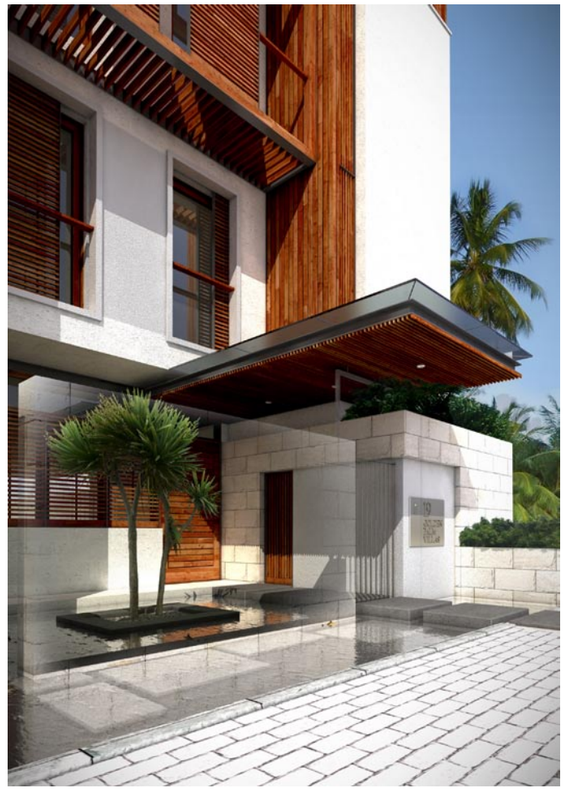
Golden Palms, Holetown, Barbados

Planning Application
Design Statement

August 2008



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Aerial Photograph - Site indicated in red

Contents : Architectural Documents

The following list of reports, prepared by the professional team, collate to form the Planning Application for the Golden Palms Develoment, Holetown, Barbados.

Consultant Team

UK Consultants

ARCHITECT
Harper Downie Design Architecture
Gate House,
No.1 St John's Square
London
EC1M 4DH

STRUCTURAL ENGINEER
Packman Lucas
Butlers Wharf West
42 Shad Thames
London
SE1 2YD

M&E ENGINEER
The Kut Partnership
Rosebery House
Tottenham Lane
London, N8 9BY

Barbados Consultants

ARCHITECT
Gillespie & Steel Associates Ltd.
Dormers
Prior Park
St.James
Barbados BB23017

STRUCTURAL ENGINEER
Stantec Consulting
Winslow House,
Black Rock,
St Michael,
Barbados

M&E ENGINEER
Leverage Consulting Engineers Inc.
Ashby House, 1 Erin Terrace,
Brittons Cross Road
St. Michael BB14002

1.0 Introduction

1.1 Aim / Purpose of Document

This document has been prepared on behalf of BJSB Ltd in support of the proposals for the redevelopment of the sites previously occupied by the Regent Hotel and Cheffette Restaurant in Holetown, St James, Barbados.

The comprehensive redevelopment of the site is to provide 20 no. highly serviced houses arranged as five staggered terraces across the site. The project has been designed as a sustainable development, maximising renewable energies and significantly cutting the carbon index rating by 66% (when measured against an average Bajan home).

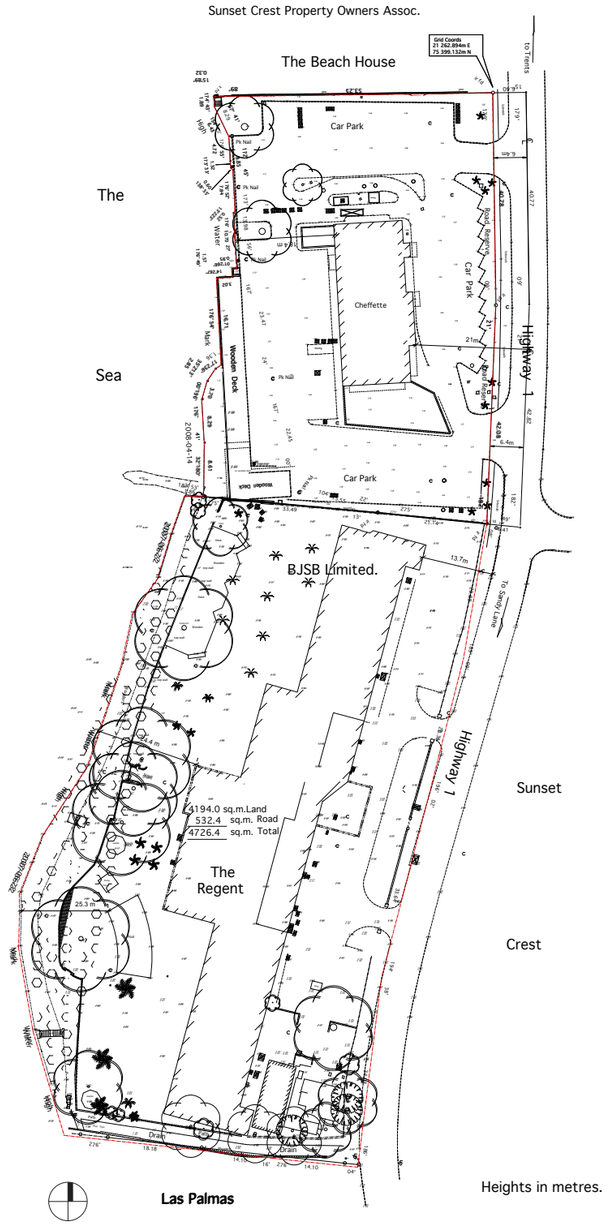
It is proposed that the development will acheive a LEED 'Platinum' rating and an Ecohomes 'Excellent' rating both being the highest rating achieveable.

