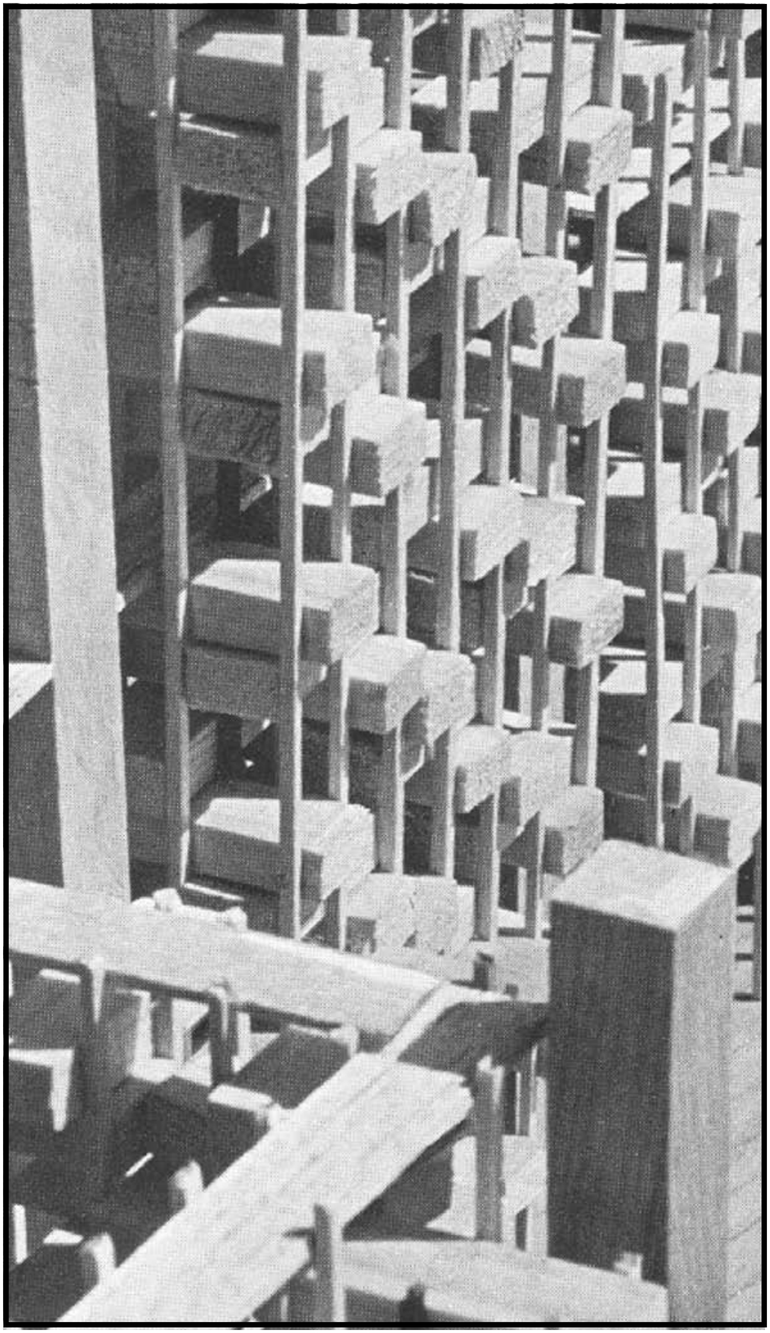


Fig - 4:1:05

Safdie felt that the ideal of houses in the sky, each with its own garden, was somewhat deserted in Unité; the project, which was far more compact with a complex arrangement of corridors and vertical circulation. Habitat was to be a revisiting of the stacking ideals and the exploration of the potential for prefabrication of units.

The units were to be constructed from concrete, making them very heavy, 70 tons per unit, but this would eliminate the need for supporting structure. A supporting structure would only be necessary if the units were constructed from lightweight fireproof materials, which were not available in 1967.

Habitat was intended to be a prototype model that was to be reproduced on the mass scale. The justification of the high building costs was that this project was the first and that production on a mass scale would allow for repetition of elements and refinement of technologies, leading to reduced costs. The reality is however that the utopian ideal of houses with gardens in the sky did not come cheaply and that the advances in technology to improve costs could quite easily be applied to the compact apartment block and as such the divide could never be breached. Habitat's structural clusters also led to higher façade ratios and more roofed surfaces, translating ultimately into higher maintenance costs.

Safdie's approach to projects since Habitat has been to rethink the fundamentals of housing for poor and middle class people; he suggests that high-density housing is not the correct typology due to its cost and adds that disruptions to income make it difficult to provide reasonable amenities for these families in such buildings. The better approach, according to Safdie, is medium-density projects that are close to the ground and utilise more land. This requires that authorities adjust urban zoning policies to make such land parcels in central areas of cities available to the poor and middle class income groups. The problem with this is that containment of urban sprawl into potentially valuable productive land is of worldwide concern.

The penthouse's private garden, giving the option of being inside or outside, makes it the most desirable unit in any high-rise apartment block. The idea of making every unit in this way would surely mean the creation of quality environments for all; the question then asked is not whether we want it or not but: can we afford it?

4:2 BEDZED BEDDINGTON LONDON

Ecology and concern for the environment is the paradigm in which we currently find ourselves, making the BedZED project in south west London one of the current leaders in environmental design, and is an example of what can be achieved when sustainable "triple bottom line" principles are implemented as primary decision making criteria.

BedZED is a collaboration between Peabody Trust Housing Association, Bill Dunster Architects and ARUP Engineers. The project set out with the aim of creating a living and working environment that fully embraces renewable natural resources, achieving closed loop material use, site resource autonomy and social involvement.

The project densities include 83 mixed tenure homes (social, key worker and for sale) in addition to 3000m² of living/workspaces, retail and leisure use space. These densities are in line with the UK's projected requirements for new homes, utilising only brownfield sites to accommodate new housing developments without any further utilisation of precious greenfield amenities. It is worth noting that these densities are achieved with the projections of Moshe Safdie, in that the development is at most a 3-storey walk up model.

The project utilises a combination of methods to achieve reduction in conventional energy use. These include:

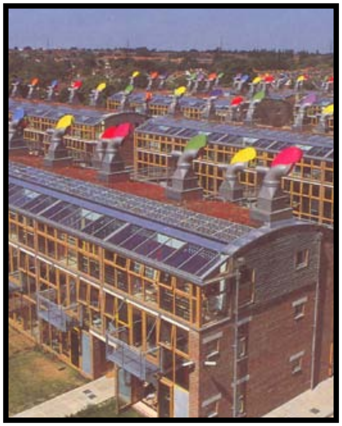


Fig - 4:2:01


Fig - 4:2:02


Fig - 4:2:03

4:2:1 ENERGY GRADING

Energy Grading, which is a technique, developed by ARUP "ranking the full range of possible renewable sources against end-use energy needs, to generate a checklist of building design properties. The key issue is to match the lowest possible grade of source against the grade of the end demand. This process also involves mapping demand and availability, given that most renewable energies tend to be more finite and need coupling via energy storage to allow this demand/availability match"' [ARUP Journal 2003.]

4:2:2 ZERO-HEATING HOMES

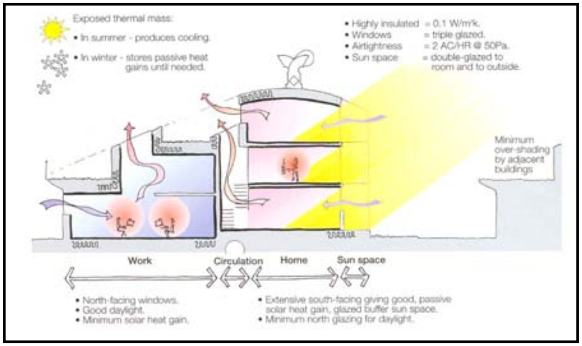
Zero-heating homes, which involves the utilisation of internal heat gaining elements such as people and their activities to sufficiently heat the buildings day and night. This is achieved by increasing the insulation value in the thermal mass, trapping the heat and as such reducing the necessity of hating the buildings at all.

4:2:3 BUILDING PHYSICS

Building Physics, involves complex thermal analysis scrutinising the availability of heat gains from occupants, appliances, cooking, washing, and solar heat gain. Solar heating was found to be highly variable in terms of availability and quantity. Further factors, which are taken into consideration, are glazing areas; these allow for solar heat gain but are also the biggest culprit in thermal heat losses.

4:2:4 BUILDING MASSING AND ORIENTATION

Building massing and orientation, requires the analysis of both the working and the living environments. The working environment with its high occupancy and office machinery leads to high heat gains and as such the preferred orientation would be north; the living environments on the other hand have low occupancy and machinery heat gains and as such have great advantages in using the solar heat of the south orientation.



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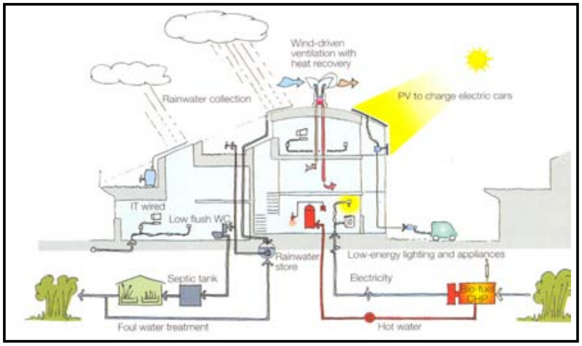


Fig - 4:2:05

4:2:5 BIO-FUELLED COMBINED HEAT AND POWER (CHP)

Bio-fuelled combined heat and power (CHP) is a system that utilises either gas or woodchip (converted to gas) to power an electric alternator for production of electricity. In addition the gas burning process allows an opportunity for heat harvesting conversion into hot water. In the case of BedZED the CHP plant uses woodchip that was identified as a suitable fuel, with the advantage that the urban tree waste was being used as landfill, saving the considerable costs associated with its removal.

