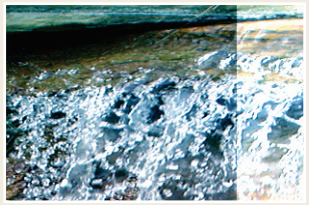


baseline indicators

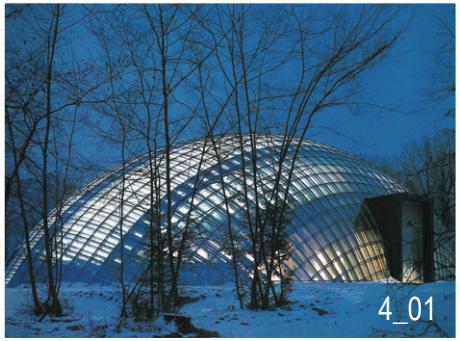
Baseline Indicators

The place created by the building complex has a distinct character where specific yet integrated functions occur. The buildings provide a place for the activities to occur. The functions must be accommodated optimally, with high environmental regard. A strong place presupposes that there is meaningful correspondence between site, settlement and architectural detail. The buildings become a concretisation of the concept of healing.

Experiences and meaning come subconsciously while moving around a place. The movement of the body in space provides a measure for things, allowing people to appreciate the splendour and explor that which is hidden; to organise what is there to see, hear, feel, smell and touch in a given environment (Meiss 15:1990). The layout of the buildings affects the orientation and wayfinding of the user. This in turn will either make their experience exciting and helpful, or disorientating and frightening. Wayfinding and spatial orientation are important aspects of an efficient environment. Simplistic environments must be avoided; spatial complexity can be provided without making environments confusing and disorganized.

The building complex must be rooted in the site, and in nature. The context of the site, the views and quality of place provided are important to the experience of healing at the facility. Natural scenes have a positive potential, and may have a restorative effect. Nature has intrinsic healing powers; water, stone, and wind are regarded as important to Traditional Healers. The site has been identified as a valuable resource, and must be managed to retain this value. Construction must not degrade the site, or drastically alter its inherent properties. The site was chosen largely for its aesthetic appeal, and it is important to retain this.

To provide the correct environment to be able to fulfill the functions of the building complex, certain baseline criteria are needed. These criteria ensure that the building accommodates all users, invites participation, monitors safety and health, reduces short term and long term economic costs, considers context and site, selects materials responsibly, and keeps the environment as an important stakeholder in the project through climatic response and environmental concern.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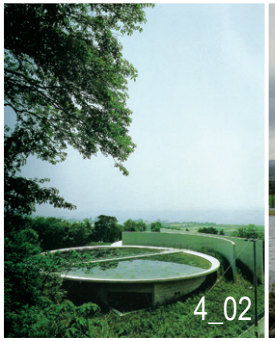
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4.1 Sustainability

Sustainability is evocative of optimistic and protective ideas, recalling sustenance and therefore a nurturing, or at least good common sense (Steele 1997:ix). Linked as it has been to development, sustainability's connotations are those of building a solid future and achieving prolonged, lasting, worthwhile progress. What is sustainable architecture? A basic definition is an architecture that meets the needs of the present without compromising the ability of future generations to meet their own needs (Steele 1997:234).

More energy is used in running buildings than in their construction and material manufacturing (Day 1990: 31). Buildings themselves, their materials, location, services and design have local effects, as well as affecting the health of people that use these places. Sustainable architecture, variously called ecological, biological, green or Gaia architecture, aligns with this critical response to a perceived global imperative that differs form its predecessors (Steele 1997:234).

In either active or passive mode, sustainable architecture tries to make connections to other buildings to take maximum advantage of mass, to local typologies that can be identified as climatically and culturally effective over time, to regional microclimates and materials or to global supplier if necessary in the implications that some material choices have for non-renewable resource depletion and for the possibility of technology transfer (Steele 1997:237).

"Humanity stands as a defining moment in history. We are confronted with a perpetuation of disparities between and within nations, a worsening of poverty, hunger, ill health and illiteracy and the continuing deterioration of the ecosystems on which we depend for our well-being. However, integration of environment and development concerns and greater attention to them will lead to the fulfilment of basic needs, improved living standards for all, better protected and managed ecosystems and a safer more prosperous future. No nation can achieve this on its own, but together we can in global partnership for sustainable development" (Steele 1997:9), from Agenda 21.