The professional team assembled by BSJB Ltd have undertaken detailed analysis of the site and its constraints and the proposed design carefully addresses these constraints, in particular the close proximity to the adjacent West Coastal defence works.

This document outlines our design statement, which is to be read in conjunction with all other documentation supplied.

2.0 Site & Surroundings

Aerial Photograph - Site indicated in red



Existing Site and Building Plan

2.1 Site Description and History

The existing Regent Hotel and Cheffette properties are well established landmarks along the West coast. They occupy narrow sites between the main coastal highway and the shoreline. To the southern boundary of the two sites is a walkway providing public access to the sea.

The area between the shoreline and the existing buildings contains gardens, patio areas and a swimming pool with surrounding deck. The existing Regent building line is located 19.5m(64ft) meters from the high water mark whilst the Cheffette building is within 17.4 meters (57ft). The existing Regent swimming pool is located within 16.5m (54ft) of the high water mark.

Currently the Regent Hotel is unoccupied and in a state of disrepair. The Cheffette Restaurant is occupied and trading.

The principal characteristics of the site are listed below:

- The Regent Hotel is a previously significant landmark building
- The Regent Hotel is vacant and in a state of disrepair.
- The existing Regent and Cheffette buildings are within 19.5m (64ft) and 17.4m (57ft) of the highwater mark respectively.
- The swimming pool is within 16.5m (54ft) of the highwater mark.
- Pedestrian access to the beach exists at the southern end of the site.
- This site lies within walking distance of a varierty of bars, restaurants and shopping facilities to the north and is located in the heart of Holetown.

2.2 Site Photographs

1 View South along coastal highway

2 South from Cheffette

3 View South of existing rear garden

4 View of front entrance

5. Cheffette Restaurant

6 View of front entrance structure

7 View North along the coastline

8 View of rear pool

9 View of Cheffette Site

3.0 Proposals

3.1 Pre-Application Discussions

Town and Country Development Planning Department

The TCDP has been consulted on the scheme thorughout its creation and prior to this submission. The scheme as presented has been supported and reflects all feedback received so far.

Coastal Zone Management Unit

The CZMU has also been consulted on the scheme prior to this submission and the scheme was supported in principle.

The following guidelines were stated:-

• The location of the proposed plunge pools is acceptable providing they encroach no further toward the high water mark than the existing swimming pool.

• Adequate structural stability should be provided to the basement and proposed building works. See Engineer's outline structural strategy later within this report.

• Pools - The proposed ozone/UV water treatment to the plunge pools should be approved by the Environmental Protection Department.

• BJSB Ltd. have agreed a period of access for the department's proposed coastal infrastructure works.

3.2 Description of Proposals

The proposal comprises the demolition of the existing Regent Hotel and Cheffette Restaurant buildings and the erection of 20 houses each comprising ground floor, first to fourth floor levels, basement car parking and storage.

The houses are arranged as two terraces. The proposed development is largely placed within the existing footprint of the two buildings on the site.

This proposal is expected to provide 100 new jobs.

Pedestrian access to the properties will be via the beach walkway or the front through a pedestrian gate beside the main vehicle entrances.

By car the property is generally accessed either through the Southern or central gates leading to the basement car parking. The central gates will be used for visitors and deliveries.

Each house incorporates a private west facing garden with a plunge pool. Privacy between the gardens and the beach walkway is achived through landscaping and planting.