4:2:6 PHOTOVOLTAICS

Photovoltaics were originally not considered as a source of electricity for the dwelling units; however, research into the lifestyles of the potential residents, in particular their travel needs, revealed that 95% of urban journeys were within a radius of 40 miles. This gave birth to the idea of utilising the photovoltaics to charge a fleet of electric cars, which can comfortably manage a 40-mile range. The electric cars are in addition a far cleaner means of transportation when compared with thier conventional petrol or diesel counterparts.

4:2:7 CLEAN WATER

Clean water and the current process of its delivery, use, transportation, and treatment were assessed and found to be wasteful. BedZED aimed to reduce the demand for potable water

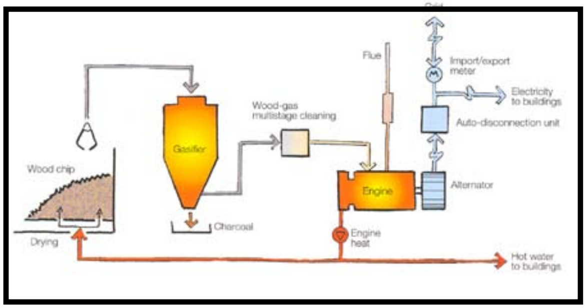


Fig - 4:2:06

Fig - 4:2:07

Fig - 4:2:08


Fig - 4:2:09


Fig - 4:2:10


Fig - 4:2:11

by 50% and to treat the effluent on site, providing recycled water for reuse in grey water functions. "Various good practice measures have been incorporated, including restrictors to prevent excessive flows, mains pressure showers to avoid power-showers, meters visible to consumers, EU 'A' grade water-consuming appliances, and very low/dual flush toilets. Rainwater is collected from roof surfaces and stored in underground tanks for irrigation and toilet flushing. An ecological on-site foul water treatment system was added to the development after a statutory water authority agreed that it would adopt and operate the completed system. This uses vegetation as a cleaning agent in the secondary and tertiary treatment stages, partly because of its low energy consumption. The system treats the water to a high enough standard for it to feed recycled 'green water' as a supplementary feed into the rainwater storage tanks." [ARUP Journal 2003.]

4:2:8 MATERIALS

Materials and the often-great distances that they must travel to site locations are one of the greater challenges that need to be overcome when dealing with a sustainable project such as BedZED. In this particular case most of the existing materials were retained on site and most of the heavy building materials were sourced within a 55km radius from the site. Recognised environmental standards formed part of the criteria for materials selection and on site sorting of construction waste for recycling was employed.

"BedZED seeks to offer its occupants the opportunity to live and work with a completely carbon-neutral lifestyle, making this choice attractive, cost effective, and appropriate to modern living. It offers solutions to many sustainable lifestyle issues in a practical and replicable way.

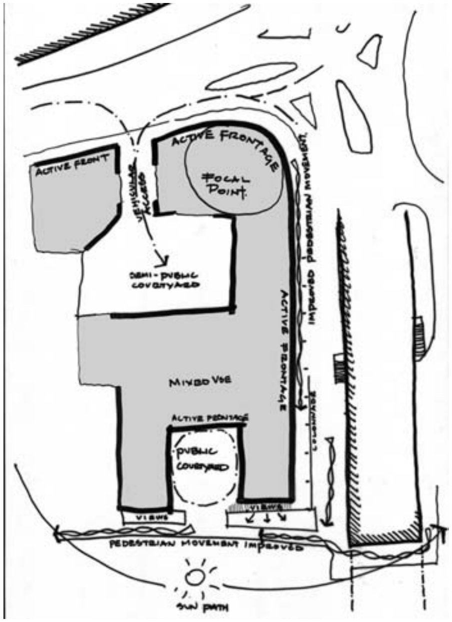
One key reason for embarking on the BedZED project was to demonstrate to a sceptical industry how sustainability is possible and can be cost-effective, and how we can really make a difference for society and its future. There is inherently considerable industry inertia to change and improvement. It is through delivering successful examples like BedZED and proving there is marked demand for this kind of project that mainstream developers and construction participants will feel that they can seriously take steps towards a more sustainable world. It requires innovation, a strong belief, considerable time input, and the dedication of the complete project team to show how this can be achieved." [ARUP Journal 2003.]

4:3 KEW BRIDGE HOUSING - KEW BRIDGE LONDON

The Kew Bridge project by BM Architects is a proposal for what sort of development should take place on the Kew site. The Developers were Saint Georges Homes. Their requirements for the site were to facilitate a mixed-use development that included retail opportunities on the ground floor with the possibility of a residents gym and residential units above. The scheme entails 2800m² of lettable retail space and a total of 18 storeys of residential units. The densities achieved in this project are extremely high and negotiations with local authorities as to the height restrictions in terms of the urban fabric were necessary.

The residential component consists of a wide variation of unit typologies ranging from 1 bedroom to 3 bedroom units with occasional balcony areas. The council requirements call for a 30% social housing component for all new developments: this was dealt with by segregating the building in terms of finishes, unit typologies and entrances.

The requirements for the improvement of the public realm were met by means of a defined courtyard space on the southern border adjacent to the River Thames, with an internalised courtyard to the northern half of the site designed to be a drop-off zone for residents as well as to provide access to the basement parking. Servicing of the building takes place via the access road on the western border of the site.



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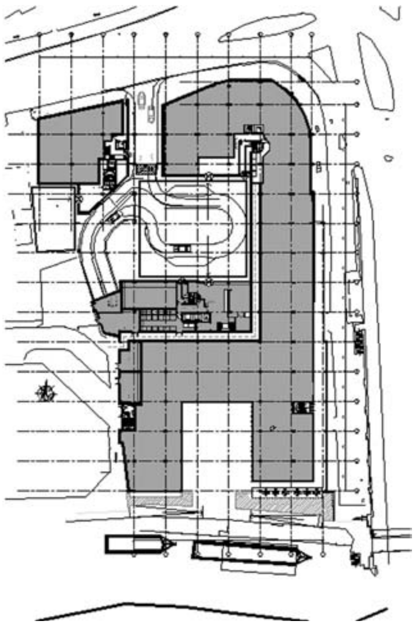
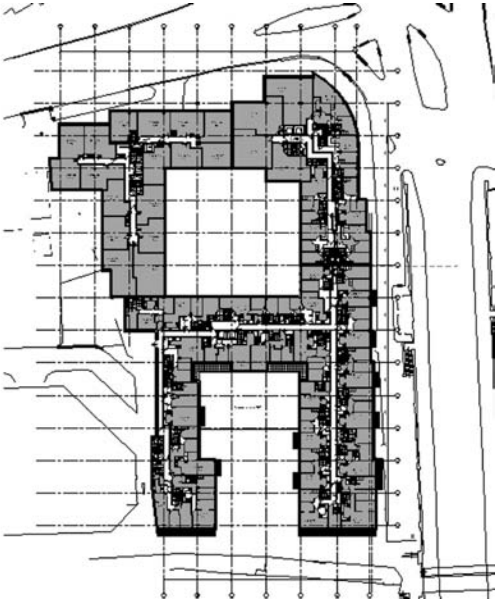


Fig - 4:3:02

The energy use of the building relies entirely on the conventional connections such as electricity from the grid and gas supply from service providers. The building envelope consists of conventional cladding and insulation as per the requirements of the British Standards Authority.

The above-mentioned precedents have helped in the design and decision-making process for the Best Practice Urban Village thesis project. They were chosen as specific examples, which provide a wide range of different approaches to an age-old architectural challenge namely housing.



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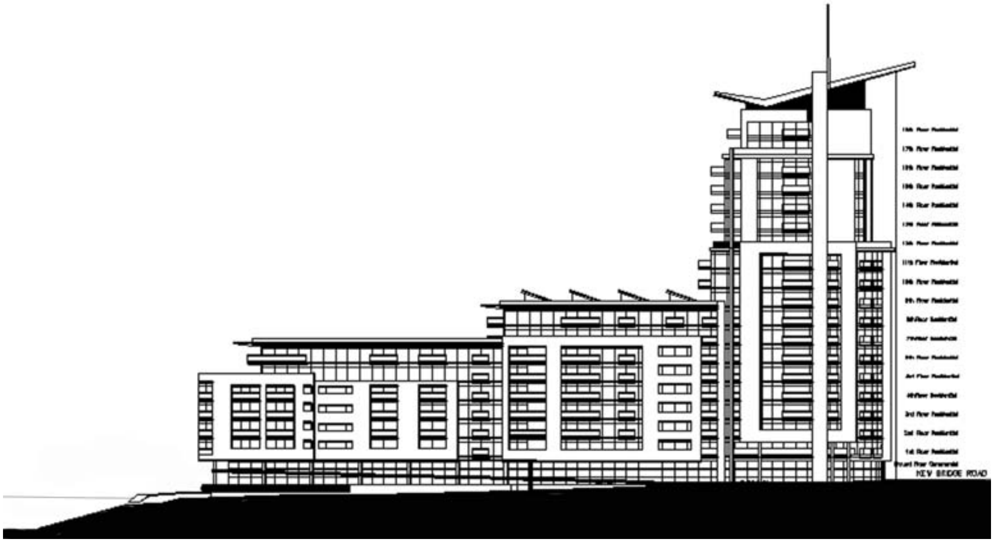


Fig - 4:3:04

Fig - 5:01

5:0 DESIGN RESPONSE

5:1 BEST PRACTICE URBAN VILLAGE - KEW BRIDGE LONDON

This brings me to the design response that is the Best Practice Urban Village on the above-mentioned Kew Bridge site in London. The initial design response was based solely on the urban design framework refer to [Best Practice - Urban village - Kew bridge London - brief Document 2003.] The framework calls for specific urban responses, namely:

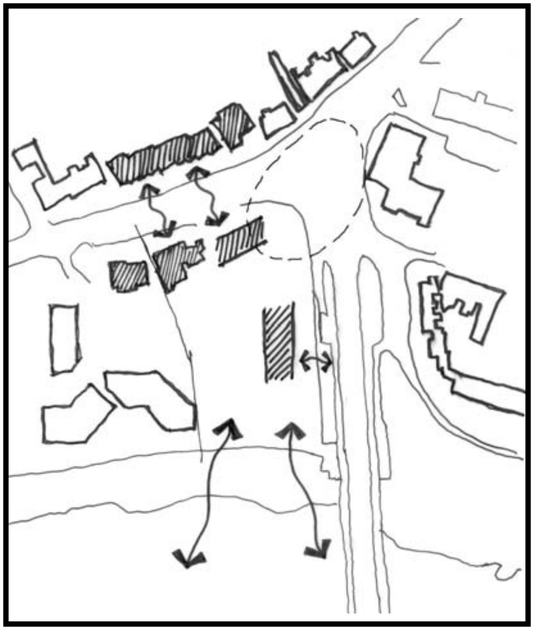
5:1:1 CHARACTER

The scale and fabric of the adjacent buildings is articulated and varies between 2 and 4 storeys. [Best Practice - Urban village - Kew bridge London - brief Document 2003.]