Agenda 21 adresses the built environment and the construction industry, which it identifies as *"a major source of environmental damage through the degradation of fragile ecological zones, damage to natural resources, chemical pollution, and the use of building materials, which are harmful to human health."*

Specifically, as a corrective the report recommends:

1. The use of local materials and indigenous building sources.
2. Incentives to promote continuation of traditional techniques, with regional resources and self-help strategies.
3. Regulation of energy-efficient design principles.
4. Standards that would discourage construction in ecologically inappropriate areas.
5. The use of labour-intensive rather than energy-intensive construction techniques.
6. The restructuring of credit institutions to allow the poor to buy building materials and services.
7. International information exchange on all aspects of construction related to the environment, among architects and contractors, particularly about non-renewable resources.
8. Exploration of methods to encourage and facilitate the recycling and reuse of building materials, specially those requiring intensive energy consumption in their manufacture.
9. Financial penalties to discourage the use of materials that damage the environment.

4.2. Social issues

4.2.1 Indoor environment, Occupant Comfort

"The quality of the environment in and around the building has been shown to have a direct impact on health, happiness and productivity of people. Healthier, happier, more effective people contribute to sustainability by being more efficient and therefore reducing resource consumption and waste. The quality of this environment needs to be achieved with minimal cost to the environment" (Gibberd 2004: SBAT). Shelter is the main instrument for fulfilling the requirements of comfort. It modifies the natural environment to approach optimum conditions of liveability. It should filter, absorb or repel environmental elements according to their beneficial or adverse contributions to man's comfort. Man strives for the point at which minimum energy expenditure is needed to adjust to the environment (Olgyay 1963:15)

Thermal comfort

The building must work with the environment in such a way that it positively modifies the thermal conditions to make the internal environment comfortable for its users. Through passive systems of heating and cooling, using the building itself to regulate temperature, a desired environment can be obtained with little mechanical assistance.

Lighting and daylighting

All facilities must be well lit; daylighting is to be used as much as possible. Day light must be controllable, so that glare is kept to a minimum. If used properly day lighting can reduce electrical consumption, reduce cooling requirements and increase occupant comfort. Facilities should be designed so that electrical lighting is kept to a minimum.

Ventilation and indoor air quality

Fresh air is necessary to replenish oxygen, and remove stale air. Required ventilation should be provided by natural means, where mechanical ventilation can be minimised, or even excluded from the building. Building orientation and space linkage must enhance natural ventilation.

The materials used within the building must not contaminate the indoor air quality. Paints, particle board, adhesives and furnishings can contribute to contaminants found inside new buildings. The least toxic materials should be chosen, along with the design of systems that circulate and distribute fresh air passively.

Noise

Due to the nature of the facilities, noise levels in many areas of the facility must be kept as low as possible. Functions must be zoned so that noisy and quiet areas are separated, limiting unwanted excessive noise, and preventing interference between groups. The limited vehicular circulation on site keeps traffic noise down to a minimum.

Views and visual quality

All work and recreational areas have views outside. These views are important, and have influenced the placement of walls and shape of rooms, so that the eye is drawn to outdoor elements.

Access to outside

Users of the buildings must have easy access to outside green spaces. These spaces provide places for outdoor activities, as well as mental rejuvination between tasks.


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inclusive environments

4.2.2 Inclusive Environments

"An essential criterion for sustainable buildings is that the building is 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" (Gibberd 2004:SBAT).

Transport

Due to the nature of the facilities located on the site, a major part of the site is limit to pedestrian movement, with controlled vehicular movement. All transport on site accommodates wheelchair users. Larger parking bays are provided near entrances and pathways for disabed users.

Routes, signage, level change

All routes and circulation space have an even surface that is easily navigable by wheelchair. Increased isle width, and path width is needed to accommodated all users. Outdoor surfaces take into consideration the varios users, incuding wheelchairs.

Level change within the building as well as between buildings must be facilitated using ramps with a gradient of 1:12. The surface of the ramp must not be slippery. Handrails and restplatforms must be provided on stairs and ramps. Curbs must be provided on ramps.