The architecture aspires to a contemporary, yet fitting architectural solution, considerate to its surroundings and designed to be environmentally friendly. It is proposed that the development will acheive a LEED 'Platinum' rating and Ecohomes 'Excellent' rating as demonstrated in sections 3.6, 3.7 and 3.8.

3.2 Description of Proposals

Height & Massing
The size, bulk and location of the buildings have been carefully considered. The buildings consist of 2 terraces with a total of 20 houses, positioned primarily within the existing buildings' footprints and sitting no further towards the coastline.
The buildings have also been designed to a similar massing and height to the existing Regent building. The view corridor from Cemetery Road has been retained and widened under this proposal.

Building Materials
The design will use regional building materials as found on the Island. Principally the design wiil make use of hardwood timber cladding and beautiful traditional coral render, this will be used either as plain render treatment or rusticated.
Railings and architectural metalwork will be achieved using rust inhibiting paints.
The design will seek to use materials from 'green' sustainable sources, a neccessary requirement to acheive the highest possible environmental accreditations.

Landscaping
The landscape design will allow the integration of the building into the surrounding context.
The rear garden design will enable privacy for the occupants and use of a wide range of indigenous species. The hard landscaping to the front entrance with be broken with planted areas, either potted plants or cascading wall climbing plants. Irrigation will be provided by grey water stored at basement level. Our eco-friendly approach aims to maximise use of grey water.

Pool
The pool water will have a very minimal chlorine level to reduce any environmental impact.

External Lighting
The external lighting design will be low impact. The plunge pool will be lit and low level lighting from the patio area will be obscured at beach level by the landscaping arrangement. This will ensure an ecologically sound and unobtrusive environment for potential nesting turtles and the public using the beach.

Internal / External Living
The design aims to provide a living environment which creates a seamless transition between the interior and exterior. An open atrium space provides a central lightwell into the heart of the building at ground floor. This may be closed with a retractable roof during adverse weather. This central space also acts as a vent relying on a principle knows as the Venturi effect, an age old passive ventilation method allowing a constant movement of air through the house thus reducing the requirment for airconditioning. Water features and planting help to combine the external spaces with the internal spaces.

Management
Each owner will be a shareholder within a development management company. The company will provide all of the services required by the owners. The concept for the development is to provide exceptional luxury service, to acheive this the development will need to employ a mimimum of 100 people.

Parking / Storage
Two car parking spaces are provided in a basement garage for each house and visitor parking is at ground level. Additional storage is also provided at the basement level.

Mechanical and Electrical Plant/Servicing
The proposal aims to achieve a centralised plant operation. (Please refer to the outline services strategy - section 3.5) This will be located in the basement.

Waste
Bin stores are located underground. A platfom lift will deposit them at ground level for roadside collection.

Employment
It is expected that this prposal will create 100 new permanent jobs.