The response to this requirement was to create articulated façades by combining units in clusters varying in heights of 2-3 storeys and alternating these clusters of solid with voids of equal height making for a less imposing volume.

5:1:2 QUALITY OF THE PUBLIC REALM

Requires improved public access around the site as well as improving existing routes such as the Thames River Walk to the south of the site; and the Kew Road slipway which forms the site access on the eastern boundary of the site. The requirements in terms of the public realm suggest the creation of an area on the southern boundary of the site this area would facilitate the dual pur-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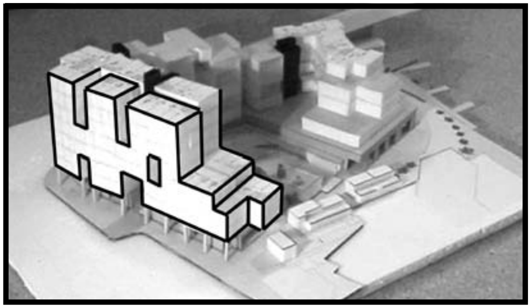
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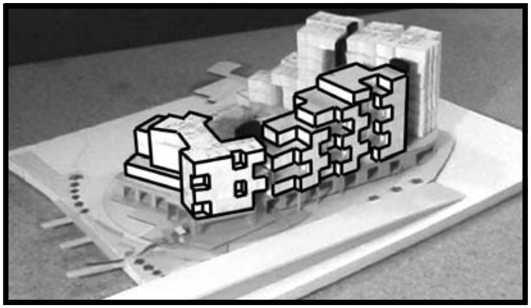
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poses of improved public interaction with the river as well as having the potential for establishing a boat club. [Best Practice - Urban village - Kew bridge London - brief Document 2003.]

These requirements were met by allowing public access through the site on the eastern boundary, which did not previously exist; this route would be developed for the purpose of making smaller retail opportunities available to entrepreneurs and small businesses, while the main high street Kew Bridge Road and Kew Road will facilitate the larger retail opportunities and anchor tenants. The orientation and bulking of the built form to the south of the site will facilitate the creation of a public open space with new and improved mooring jetties for the boat club.

5:1:3 CONTINUITY AND ENCLOSURE

This requirement calls for clear definition between public and private spaces and specifies that these spaces should be orientated towards the south with careful consideration being placed on the potential for overshadowing by the built form. [Best Practice - Urban village - Kew bridge London - brief Document 2003.]

The response to these criteria led to the creation of two distinct areas: one for the public domain and the other a semi private area designated exclusively for the use of the development's residents. The public area is situated at the south end of the site adjacent to the River

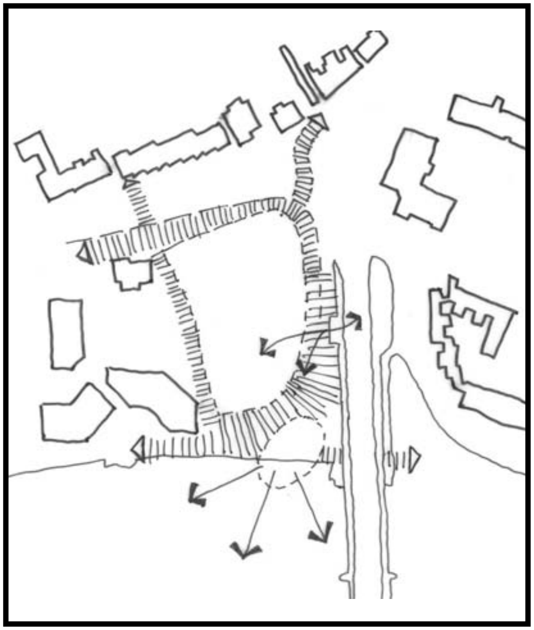


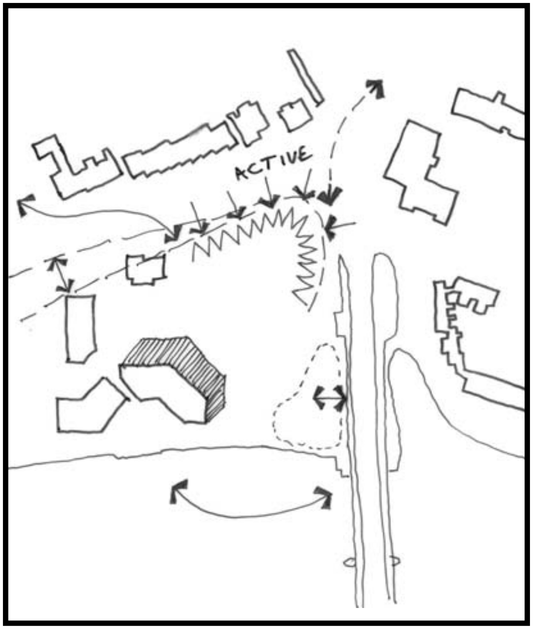
Fig - 5:1:04

Fig - 5:1:05

Thames and has been designed in such a way that it forms multi-platforms from which the general public can take the time to pause and enjoy the river and the activities that will be related to the boat club. In addition this area includes a terraced water feature which is intended to function as a splash pool for children in the hot summer months, as well as a place for remote controlled boating which will form part of the activities of the boating club.

The semi private area is situated within the courtyard in the northern half of the site. Access to this area is strictly controlled via the main entrance lobby adjacent to Kew Bridge Road. This area facilitates the opportunity for the residents to utilise a communal outdoor area for social activities such as barbeques and sun tanning. The area is home to the community crèche which will be made available to residents with small children who require day-care for their little ones; the crèche consists of 4 classrooms and a secure play area which is further segregated from the rest of the semi private social area.

Other activities within this area include a skateboarding half pipe and a one-on-one basketball hoop. These opportunities are intended to provide a safe semi public area for the younger adults or older children in the development to remain active, without having to go onto the streets.



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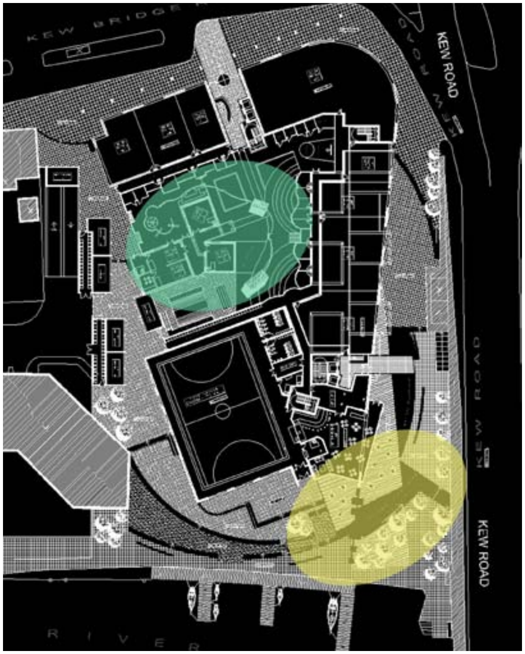

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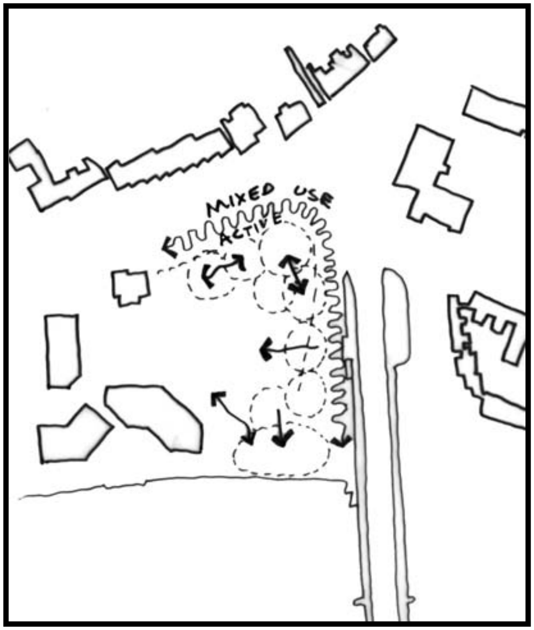
5:1:4 DIVERSITY

Requires that the development allow for mixed uses including office space, residential, amenity/recreational use and river related activities. [Best Practice - Urban village - Kew bridge London - brief Document 2003.]

The response to these requirements came from an analysis of the immediate context, which revealed an abundance of unused office space in close proximity to the site. It was therefore decided not to include this utility in the new development and instead to focus on community, residential and retail opportunities in the hope that increasing the population in the area would increase the need for office space, by so doing solving the problems of surplus office space.