Visual signs and displays must be clear, simple, and be translated into at least three languages. Visual signals must be used to reinforce audible warning signs, such as a flashing red light used with an audible fire alarm. Certain areas of the buidings are restriced to staff. This must be clearly demarcated and signed.

Toilets and bathrooms

The correct dimensions for toilet cubicles must be provided to aid wheelchair users. Doors must open outwards, with sufficient room to mannuver into the cubicle.

Showers must be of the correct dimension to accommodate disabled users. Handrails and a folding seat must be provided. Water controls, in the shower as well as on basins, must be such that they can be operated by all users

access to facilities

4.2.3 Access to Facilities

"Convention living and working patterns requires 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" (Gibberd 2004:SBAT).

Childcare

Childcare facilities are provided for users of the Healing Centre. These facilities are provided off-site in Mamelodi, near the pick-up point for transport to the facility. They are not located at the Healing facility itself as this may cause distraction to the users.

Residential

Residential areas of the users as well as the staff are located more than 12km from the facility. Due to this reason transport to and from for the Healing centre is available for its users. A similar transportation system for the staff can be arranged, with a central parking area close to their homes. This parking area should be located close to retail and banking facilities where banking, post and groceries can be handled daily if necessary.

4.2.4 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" (Gibberd 2004:SBAT).

Environmental control and user adaptation

Users of the building have reasonable control over the building; this is in terms of opening windows and adjusting blinds and curtains. Furniture and fittings allow arrangement or rearrangement by the user. Personalisation of spaces may take place in the office facilities, and on a limited level in the accommodation facility. Provision should be made for places to put up pictures and notes.

Social space

Design for easy informal as well as formal interaction between people has been provided. This is accommodated in term of various indoor and outdoor seating areas, meeting and counselling rooms and studios. This aids interaction between users themselves, as well as staff.

Community involvement

The community is an important part of this project. The aim of the Healing Centre and the rest of the building complex is to uplift the community, by providing a better psychological state, and so quality of life for its members. Skills training and workshops will benefit the community from the construction phase, through to operation of the buildings. The greater Pretoria community is involved to a certain extent by supporting the Healing facility. Through the Spa and Herbal Centre income, awareness and support is generated to facilitate the functioning and operation of the Healing facility.

4.2.5 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 help to limit the incidence of accidents and where these occur, reduce their 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" (Gibberd 2004:SBAT).

Lifelong learning / education

The nature of the Healing Centre, Herbal Centre and Spa are conducive of education and learning, especially by its users. The staff of all these facilities should periodically be sent on courses, and have access to materials that will further their knowledge, and help them educate users better.

Security, health and safety regulations

Security of the building complex in general will be aided by check points at the entrances. The property must be securely fenced, especially due to the accommodation facilities located at the Healing Centre. At night security should be increased through the employment of security services.

The buildings must comply with health and safety regulations. Policy and checks must be in place to ensure that these are complied with.

First-aid kits must be located in central locations. Staff must be trained in first-aid to be able to assist the injured properly. A protocol on dealing with injuries and emergencies must be established and made known to all staff.

Fig 10

4.3 Economic issues

4.3.1 Local Economy

"The construction and management of buildings can have a major impact on the economy of an area. The economy can be stimulated and sustained by buildings that make use of and dvelop local skills and resources" (Gibberd 2004:SBAT).

Contractors

80% of the construction should be carried out by contractors based within 100km of the building project. Skilled and unskilled labour must be included, with training programmes and educational tasks.

Materials and manufacture

80% of the construction materials: cement, sand and bricks, and the building components, windows, doors and furniture, must be produced within 200km of the site.

Outsource opportunities

Opportunities should be created for emerging small businesses. This includes outsourcing catering, cleaning and security services, making space and equipment available for these businesses to use. All repairs and maintenance required by the building can be carried out by contractors within 100km of the site. Standardised quality fixtures last longer, and when damaged their components are easier to replace.

4.3.2 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" (Gibberd 2004:SBAT)

Usable space

Al buildings msut be managed so that they are used productively and generally occupied to ensure efficiency. Programmes and events must be monitored to ascertain which spaces are being used effectively, and which could be used better or more frequently. The use of space must be intensified by space management approaches such as shared work spaces and areas. Some spaces can be adapted and used for more than one function. Non-useable space such as WC's, plant rooms and circulation must be kept to a minimum.