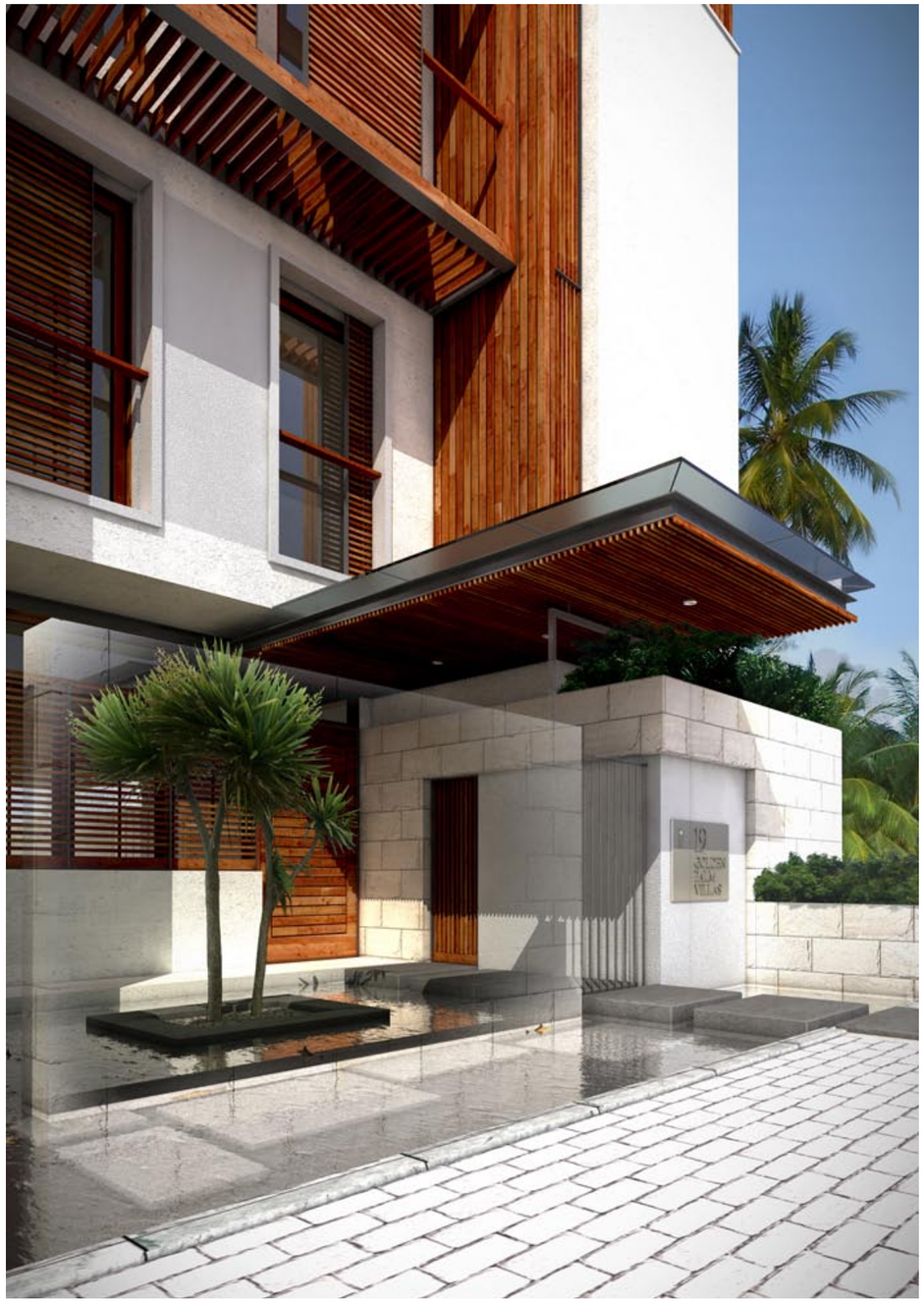
3.3 Perspective Images

Road side perspective (indicative only)

3.3 Perspective Images

Beach approach (indicative only)

3.3 Perspective Images



Entry courtyard

3.3 Perspective Images

Beach approach (indicative only)

packmanlucas
Structural Designers
Butlers Wharf West
42 Shad Thames
London
SE1 2YD

T: +44(0)20 7378 7391
F: +44(0)20 7403 7570
www.packmanlucas.com

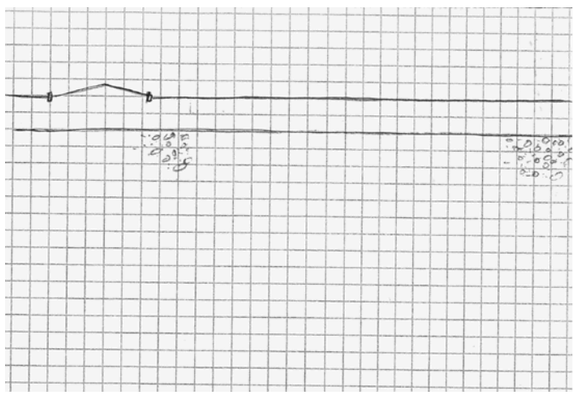
Project: Golden Palms, Barbados			Job Ref.: 4094
Section: Structural Strategy Statement			Sheet No./Rev: Rev A – May 2008
Originator: JOT	Date: November 2007		Chk'd by: RKP