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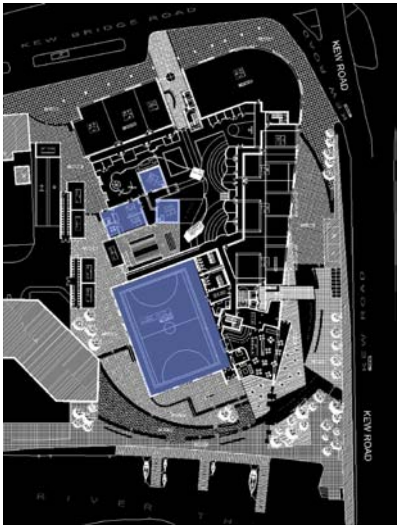

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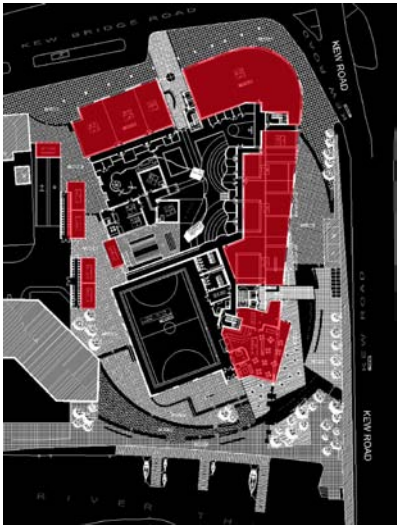


Fig - 5:1:10

Fig - 5:1:11

5:2 DESIGN RESOLUTION

The main focus of the design resolution revolves around the residential unit, the way people live, and considers how the built form can utilise the environment and new technologies to help replace non-renewable energy loads with sustainable renewable energy.

Furthermore the main design resolution was placed on the eastern wing (which will now be known as block B) of the development adjacent to Kew Road. This section was chosen for resolution because of the challenges associated with a north south orientation.

The analysis of conventional high-rise typologies such as the BM Kew Bridge housing project reveals that the preferred model is that of a compact densely stacked construction. The reasons for this can be attributed to the compact unit having the greatest efficiency of construction costs, as discussed in the Habitat 67 project, and furthermore the financial advantage of being able to sell the greatest amount of floor space. These reasons are financially driven and do not necessarily make for the creation of quality environments. However the BedZED project has proven that with a like minded team of dedicated professionals it is possible to create quality environments that are both sustainable and financially viable and above all are an attractive option for an emerging market that is increasingly becoming aware of society's impact on the environment.

When evaluating the design requirements of the project in terms of sustainable options the following design decisions were made.

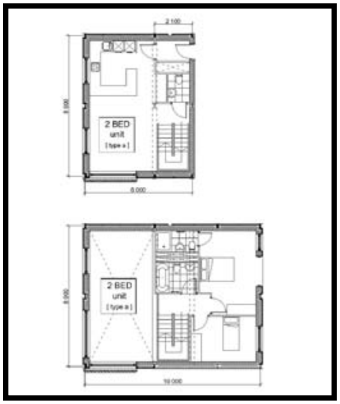


Fig - 5:2:01

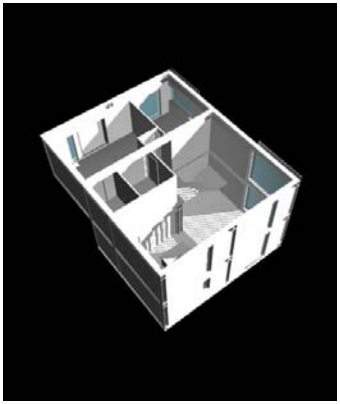


Fig - 5:2:02

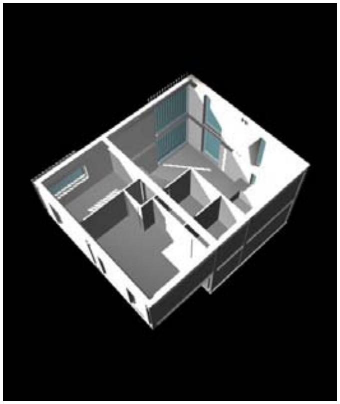


Fig - 5:2:03

5:2:1 LIGHTING

North south orientation means that the desirable north and south light is reduced due to the bulk of the façade facing the less desired east and west orientation. This problem was overcome by generating a fragmented volume, which increases the façade ratios of block B, which is therefore a more costly construction. However this was felt to be an acceptable intervention when weighed up against the advantages of lighting, passive solar heat gains, and the views towards the River Thames.

"The design of the development has where possible orientated units in such a way that the habitable rooms are south facing in order to utilise the best natural lighting opportunities. Where natural lighting lux levels are not achieved in the variations of rooms' energy efficient fittings are to be used in all circumstances." [Best Practice - Urban village - Kew bridge London - technical report 2003.]

Fig - 5:2:04

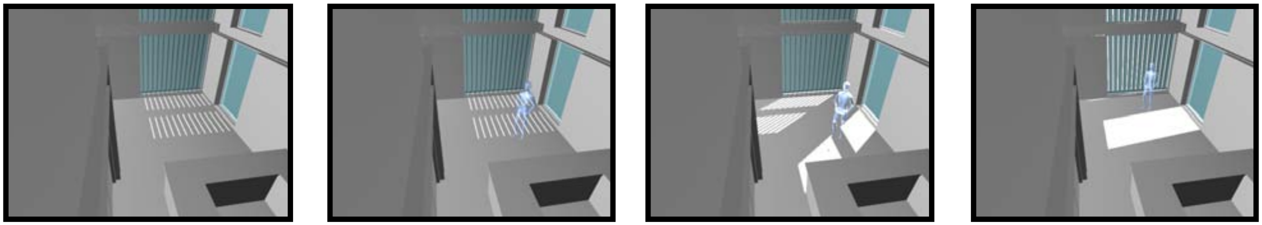
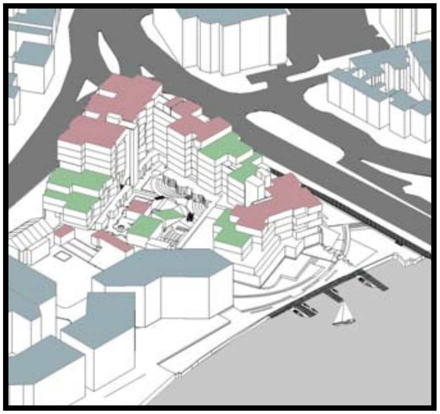


Fig - 5:2:05


Fig - 5:2:06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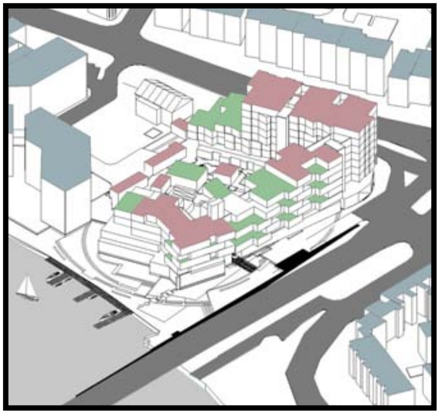


Fig - 5:2:08

5:2:2 ACCESS TO GREEN OUTSIDE

The location of the site is within a 10min walk from one of the United Kingdom's most famous parks, Kew Gardens, providing excellent opportunities for access to large open green spaces for leisure activities such as softball and football. The site however also provides access to outdoor spaces in two ways. The first is private outdoor space, which is available due to the fragmentation of the bulk volume of the building. The second is the semi private courtyard space, which makes provision for the social interaction of the residents.

5:2:3 SOCIAL SPACES

In the pursuit of creating quality environments emphasis has been placed on the users of the building and more specifically on the social aspects of large groups of people living in close proximity. The need for people to engage socially requires more often than not an opportunity to do so, and as such designated social gathering spaces exist in the form of the outdoor spaces as described above and in the form of the community hall where various social and sporting events will take place. In addition to these outdoor spaces further areas have been created in the internal fabric of the building. These spaces are to be used for Internet cafes, vending machine locations, games areas and reading or leisure opportunities.

"On every floor of the residential fabric 'pause areas' have been designed for reading and for residents to gather for social interaction and a cup of coffee." [Best Practice - Urban village - Kew bridge London - technical report 2003.]

Fig - 5:2:09

Fig - 5:2:10

Fig - 5:2:11

Fig - 5:2:12

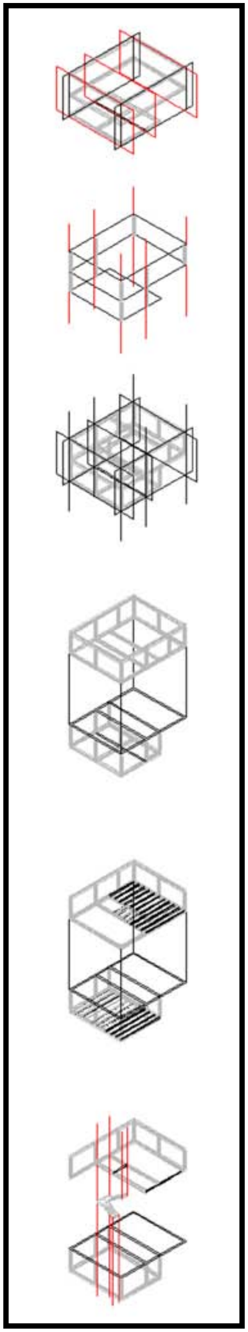


Fig - 5:2:13

5:2:4 BUILD-ABILITY

Prefabrication of the main structural elements and modular infill panels will make for a rapid construction time and will ultimately reduce construction costs. In addition these components will have the potential for reusability in future buildings. The construction cost for conventional compact buildings will always be lower as previously established; however the intent of this development is to challenge the conventional and to try and find a balance between the way things are done and the way things could be done.

5:2:5 HEATING AND COOLING SYSTEM

A Combined Heating and Power system such as the model included in the BedZED project will be used for the heating and power requirements of the Urban Village, the difference being that the heat that is recovered during the generation of electricity will be used to heat water for the specific intent of heating the building, via an under floor heating system throughout the development. The system uses an automated wood chip fired system which uses gasification technology; the engine then produces electricity at approx 40% efficiency and recovers heat at a rate of e=2h. Clean combustion of the wood is achieved by water and sand filtration. Provision has been made for the delivery of the wood chip via the River Thames with a minimum storage capacity of 7 days on site.

"The CHP plant aims to maximise mixed-use activities on site as well as the incorporation of other neighbouring sites with power and heating requirements; surplus power could be sold at green tariff rates to these sites." [Best Practice - Urban village - Kew bridge London - technical report 2003.]