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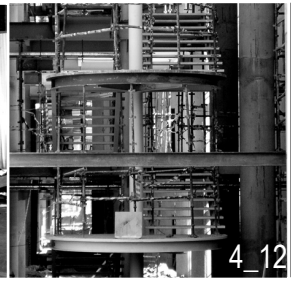
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adaptability

4.3.3 Adaptability and Flexibility

"Most buildings can have a life-span of as least 50 years. It is likely that within this time the use of buildings wil change, or that the feasibility of this will be investigated. Buildings which can accommodate change easily support sustainability by reducing the requirement for change and the need for new buildings" (Glbberd 2004:SBAT).

Partitions

Internal partitions between space are non-load bearing, made from brick, block or plaster board and can be removed or changed relatively easily.

Services

There is easy access to electrical and communication services in usable space. Provision should be made for easy modification of these systems.

Vertical Dimensions

Structural dimensions from the underside of the roof, or slab to the floor should be a minimum of 3m. this ensures ease of change, good depth for future services, as well as a comfortable environment for occupants for visual, acoustic and thermal quality.

ongoing costs

4.3.4 Ongoing Costs

Maintenance

Specifications and material specification for low maintenance and or low cost maintenance should be implemented at initial design stages. All plant and fabric have a maintenance cycle of at least two years. Low or no maintenance components, windows, doors, paint and, ironmongery should be selected. Maintenance should be carried out effectively and efficiently, with access to hard-to-reach areas provided for cleaning and repairs.

Security

Measures must be taken to limit the requirement and costs of security. Alarms and other monitoring devices can be installed to minimise the number of security people necessary.

Insurance/ water/ energy/ sewage

Costs of insurance, water, energy, and sewage should be monitored. Consumption and costs must be regularly reported to management and users. Policy and management to reduce consumption should be implemented, whereas passive systems can be used for the control of energy saving, such as photo voltaic cells that control ventilators, or supply night-lighting through energy-efficient controls.

Disruption and down time

Electrical, communication, plant and other services should be located where they can easily be accessed with a minimum of disuption to occupants of the building. Access to these should be from circulation areas and not iving and working areas.

4.4 Environmental issues

4.4.1 Environmental Architecture

What is here refered to as Environmental Architecture, has many other names: Construction ecology, Green Architecture, Selective Design etc. In general Environmental Architecture is a reaction to environmental degredation.

Protection of the globe through re-evaluation of the way in which buildings are designed and constructed ,reflects the concerns of the green movement generally. The major impact that building design, construction and maintenance have on national energy consumption began to be widely recognised in the early seventies (Jones 1998:12). The design of any building derives from a considered response to climate, technology, culture and site. Considerations of global sustainability and energy conservation bear directly on these four issues and therefore go right to the heart of architectural design.

Under the impact of technological change, there is a growing consensus that architectural objectives and procedure should be realigned to reflect our improved climatic awareness (Hawkes, McDonald, Steemers 2002:17). Global climate change is an issue of widespread social and political concern as it is witnessed by international accords and protocols.

The environmental impact of buildings is widely acknowledged, and in the past quarter-century much progress has been made in developing the means to reduce it through technological development and scientific analysis. However, there is a need to locate this within comprehensive architectural paradigms that connect it to the wider historical, cultural and social discourse without which technology remains of purely instrumental value. The challenge is to reach a point where Environmental Architecture is indistinguishable from good architecture.

Selective design, as opposed to excusive design, aims to exploit the climatic conditions to maintain comfort, minimising the need for artificial control reliant on the consumption of energy (Hawkes, McDonald, Steemers 2002:123). This manipulation of climate, to filter selectively positive characteristics of the environment, is achieved through architecture. The form of a building is the most significant consideration with respect to the selective potential of a design.

The environmental architecture mode denotes the possibility of making a return to the rich relationship between climate and comfort in which a building is understood as a complex system of interrelated uses, spaces, materials, components and sources of energy.

The approach has the following principles:

- To maximise the use of ambient, renewable sources of energy in place of generated energy and fossil fuels.
- To minimise the use of energy-consuming mechanical plant in processes of environmental control.
- To provide the users of buildings with the maximum opportunity to exercise control over their environment and adapt it to their needs.
- To use non-toxic materials that affect the health of construction workers or the users.
- To reuse, recycle and adapt old structures for future construction.