Description of Project	Re-development of existing hotel and restaurant site to construct 5 No. blocks consisting of four concrete-framed townhouses each. The buildings are to be underlain by a continuous single level basement car park.
Site Constraints	The site is a strip of land situated between the coastal road and the sea. At either end the site is bounded by a storm drainage channel and a café/restaurant.
Ground Conditions	Ground conditions are to be established by site investigation, but the general profile is anticipated to be made ground overlying sands and corals.
Design Standards	The buildings will be designed and detailed in accordance with the locally applicable structural design codes (e.g. Caribbean Uniform Building Code) and generally accepted "best practice". Reference will also be made where applicable to the following British Standards BS5268: Structural use of timber BS5628: Code of practice for use of masonry BS5950: Structural use of steelwork in buildings BS6399: Loading for buildings BS8002: Code of practice for earth retaining structures BS8004: Code of practice for Foundations BS8102: Code of practice for protection of structures against water from the ground BS8110: Structural Use of Concrete
Gravity Loading	"Dead" Loads: Material self-weights etc will be assessed as the design develops. "Live" Loads: Live (or imposed) loads will be assessed in accordance with the relevant design codes and standards
Lateral Loading	Wind Loads: Wind loads applied to the building will be assessed in accordance with CUBiC. Notional Horizontal Loads: Notional horizontal loads to be applied to the building will be assessed in accordance with the relevant design codes and standards.
Performance Criteria	Earthquake Loading : In the light of recent seismic activity in the area, lateral loading requirements will be reviewed in order that due account is taken of the possible effects of earthquake loads.
Substructure	In the absence of a detailed ground investigation at this stage, we outline below our proposals for a "robust" foundation system appropriate for a situation where soil conditions are less than ideal (for example, soft friable coral). After detailed site investigations have been carried out, the proposed foundation system will be reviewed and amended as necessary. Basement/retaining walls: It has been assumed that the basement excavation can be formed using temporary batters (at the natural angle of repose of the soil) on three sides. On the fourth side, because of the proximity of the road to the excavation, it is proposed to use a contiguous bored pile retaining wall (or steel sheetpiles, subject to rig availability) to ensure support to the road is maintained. The wall will act as a cantilever during construction and as a propped cantilever after construction of the ground floor slab. If the properties of the underlying soils allow it may prove possible to construct the whole excavation as open-cut and eliminate the retaining wall to the road side. A waterproofing strategy appropriate to the intended use of the basement (car-parking and plant room) will be selected, but one option is the use of proprietary waterproofing additives in the concrete substructure. A positive drainage system will be provided inside the basement to deal with seepage and surface water entering the basement during periods of extreme rainfall. Foundations: It is anticipated that the underlying soils have sufficient bearing capacity to make conventional spread (pad or raft) foundations feasible. However, during construction the basement box will be subject to flotation caused by high groundwater levels. This effect can be reduced by dewatering until the weight of the building balances out the hydrostatic forces, but even in the permanent condition the building will be subject to eccentric loading caused by the offset position of the superstructure on the basement box. To prevent structural instability caused by hydrostatic forces it is proposed to use bored piles (acting in tension) to effectively hold down the structure. Bored/driven piles may also be provided to support the vertical loading from the superstructure should the soil properties prove unfavourable. Also refer Packman Lucas basement construction sequence diagram (document ref 4094/20/SK071119).

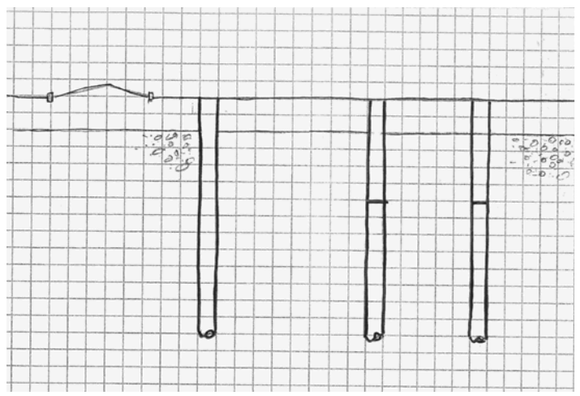
3.4 Outline Structural Strategy

Superstructure	It is proposed that the structure will utilise a combination of reinforced concrete and loadbearing masonry. The majority of the upper-floor plates will utilise precast hollow-core planks spanning the full width (approximately 8.5m) of the individual residential units onto the loadbearing masonry party walls. Where necessary, openings in the floor slabs will be trimmed by insitu reinforced concrete downstand beams. The loadbearing masonry walls will be hollow concrete blocks, filled with mass concrete and reinforced with steel rods where required.
Stability System and Robustness	The structure is a braced frame. Lateral loads are transferred by diaphragm action of the floor plates to shear walls which act as vertical cantilevers to transfer loads to the foundation system. Floors and walls will be tied together to create a robust structural frame. In light of recent seismic activity in the region, the structural stability and tying systems will be developed to ensure compliance with the latest regulatory and best-practice requirements.
Movement Joints	Movement joints will not be required in the superstructure as each of the five blocks is small enough for movement effects to be negligible. At ground floor and basement levels the frame is constrained by the surrounding soil.
Fire Resistance	Refer to Architect for details of fire strategy.
Durability/corrosion protection	Structural materials and elements will be selected and detailed as appropriate to the prevailing environmental conditions.
Materials	Detailed material specifications are to be developed.
Other relevant data/documents	Soils investigation to be completed.