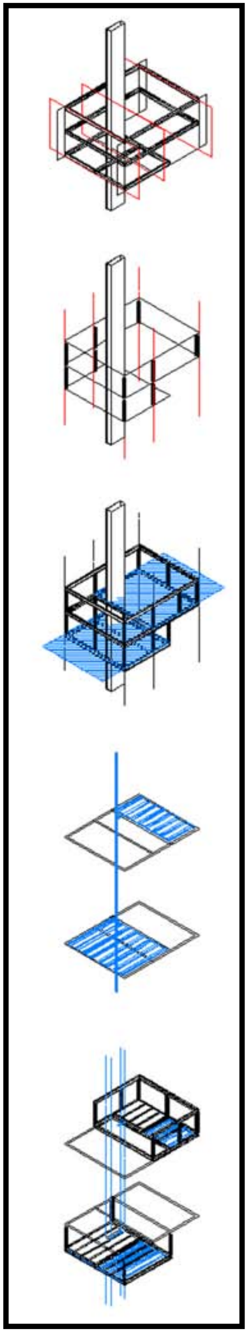


Fig - 5:2:14

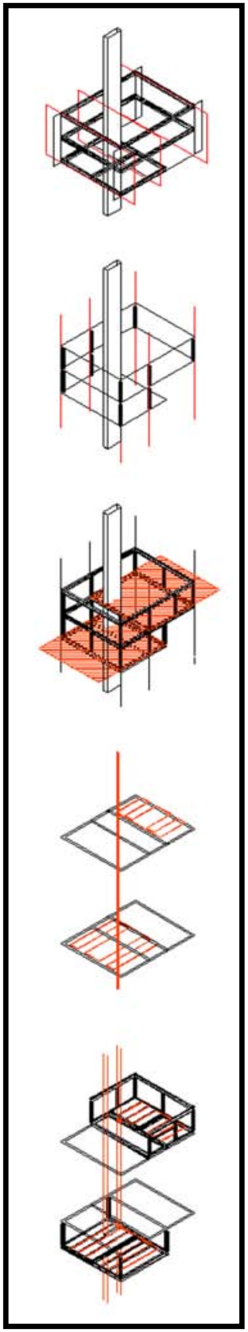


Fig - 5:2:15

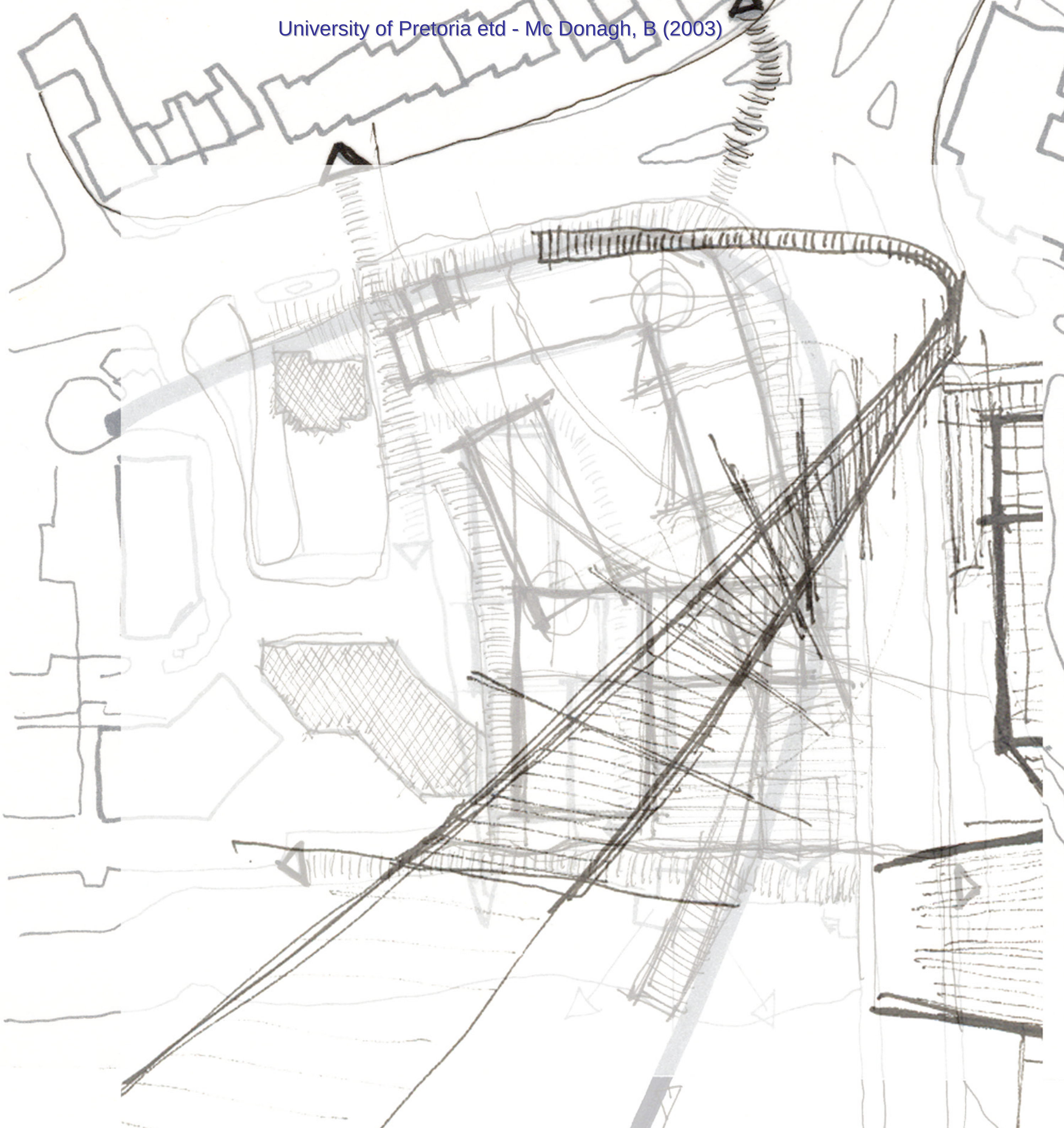
Fig - 6:01

6:0 CONCLUSION

The challenge facing architects today is to create buildings and environments that are sustainable and that facilitate a balance between all three aspects of the triple bottom line. The way that buildings use energy and what have come to be the accepted norms in terms of high-rise housing typologies must be evaluated. There is an improved way of creating the places in which we live and with the correct focus and further study the financial implications can be overcome, leaving us with a better world to live in.

Fig - 1:01

SECTION B BASELINE CRITERIA DOCUMENT



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LIST OF FIGURES

1:8 INTRODUCTION

The following Report is based on the Sustainable Building Assessment Tool Jeremy Gidbert 2002. The SBAT tool is designed to access and to set targets for buildings in terms of their performance with regards; social, economic and environmental objectives.

Additions to the structure of the SBAT tool have come from the RIBA sustainable development checklist www.architecture.com and the Zero CO2 housing competition report 2002

The target setting will be used as a guide to ensure the design adheres to the requirements of responsible development and will be used as a measuring tool to establish how accurate the end product prescribes to these targets that have been set.

2.0 SOCIAL ISSUES

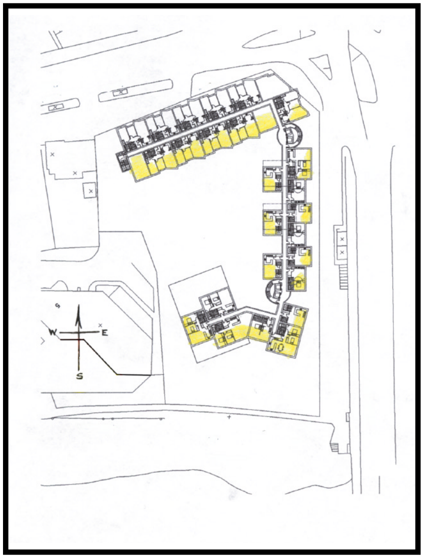
2:1 OCCUPANT COMFORT

The quality of environments in and around buildings has been shown to have a direct impact on health, happiness and productivity of people. Healthier, happier and more effective people contribute to sustainability by being more efficient and therefore reducing resource consumption and waste. However the quality of this environment needs to be achieved with minimal cost to the environment. Development Impact Assessment Tool 2003.

2:1:1 LIGHTING

The design of the development has where possible orientated units in such a way that the habitable rooms are south facing in order to utilise the best natural lighting opportunities.

Where natural lighting lux levels are not achieved in the variations of rooms' energy efficient fittings are to be used in all circumstances.



Natural light aspect Fig - 2:1:1

2:1:2 VENTILATION

Natural ventilation is to be used as far as possible to achieve the required air changes for the various rooms. Systems of heat recovery are to be employed for the winter months so as to ensure sufficient ventilation without excessive heat loss.

Mechanical ventilation is to be explored as an option for the venting of the basement, toilets and kitchens. The potential of heat recovery from kitchen and bathroom extraction is to be explored and employed during the winter months to assist in the workload of heating systems.

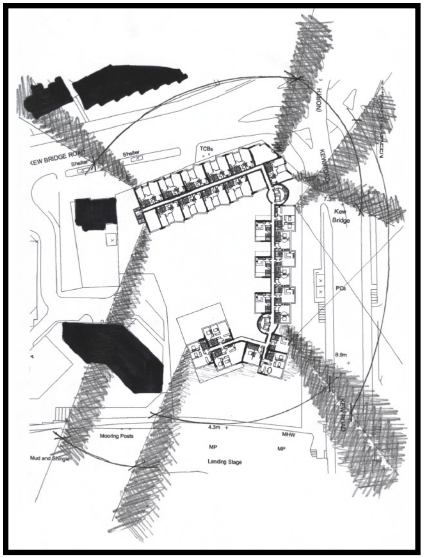
2:1:3 NOISE

The nature of the external wall construction with regards the thermal insulation requirements will provide the potential for high levels of sound insulation from external sources, the values for which will be determined in detail with the specification of materials and quantities. The noise levels between units sharing walls will be controlled by means of insulated party walls ensuring acceptable noise levels in the work and living environments.