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4.4.2 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 etc.), it also needs to be pumped (using energy) though a large network of pipes (that need to be maintained and repaired). Having delivered the water, a parallel effort is then required to dispose of this after its use (sewage 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" (Gibberd 2004:SBAT).

Water consumption and efficiency of use

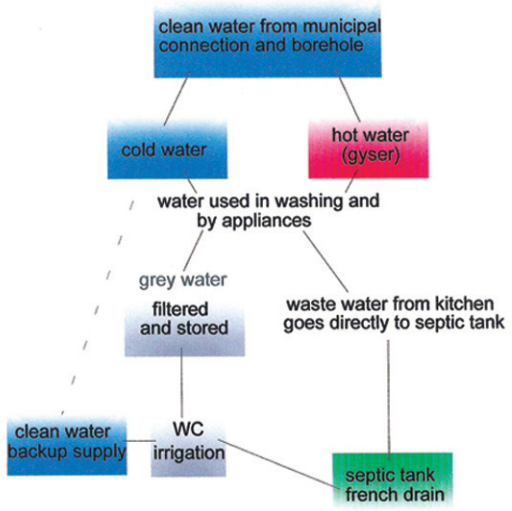
All water devices should minimise water consumption and encourage efficiency of use. Recycling and reuse of greywater to flush toilets and water plants is encouraged. Onsite treatment of black water must be accommodated in the design of such services. A borehole should be included if a site is located far from municipal services, ground water levels permitting.

Runoff

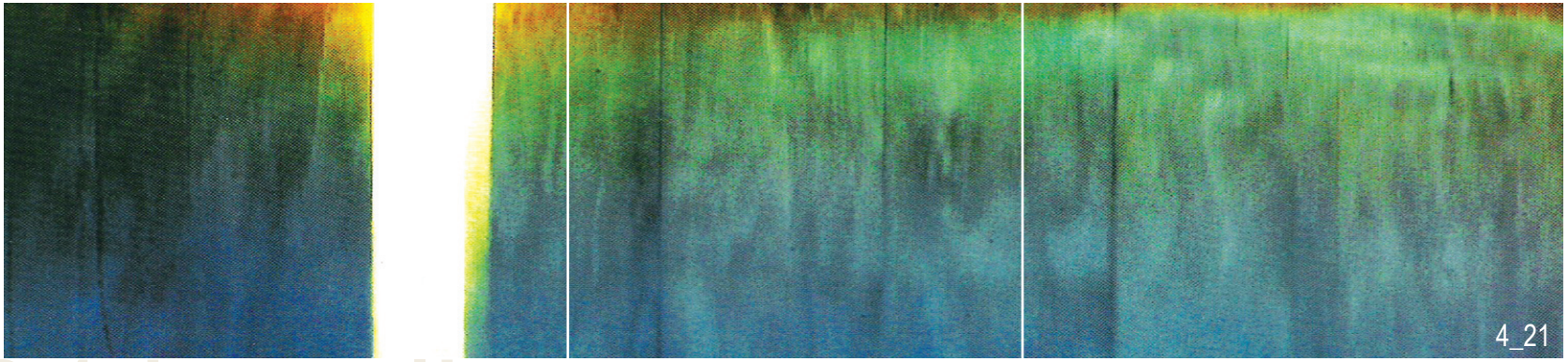
Runoff can be reduced by using pervious and absorbent surfaces. Hard landscapes should be minimised, with pervious surfaces specified for parking and paths.

Planting and landscaping

Planting must be indigenous with low water requirements. Planting can help to prevent excessive water evaporation, modify the ambient temperature around a building, act as a wind break, help to filter pollution and provide privacy. The character and contours of the site should be retained as far as possible, to assist with water absorption, reducing runoff.



water usage (diagramatic representation) 4_20



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4.4.3 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" (Gibberd 2003:SBAT).

Natural lighting

Natural lighting is used as much as possible throughout the buiding complex. There has to be sufficient light for visual focus and to perform the disired task. Glare must be avoided. Artificial lighting should be limited to nighttime. Energy efficient lighting fixtures must be used.