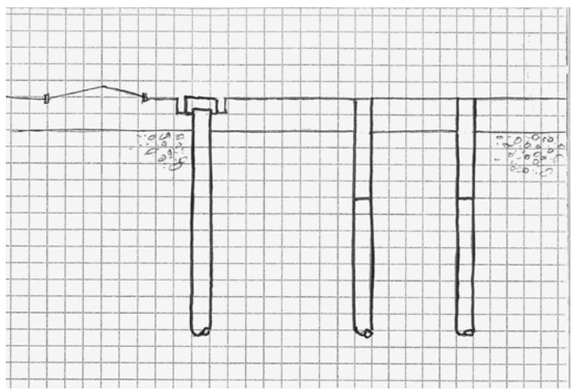
Golden Palms, Barbados – Indicative Basement Construction Sequence



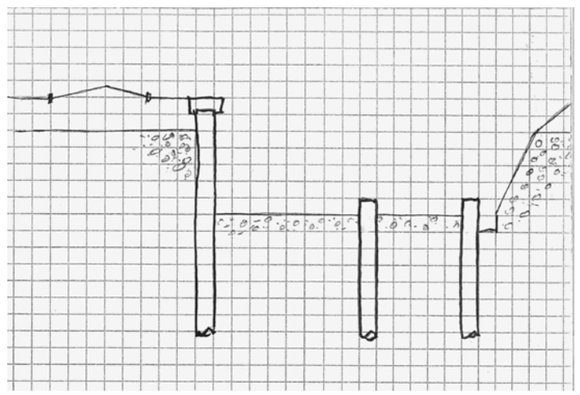
Stage 1 – Clear site and prepare temporary piling platform



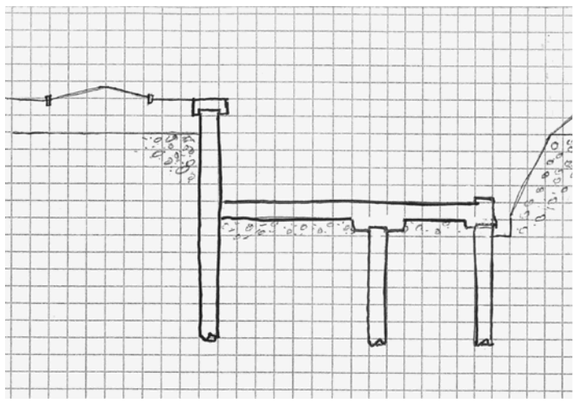
Stage 2 – Install contiguous bored-pile wall to retain highway and bearing piles for support of superstructure



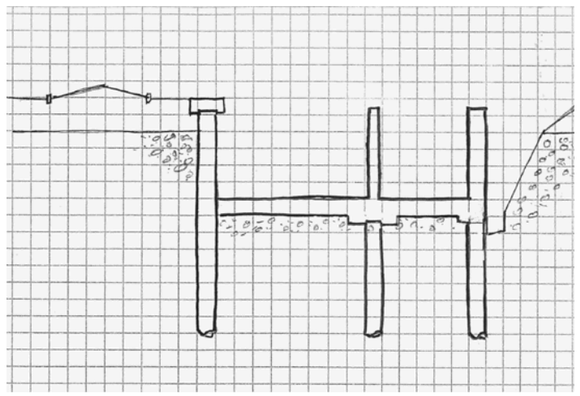
Stage 3 – Construct reinforced concrete capping beam to top of retaining wall



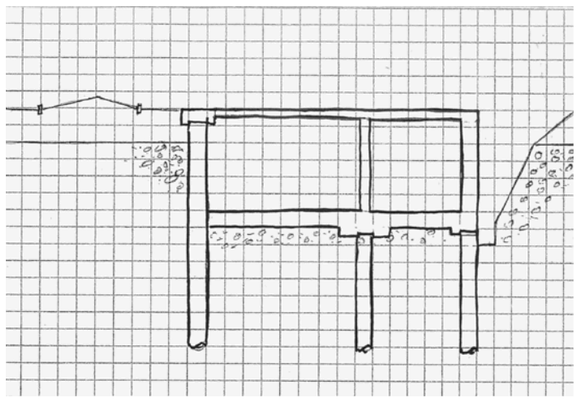
Stage 4 – Excavate to basement formation level (batter to three faces of excavation) and install groundwater control systems (French drains/well points etc)