2:1:4 VIEWS

Stacking arrangement and orientation of residential units are of such a nature that the views towards the River Thames and Kew Gardens adjacent the site is of primary importance.

Where this is not achievable window openings and depth of rooms are to be of such a nature that sufficient light and views are accessible. All living and working environments are to be 6 metres or less from windows.



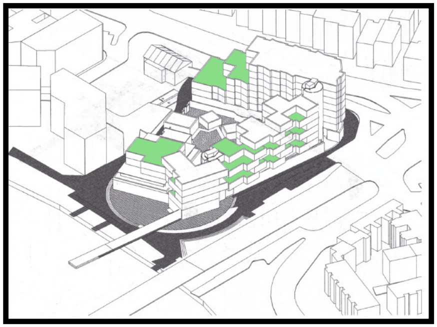
Views and sight lines Fig - 2:1:2

2:1:5 ACCESS TO GREEN OUTSIDE

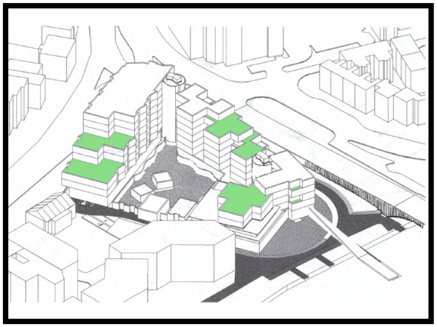
The location of the site is within 10min walk from one of the United Kingdom's most famous parks, Kew Gardens, providing excellent opportunity for access to large open green spaces for leisurely activities. The site will however provide access to outdoor spaces for both the occupants of the development and public in the form of two separately defined spaces.

The first will be more private in nature providing a controlled secure environment for the occupants to utilise for outdoor activities such as skateboarding and a play area for the children.

The other is to be public incorporating water activities such as a children's splash pool and a pool for the remote controlled boating club, which will be linked to the Thames Boating club with activities such as sailing, rowing and boating.



Access to green outside Fig - 2:1:3



Access to green outside Fig - 2:1:4

2:2 INCLUSIVE ENVIRONMENTS

Buildings can be designed to accommodate everyone, or specially designed buildings need to be provided. Ensuring that buildings are inclusive supports sustainability as replication is avoided and change of use supported. Development Impact Assessment Tool 2003.

2:2:1 PUBLIC TRANSPORT

The site is located within 100 metres of Kew Bridge Train Station (direct 15 min journey to Waterloo Station) two Public Bus stops (to and from central London).

In addition to this River Ferry opportunities are to become available from the proposed Boat club on the river frontage of the site.All public transport facilities cater for disabled access.

2:2:2 ROUTES

Surface treatments of the routes between and within buildings will be of a smooth non-slip surface providing equal access to all members of the public including the disabled.

2:2:3 CHANGES IN LEVEL

Due to the nature of the site and the designation of areas specific public and private, various level changes will take place.

All changes in level will however cater for wheelchair access with appropriate ramps of 1:12 fall, or lifts where necessary.

2:2:4 EDGES

All edges at level changes are to be treated with textured edge floor finishes.

Stair nosings are to be treated with distinguishable contrasting floor finishes.

These measures are to ensure safe movement through the development for the visually impaired.

2:2:5 TOILETS

Approx 30% of the residential units (across all typologies) are able to accommodate the facilities required to meet the ablution needs of the disabled person.

Public facilities are provided for at the community hall and provision will be made for both genders and physical disabilities.

2:2:6 PUBLIC ACCESS

The development will improve the three existing public edges namely Kew Bridge Road frontage, the Kew Road slipway leading into a new public gathering area with Boat Club and The River Thames public walkway including the public access under Kew Bridge. In addition a new pedestrian route will be created along the western edge of the site directly linking Kew Bridge Road with The Thames River walkway.

2:3 ACCESS TO FACILITIES

Conventional living and working patterns require regular access to a range of services. Ensuring that these services can be accessed easily and in environmentally friendly ways, supports sustainability by increasing efficiency and reducing environmental impact. Development Impact Assessment Tool 2003.

2:3:1 CHILDCARE

The development will include a crèche, which will cater for the needs of the community living on the Kew Bridge site.

2:3:2 BANKING

No provision has been allowed for banking services on the site, these facilities are available to the public within 1.5 km along Kew Bridge Road towards Hammersmith.

2:3:3 RETAIL

The development will provide an anchor tenant in the form of a leading grocery store (decision of tenant to be based on the Green policies of tendering tenants). Further retail opportunities are available in the 2500 m² of retail floor space on the ground floor adjacent Kew Bridge Road and Kew Road.

2:3:4 COMMUNICATION

The development will provide information technology, telephone and television connections to every unit, residential and retail as a standard service.

The nearest postal facilities are available in Hammersmith a 5 min bus ride.

2:4 PARTICIPATION & CONTROL

Ensuring that users participate in decisions about their environment helps ensure that they care for and manage this properly. Control over aspects of their local environment enables personal satisfaction and comfort. Both of these support sustainability by promoting proper management of buildings and increasing productivity Development Impact Assessment Tool 2003.

2:4:1 ENVIRONMENTAL CONTROL

The individual's control over his/her immediate environment will include the opportunities for each unit to be controlled by the inhabitants by means of opening windows and in some cases adjusting of solar protective louvers.

The building is to be designed in such a way that the changing condition in one unit will not adversely affect the overall building climate stability.

The building management systems will include recycling policies and visually accessible meters that indicate building performance in terms of amount of water and electricity used.

Management will include community meetings once a month that will provide an opportunity for feedback and input from representatives of the community.

2:4:2 USER ADAPTATION

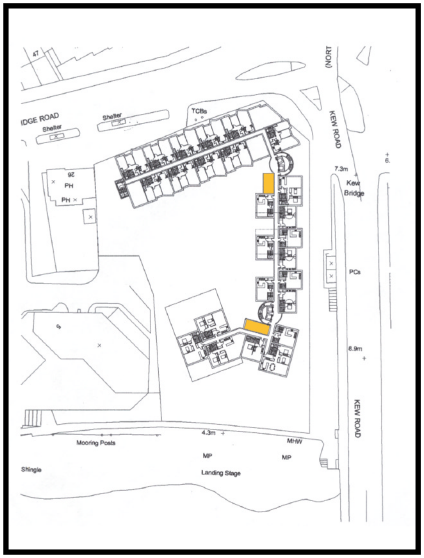
Adaptation and flexibility are provided for in the design of the residential units in the form of moveable internal partitioning walls and folding furniture.

Provision for personal storage space will be made for each unit in the form of compartmental storage either in the unit or in the basement space.

2:4:3 SOCIAL SPACES

Designated social gathering spaces exist in the form of the outdoor spaces as described above and in the form of the community hall where various social and sporting events will take place.

On every floor of the residential fabric 'pause areas' have been designed for reading and for residents to gather for social interaction and a cup of coffee.



Social gathering spaces Fig - 2:4:1

2:4:4 AMENITY

In the above mentioned social areas provision will be made for access to cupachino and snack vending machines that will be maintained by a designated resident as a potential income opportunity.

Further access to retail amenities will be available in the form of the retail facilities on the ground floor.

2:5 EDUCATION, HEALTH AND SAFETY

Buildings need to cater for the well being, development and safety of the people that use them. Awareness, and environments that promote health can help reduce the incidence of diseases such as AIDS. Safe environments and first aid can help limit the incidence of accidents and where these occur, reduce the effect.

Learning and access to information is increasingly seen as a requirement of a competitive work force. All of these factors contribute to sustainability by helping ensure that people remain healthy and economically active, thus reducing the 'costs' (to society, the environment and the economy) of unemployment and ill health. Development Impact Assessment Tool 2003.

2:5:1 EDUCATION

Access to the Internet will be provided for to the residents of the development in the form of Internet connections in all the residential units.

2:5:2 SECURITY

All external pedestrian routes are to be designed in such a way as to ensure well-lit routes that have the added safety of overlooking aspects from residential units above.

These routes will have clear visual links between public spaces to ensure the safety of the public utilising the routes.

Access into the buildings will be controlled by means of security doors with key-card and visual intercom systems.

2:5:3 HEALTH

First aid kits will be provided for at the main access core on every floor and 3 members of the community per floor will be educated in basic first aid procedures in the event of an accident or emergency.

2:5:4 SMOKING

No smoking in public spaces throughout the building: lifts, stairs, passages, entrance and lift lobbies, pause areas and near any air intake for ventilation purposes for the building.

2:5:5 SAFETY

The development will comply with all Health and Safety regulations as stated by the British Standards for Building compliance.

2:5:6 CULTURAL DIFFERENTIATION

The cultural diversity of the envisaged community has been considered and is understood to be largely of a Caucasian majority.

The potential needs of other ethnic groups has been considered and catered for in the flexibility of the residential units, the units can be personalised to the needs of the specific inhabitants.

3 ECONOMIC ISSUES

3:1 LOCAL ECCONOMY

The construction and management of buildings can have a major impact on the economy of an area. The economy of an area can be stimulated and sustained by buildings that make use and develop local skills and resources. Development Impact Assessment Tool 2003.

3:1:1 LOCAL CONTRACTORS

The list of tendering contracting firms will comprise of locally based London contracting firms thereby ensuring a local company will secure the right to build the development.

Local subcontractors affiliated to the tendering contracting firms will also be scrutinised in terms of their location relative to the site location.

Leniency will however be demonstrated in cases of specialised applications or skills with regards to subcontractors.

3:1:2 LOCAL BUILDING MATERIAL SUPPLY

Tender applicants will have to agree to ensure that construction materials are sourced from within the proposed 200km range of the site as part of the tender conditions.

3:1:3 LOCAL COMPONENT MANUFACTURER

Tender applicants will have to agree to ensure that construction materials are sourced from within the proposed 200km range of the site as part of the tender conditions.