Ventilation

Natural ventilation is maximised. The interiors are cooled by openable windows, most located near ceiling level to allow stale and warm air out. In areas with high moisture levels and excessive heat, such as bathrooms and kitchen, extractor fans are used to aid ventilation.

Heating and cooling

Energy efficient sytems are used within the building to passively control temperatures. Passive methods for heating include direct gain, trombe walls/floors and fire places. Passive cooling uses the building's thermal mass, as well as ventilation to keep the structure, and so the rooms cool. Openings are shaded to prevent uncontrolled solar gain.

Renewable energy

Solar hot water systems are used to heat water in summer. Back-up electrical systems are used in very cold weather, or conditions with little sunlight.

4.4.4 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. Buildings can support sustainability by, limiting development to sites that have already been disturbed, and working with nature by including aspects of natural ecosystems within the development.

Energy

A building consumes energy in a number of ways: in the manufacture of building materials, components and systems (embodied energy); in the distribution and transportation of building materials and components to the site ('grey energy); in the construction of the building (induced energy); and in running the building and its occupants equipment and appliances (operational energy). A building also consumes energy in its maintenance, alteration and final disposal. An energy efficient building looks to reduce consumption on all of these areas (Jones 1998:36).

'Brownfields'

The site as a whole is largely a brownfields site. The buidling complex is situated in areas that have already been disturbed by human intervention. The proposed buildings must not cause further environmental degradation.

Landscape inputs

All new planting must be of indigenous species. Exotic species must be cleared from the site. However, the clumps of exotic Silver Birch are to be retained due to the quality of place they create. The planting and vegetation chosen to be planted on site must take into consideration the natural climatic and soil conditions.

4.4.5 Recycling and Re-use

"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" (Gibberd 2004:SBAT).

Inorganic waste

This waste should be sorted into what can be recycled or re-used, and either stored or arrangements made for the recyclable waste to be taken to an appropriate plant.

Organic waste

This must be recycled and disposed of on site; greywater can be filtered and re-used, blackwater treated and used for irrigation, and other organic waste can be used for compost.

Construction waste

Construction waste must be minimised through design management and construction practises. Design allowances should be made for material recovery with disassembly, and adaptive reuse of salvaged building materials.

4.4.6 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 processes that are harmful to the environment and consume non-renewable resources" (Gibberd 2004:SBAT).

Embodied energy studies have assessed the energy taken to bring materials and components to their final position. This includes extraction of the raw material, processing it into a workable material, making components and products, installation and use, removal and demolition, as well as the transport and storage of the product at each stage. Industry and its products can have damaging effects and the environment. If a suitable alternative material can be found which is less damaging to the environment, then it should be used.

Materials should be chosen for their local manufacture, low embodied energy and limited environmental damage, their properties for recycling and re-use at a later stage and lastly their aesthetic appeal.

Earth and stone found on site make up a major part of the construction materials used in the buildings. Other materials used are found within close proximity of the site.

Rammed earth

Rammed earth is a method of simple wall construction that uses utilises form work, wood or steel, into which a damp gravely earth mixture is rammed in layers, till total compaction. When the forms are removed the wall is complete, except for curing, and requires no further treatment other than plaster finishes or cosmetic treatments as desired (McHenry 1984:48). The final product is solid and durable.

There are many benefits to using earth construction in South Africa. Earth has good thermal properties; it stores energy in the form of heat due to its mass, is warm in winter and cool in summer. Soil is a readily available resource that is relatively cheap, or even free if it is excavated on site. Due to a long tradition of earth construction in this country, many people have the skills to build with earth. Earth construction is labour intensive, and provides jobs. Due to availability of the material, cost and available skills, earth building is a highly affordable alternative to some conventional technologies. Local communities become directly involved in the process and production of the building and generate income from its construction.

Ideally soil used in earth construction must contain four elements: course sand or aggregate, fine sand, silt and clay (McHenry 1984:48). Earth construction has good compressive strength, but poor tensile strength. Appropriate structural design and construction has to be addressed.

(A more detailed report on rammed earth and the other building materilas used is included in the Technical Documentation chapter.)

The Accommodation Schedule for the building complex is contained in Appendix E.

The Sustainable Building Assessment Tool (SBAT), tables and graph are contained in Appendix F.