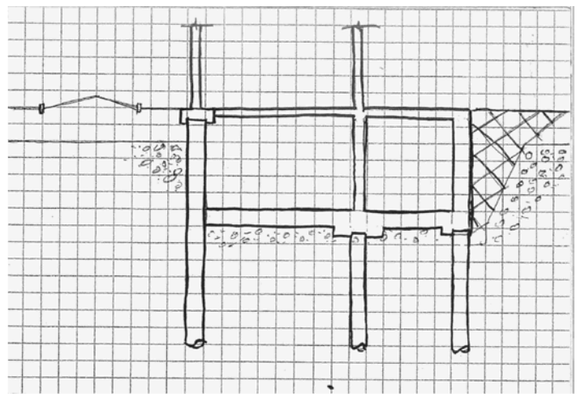
Stage 5 – Construct reinforced concrete pile caps and basement slab



Stage 6 – Construct reinforced concrete basement walls and internal walls and columns



Stage 7 – Construct ground floor slab to complete basement "box"



Stage 8 – Place backfill around basement box. Commence construction of superstructure

3.5 Outline Services Strategy

Introduction

Golden Palms is a residential development of 20No. town houses complete with communal car parking.

The town houses are identical in layout with each arranged over Basement to Fourth Floors, and including generous living quarters, open central courtyard, parking, and a private swimming pool, save for the two most northern properties which are of a reduced height.

This services strategy gives a brief overview of the proposed Mechanical, Electrical, and Public Health Services to the development. The strategy for the services has been compiled to result in a sustainable and environmentally friendly development.

5302

KUT

GOLDEN PALMS
BARBADOS
RESIDENTIAL DEVELOPMENT

SERVICES STRATEGY

(5302 : July 2008)

The Kut Partnership
Rosebery House, Tottenham Lane, London N8 9BY
T: 020 8348 5171 ·F: 020 8340 8926 ·E: tkp@kut.co.uk ·www.kut.co.uk

GOLDEN PALMS
BARBADOS
RESIDENTIAL DEVELOPMENT

SERVICES STRATEGY

CONTENTS

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Swimming Pools

Each of the 20No. town houses will have its own infinity pool at the rear of the property.

The complete pool installation will be in accordance with the requirements for public pools as highlighted in the 'Guidelines For Submission Of Building Development Applications' published by the Barbados Environmental Protection Department, from here on referenced as the EPD Guidelines.

The pool design will include a central pool plant serving all 20No. pools by means of a common pumped circulation system, with return via the knife edge spillway on each of the pools. This arrangement will provide significant advantages in terms of operational efficiency, plant space requirements, and maintenance regimes.

The pool plant will be housed in a dedicated Pool Plant Room within the Basement, and will include Ultraviolet (UV) water treatment.

UV treatment will reduce the amount of chloramines, allowing the residual chlorine to work more effectively, and subsequently allowing residual levels to be reduced by up to 80% against traditional chlorinated pools, with residual chlorine levels known to be as low as 0.3ppm.

Further justification for the use of UV treatment is the reduced plant space requirement and less arduous installation and maintenance when compared to ozone systems, which have specialist maintenance needs due to the high voltage ozone generators.

Drainage of the pool system will be infrequent and generally only to facilitate pool repairs, when the drained pool water will be discharged to a separate absorption well at a controlled rate, as required by the EPD Guidelines.

Backflow prevention into the mains water feed will be achieved by means of both a non-return valve and an air gap, these in response to the requirements of the EPD Guidelines.

Sewage Treatment

The sewerage treatment plant will be designed in accordance with the EPD Guidelines.

Discharge from all wc's, kitchen sinks, washing machines and dishwashers will be run to connect in a central sewage treatment plant.

Treated effluent from this plant will discharge via an additional tertiary treatment to the drainage gulley at the Las Palmas end of the development.

On-site monitoring of the discharge will ensure it meets the required standard for discharge in the manner described.

The treatment plant will include a dewatering process to reduce the bulk for disposal. The final by-product can be either burnt, carted away from site, or due it's high nitrogen & organic content can be used for fertilisation locally.

An underground petrol interceptor will be included with a drainage gulley running through the centre of the Basement car park, into which will be connected secondary gulleys from each pair of residential parking bays.

Grey Water System

Rainwater and discharges from all baths, basins and showers will be routed to the 2No. underground combined rainwater/grey water collection vessels for re-use as the supply to the irrigation systems.

The grey water will pass into the vessels via a fine mesh filter, which will be backwashed by the grey water, and any effluent will be passed into the foul drainage system.

Water Services

- **Softened Water**

  Central storage of softened water to provide a supply to all sanitary fittings, excluding Kitchen and food preparation areas.

  Supplies from the central storage will be pressurised to ensure a balanced water pressure at all points of use.

- **Raw Water**

  Central storage of raw water for drinking purposes will provide a supply to all Kitchens and food preparation areas. Again the supply will be pressurised to ensure a balanced pressure at all points of use.