3:1:4 OUTSOURCE OPPORUNITIES

The development will generate catering, cleaning, entertainment and security needs.

Local service providers will meet these requirements as priority service providers.

3:1:5 REPAIRS AND MAINTENANCE

The driving design principal for this development is that the built fabric should respond to its environment by utilising passive heating and cooling systems in conjunction with a well insulated external skin to achieve desirable living and working environments without the need for excessive heating and cooling systems.

It is therefore that machinery would be drastically reduced and locally sourced to ensure any future maintenance would be conducted easily and efficiently.

Construction materials will be sourced from local suppliers these include recycled building materials and will therefore be maintained over the life span of the building by local supplies.

3:2 EFFICIENCY OF USE

Buildings cost money and make use of resources whether they are used or not. Effective and efficient use of buildings supports sustainability by reducing waste and the need for additional buildings. Development Impact Assessment Tool 2003.

3:2:1 USEABLE SPACE

Space used by plant, WCs and circulation should not make up more than 20% of total area of the development. Development Impact Assessment Tool 2003.

3:2:2 SPACE USE

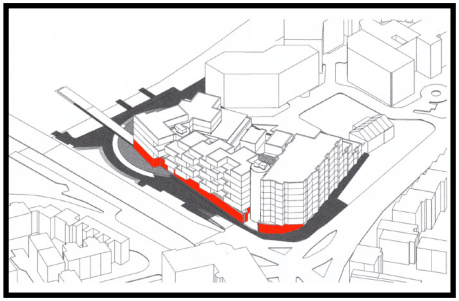
The community hall will accommodate various space requirements including sporting functions and social gatherings as well as providing facilities for educational purposes.

3:2:3 USE OF TECHNOLOGY

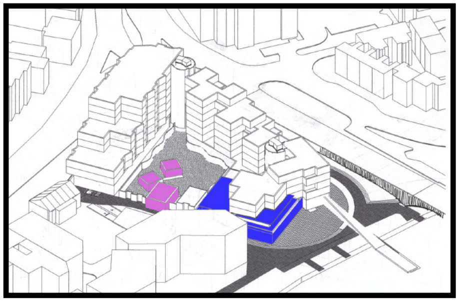
Communications and information technology connections will be utilised to convert home space into workspace aiding in the reduction of travel requirements of the residents.

3:2:4 MIXED DEVELOPMENT

The development will cater for a range of functions namely: Retail 2500m² lettable space, Community Hall for various sporting and social events, Boat Club to accommodate various water sport disciplines on the Rive Thames, Crèche facilities providing day-care and babysitting services and a wide range of Residential unit typologies.



Retail area Fig - 3:2:1



Community hall & creche Fig - 3:2:2

3:3 ADAPTABILITY AND FLEXIBILITY

Most buildings can have a life span of at least 50 years. It is likely that within this time the use of the building will change, or that the feasibility of this will be investigated. Buildings, which can accommodate change easily supports sustainability by reducing the requirement for change (energy, costs etc) and the need for new buildings. Development Impact Assessment Tool 2003.

3:3:1 VERTICAL DIMENSION

The structural dimensions of floor-to-floor height are as follows:

Ground Floor Retail
4 500mm

Ground Floor Commu nity Hall 6 000mm

Residential units 1st to 7th floor 3 000mm

3:3:2 INTERNAL PARTITIONS

The construction of the internal partitions between residential units is designed to be non-load bearing and as such could be removed for potential future flexibility of use.Development Impact Assessment Tool 2003.

3:3:3 SERVICES

Easy access provided electrical, communication and (and HVAC, where appropriate) in each useable space. Provision made for enabling easy modification of system (i.e. addition subtraction of outlets) Development Impact Assessment Tool 2003.

3:4 ONGOING COSTS

3:4:1 MAINTENANCE

Specification and material selection will be determined on the low maintenance and or low cost maintenance performance of the materials and fittings to be used in the building.

All plant and fabric selection will be based on a minimum 2-year maintenance cycle.

Low or no maintenance components (i.e. windows, doors, plant, ironmongery etc) will be selected.

Low energy light bulbs are to be installed throughout the development and replaced by likewise once replacement becomes necessary and, as far possible replacement of such fittings will be designed to be easily accessible and cost effective.

3:4:2 CLEANING

The selection of low maintenance in terms of cleaning and durability will form part of the criteria in materials selection.

Design will allow for easily accessible for cleaning of windows where possible.

3:4:3 SECURITY / CARE TAKING

The design of the development will be such that one controlling security point will be required at the main entrance to the complex and security technology measures will be incorporated to maintain a secure building at secondary entry point to the complex.

The 24-hour activities that the residential units, community centre and retail will provide, will assist in the reduction of security threat to the inhabitants of the complex.

3:4:4 INSURANCE / WATER / ENERGY / SEWERAGE

The running costs of insurance, water, energy and sewerage will be displayed in such a way that all users of the building will be made aware of the buildings performance these readings will be monitored and reported on in the management meetings with the Community representatives on a monthly basis.

Policies of management will incorporate proactive building participation that will be encouraged the reduction the unnecessary consumption i.e. switching off lights on leaving building spaces.

3:4:5 DISRUPTION AND 'DOWN TIME'

Electrical and communication services, HVAC and plant located where they can be easily accessed with a minimum of disruption to occupants of building. This should maximising access to this from circulation areas (rather than work/living areas) and lift off panels at regular intervals to vertical and horizontal ducting Development Impact Assessment Tool 2003.

3:5 CAPITAL COSTS

Buildings are generally one of the most valuable assets that people, and often organisations and governments own. Money spent on buildings is not available for other uses such as health and education. Often too, the high cost of buildings results in the services (i.e. health and education) and the accommodation (for work and living) is beyond the reach of people with the lowest incomes.

Buildings that are cost effective support sustainability by helping provide access to accommodation and services for low-income areas and by enabling money to be spent on other areas that support sustainability. Development Impact Assessment Tool 2003.

3:5:1 CONSULTANT FEES

Incentives are to be made available to consultants for innovation in capital cost and ongoing costs reductions in the form of additional fees.

3:5:2 BUILD-ABILITY

Prefabrication of mass quantity construction components is to be explored to increase speed and ease of construction.

These components will have the potential for reusability in future buildings.

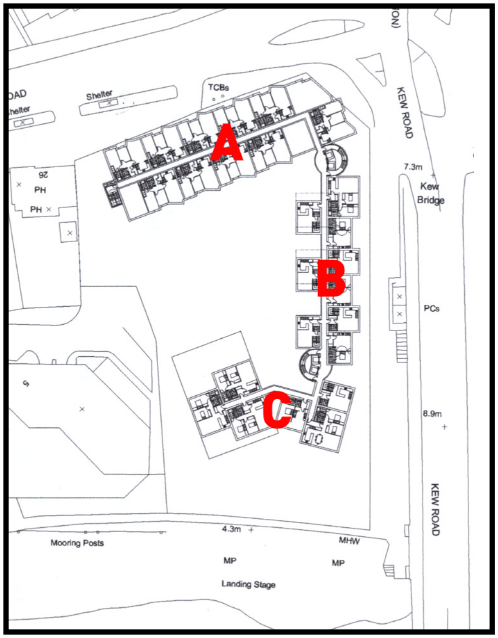
3:5:3 CONSTRUCTION

The development layout will enable ease of phasing and will be conducted in the following sequence:

1. Basement construction: the entire basement will be constructed in one phase.
2. Ground Floor Retail and Residential Block A.
3. Ground Floor Retail and Residential Blocks B & C.
4. Community Centre, Crèche, Boat Club and Residential Block D.

3:5:4 AMENITY

The development functions were based on studies of the immediate area and are aimed at filling required function to the area and adding potential market to the existing businesses and functions.



Phasing Diagram Fig - 3:2:3

4 ENVIRONMENTAL ISSUES

4:1 WATER

Water is required for many activities. However the large-scale provision of conventional water supply has many environmental implications.

Water needs to be stored (sometimes taking up large areas of valuable land and disturbing natural drainage patterns with associated problems from erosion) It also needs to be pumped (using energy) through a large network of pipes (that need to be maintained and repaired). Having delivered the water, a parallel effort is then required for disposal after use, i.e. sewerage systems.

Reducing water consumption supports sustainability by reducing the environmental impact required to deliver water, and dispose of this after use in a conventional system. Development Impact Assessment Tool 2003.

4:1:1 RAINWATER

The rainfall for London is Approx 799mm per annum with the best rainfall during the winter months Nov-Feb, The highest recorded month in 2002 was December at 81mm.The area of roof to be used for the water collection is approx: 3460m².

Highest rainfall month for 2002 allowing for an additional 20% safety factor makes for a tank capable to store 350m³ of water. Therefore the size of tank required for rainwater storage at basement level is a cubic tank of 7x7x7m. A roof washer system is a system that ensures a level of decontamination of rainwater collected before the water is stored. The system rejects the first 50 litres of water per 1000m² of roof. The rainwater that falls on the roofs of the building will be collected and linked to the water recycling system which will filter both rain and grey water for reuse either for clothes washing, toilet flushing or garden use.

4:1:2 WATER USE

Estimated inhabitants of the residential building	216	Adults
(See densities strategy for estimation breakdown)	108	Children
	324	Total
Family based on 2 adults and 1 child	108	Total families
Proposal for 2 adults and 1 child: Bath/shower	120	litres/day
Washing machine	70	litres/day
Low-flush toilets	30	litres/day
Cooking	10	litres/day
Total	230	litres/day
Total usage x families	24 840	litres/day

Zero CO2 Housing COMPETITION REPORT FEB 1999

Specifications will also include the use of water-saving showerheads, flow restricting taps and low flush toilets.

4:1:3 GREY WATER

Grey water will be collected from wash hand basins, showers, baths and kitchen sinks

Bath/shower	120	litres/day
Cooking	10	litres/day
Total	130	litres/day
Total collection x families	14 040	litres/day

Zero CO2 Housing COMPETITION REPORT FEB 1999

This water will be filtered, cleaned, and stored in holding tanks in the basement for the reuse in the following applications.

Low-flush toilets	30	litres/day
Washing machines	70	litres/day
Total	100	litres/day
Total x families	10 800	litres/day

It is therefore that of the 24 840 litres/day used by the 108 families 14 040 litres/day will be reused at a rate of 10 800 litres/day.

Surplus water of 3 240 litres/day will be added to the rainwater collection of approx 110 litres/day and used for landscape irrigation.

4:1:4 RUNOFF

Runoff reduced by using pervious or absorbent surfaces. Hard landscaping minimised. Development Impact Assessment Tool 2003.

4:1:5 PLANTING

Planting has low water requirement (indigenous species). Development Impact Assessment Tool 2003.

4:2 ENERGY

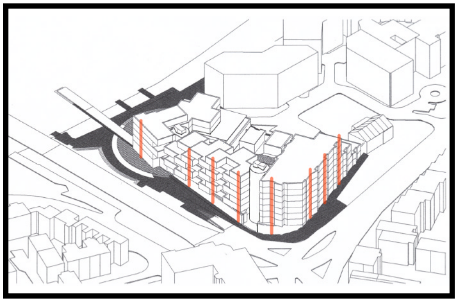
Buildings consume about 50% of all energy produced. Conventional energy production is responsible for making a large contribution to environmental damage and non-renewable resource depletion. Using less energy or using renewable energy in buildings therefore can make a substantial contribution to sustainability. Development Impact Assessment Tool 2003.

4:2:1 LOCATION

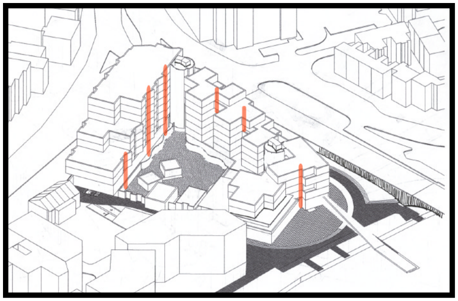
See public transport 2:2:1.

4:2:2 VENTILATION SYSTEM

The nature of the heating and power plant will necessitate the use of turrets to convey heated air into units around the site. These turrets will, with minor adjustments, utilise the properties or passive thermal air movement during the summer months to cool the units by means of air extraction through the units. The target setting for habitable rooms is 1 ac/h and 3ac/h for kitchens and bathrooms.



Heating turrets Fig - 4:2:1



Heating turrets Fig - 4:2:2

4:2:3 HEATING AND COOLING SYSTEM

Combined Heating and Power system recovers heat lost during electricity generation and distributes it through turrets around the development. The system uses an automated wood chip fired system which uses gasification technology, the engine then produces electricity at approx 40% efficiency and recovers heat at a rate of e=2h. Clean combustion of the wood is achieved by water and sand filtration.

Provision has been made for the delivery of the wood chip via the River Thames with a minimum storing capacity of 7 days on site.

The CHP plant aims to maximise mixed-use activities on site as well as the incorporation of other neighbouring sites with power and heating requirements, surplus power could be sold at a green tariff rates to these sites

4:2:4 APPLIANCES AND FITTINGS

All appliances will be energy efficient. Low energy lighting and energy saving light bulbs is assumed as standard.

4:2:5 RENEWABLE ENERGY

Solar panels capable of producing 170W per 1m² will be incorporated to power fans assist with the generation of electricity and used to power the extraction fans in the turrets and bathrooms and kitchens.

Turbine generators will use the tidal flow of the River Thames to generate additional electricity, which would assist with the extraction fans power requirements.

4:2:6 NATURAL LIGHT

The design of the development has as far as possible orientated the habitable room facing south utilising the solar radiation to assist in passive heating of the residence. The window openings are to consider views, natural light and solar control, for sun control. Solar protective devices will be employed to control heat gains during the summer months.

Natural lighting & passive heating Fig - 4:2:3

4:3 RECYCLING AND REUSE

Raw materials and new components used in buildings consume resources and energy in their manufacture and processes. Buildings accommodate activities that consume large amounts of resources and products and produce large amounts of waste. Reducing the use of new materials and components in buildings and in the activities accommodated and reducing waste by recycling and reuse supports sustainability by reducing the energy consumption and resource consumption. Development Impact Assessment Tool 2003.

4:3:1 TOXIC WASTE

Arrangements made for the safe disposal / recycling of toxic/harmful substances i.e. batteries, printer toners. Development Impact Assessment Tool 2003.

4:3:2 INORGANIC WASTE

The development's management policies will include an active recycling program with collection points for the separated recycling bins at every level. These bins will be taken down to basement level for compaction and removal by partnership recycling companies.

4:3:3 ORGANIC WASTE

The organic waste will be made available to the Kew Gardens Company for composting and ultimately fertiliser for the gardens.

4:3:4 SEWERAGE

This will be directed into the mains sewerage from removal.

4:3:5 CONSTRUCTION WASTE:

The design of the development will utilise modular sizes of components to minimise construction waste and unnecessary off-cuts.

Contractor is to incorporate best practice sustainable site management policies limiting construction waste with incentive based target setting of materials saving.

4:3:6 REUSE OF EXISTING BUILD INGS

The existing area has been surveyed and the findings were that of a number of redundant office buildings had been converted into residential blocks and that these opportunities have been exhausted

3:3:7 HERITAGE

The area boasts a number of listed structures namely The Grade 1 listed Steam Museum and the Grade 2 listed Kew Bridge and Kew Bridge Station. These structures have informed the massing and fabric of the development.

4:4 SITE

Buildings have a footprint and a size that take up space that could otherwise be occupied by natural ecosystems which contribute to sustainability by helping create and maintain an environment that supports life, (for instance, controlling the carbon dioxide and oxygen balance and maintaining temperatures within a limited range). Buildings can support sustainability by limiting development on sites that have already been disturbed, and working with nature by including aspects of natural ecosystems within the development. Development Impact Assessment Tool 2003.

4:4:1 BROWNFIELD SITE

The proposed site has previously been built on but is currently without any obvious traces of previous superstructure.

The massing of the development will 'step up' from 3 storeys at the southern boundary closest to the River Thames towards a maximum height of 7 storeys at the northern end of the site Kew Bridge Road where the impact of overshadowing will be minimised by the fragmentation of the built form.

4:4:2 VEGETATION

Planting opportunities will be realised in landscaped areas, atriums, roof gardens and balconies.

Potential small-scale urban agriculture will be possible in selected roof garden areas throughout the development.

4:4:3 LANDSCAPE INPUTS

Landscape does not require heavy artificial input i.e. fertilizer, insecticide and pesticide. Development Impact Assessment Tool 2003.

4:4:4 APPROPRIATE DENSITY FOR BUILDING LOCATION

The Development strategy for the site is to achieve urban densification, providing a range of mixed-use functions for retail, community and residential (30% is to be affordable component) opportunities. This structure will accommodate for a wide range of tenure, and a mixed population in terms of age, wealth and occupant skills promoting the notion of a balanced and integrated community, which will be sustainable in terms of social economic and environmental notions.

Apartment
1 Bed unit @ 45m²
24 x 2 Habitable Rooms
Total 48HR

Apartment
2 Bed unit @ 65m²
84 x 4 Habitable Rooms
Total 336HR

Apartment
3 Bed unit @ 120m²
12 x 5 Habitable Rooms
Total 60HR

Residential Development Densities Requirements for Hounslow Council are as follows:

Densities higher than the maximum 247 hr/hectare set out in UDP policy H.1.4 are considered suitable.

The Area of the Kew Bridge Site is 0.731 acres therefore the minimum density required for the site as per Hounslow Council is 173 Habitable Rooms. Total number of Habitable Rooms is 444.

4:5 MATERIALS AND COMPONENTS

The construction of buildings usually requires large quantities of materials and components. These may require large amounts of energy to produce. Their development may also require process that are harmful to the environment and consume non-renewable resources.

4:5:1 EMBODIED ENERGY

The materials selection for the development will consider embodied energy as one of the criteria for final selection. However, the recycle ability of materials will also be considered.

A target for 60% renewable or low embodied energy materials will be set for the development.

4:5:2 MATERIAL / COMPONENT SOURCES

90% of materials and resources will be acquired from verifiable, recycled and renewable resources.

4:5:3 MANUFACTURING PROCESSES

Environmental damage limited during product component development. No green house gases released, no pollution caused. Development Impact Assessment Tool 2003.

4:5:4 RECYCLED / REUSED MATERIALS AND COMPONENTS

10% of building materials and components are reused or from recycled sources.

These sources will include:

Ashwell Recycled Timber
Products Ltd.
Address:
Wick Place Farm
Unit F1
Wick Place Farm
Brentwood Road
Bulphan_Essex
RM14 3TL

Deptord Recycling Centre.
Address:
Landmann Way
Off Surrey Canal Road
Deptford
SE14 5RS

L & B Recycling
Solutions.
Address:
Hannah Close
Great Central Way
Neasdon
London
NW10 OUX

4:5:5 CONSTRUCTION PROCESSES

The bulk of construction materials and machinery will be delivered to the site via Kew Bridge Road

The River Thames will be considered for deliveries of construction materials during high tide only as to ensure no environmental damage caused to the riverbank.

4:6 BUILT ENVIRONMENT

The built form and mass of the development is a result of consideration for the immediate urban fabric, potential overshadowing and urban design guidelines.

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9:0 ACKNOWLEDGEMENTS

'ADVERSITY INTRODUCES A MAN TO HIMSELF' ANONYMOUS

The road leading to this moment has been a long and hard fought one; I have had to make many sacrifices which have been very difficult for me. However I have met and made friends with some of the most amazing people which have shown me boundless generosity and support throughout the years. It is to these special people that I would like to say a heart felt thank you, without you this thesis would not have been possible.

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Bob Palmer and Ronel Phillips

Geoff and Trish Williams

Nano Evanhuis

Michelle Van Rensburg

The dog gang - ‘hopdog’, ‘the skaap’, ‘louis tril’, and ‘FB in da house’