- **Hot Water**

  Hot water will be provided by 2No. unvented twin coil indirect cylinders in each dwelling, to be filled by a cold water feed from the boosted cold system. The HWS cylinder storage will be heated by both the VRF and solar thermal systems, plus additional back-up/top-up to be provided by integral electric immersion heater elements, all to ensure hot water storage at 65ºC min. and delivery at 55 ºC min.

  The solar thermal systems to consist of flat plate or evacuated tube solar collectors mounted at roof level, facing South, and inclined at an optimum angle of 30º. Each system to be complete with a pumped circuit and controls, all suitable for heating the HWS cylinders via dedicated coil connections.

  Water heating will also be available from the VRF air-conditioning in the form of the waste heat removed from the system when in cooling. This unwanted heat will be redirected to a plate heat exchanger connected to dedicated connections on the HWS cylinders.

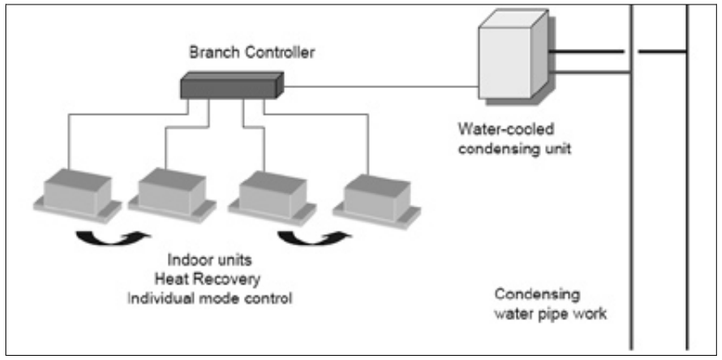
Comfort Cooling

All Bedrooms, Living Rooms and Kitchen Areas to be comfort cooled to 23ºC by water-cooled VRF air-conditioning (variable refrigerant flow), with heat rejection to either open or closed ground loops/bore holes. This arrangement will allow high operating efficiencies when compared to a traditional air-cooled systems, particularly given the climatic conditions.

The VRF systems are to be 'heat recovery' types, allowing simultaneous modes of operation. These will allow the user to select comfort cooling, or space heating (if required), in each room regardless of the mode of operation in the others. This arrangement effectively load shares across the house, with the heat removed from one room in cooling transferred to another in heating (if required), thus permitting reduced demand on the compressors.

Further still each VRF system will include heat exchanger for heat rejection into the HWS storage cylinder i.e. any heat removed during cooling can be used for pre-heating the HWS. Typically this can allow pre-heat up to 45ºC (with top-up to 60ºC by either the solar thermal system or the back-up electric immersion elements).

All VRF condensers to include inverter drives to maximise efficiencies and minimise running costs. Comfort cooling (and heating if required) to be achieved using concealed direct expansion (DX) fan coil units – either within ceiling voids or installed vertically behind partition walls.



Water-cooled VRF air-conditioning arrangement

LEED Assessment

The development will aim to achieve Platinum rating under the LEED Green Building Rating System (Leadership in Energy & Environmental Design), a points scoring assessment by the U.S. Green Building Council here on referred to as LEED.
A number of renewable and green technologies will be installed in an effort to achieve the required rating, including Ground Source Heat Pumps (GSHP), and either both Solar Thermal and Photovoltaics (PV) cells or Combined Heat & Power (CHP).

Combined Heat & Power

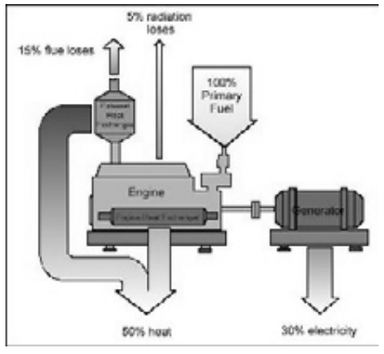
Combined Heat & Power (CHP) will be considered in an effort to achieve the required LEED rating. The CHP may be used as an option in place of both Solar Thermal and Photovoltaic cells, depending on which option will best enable the rating to be achieved.

The CHP plant will be fuelled by a fossil fuel, however an investigation will be undertaken to source alternative fuel supplies e.g. bioethanol produced from island grown sugar cane.

The plant will be located in a nominated area within the Basement, and will be provided with adequate ventilation and noise attenuation.

It is intended that the CHP will be sized to produce up to 30% of the total electrical demand for the development, with the thermal output used to heat the swimming pools and the domestic hot water.

Inclusion of CHP would provide a standby source of electric in times of power outage, covering the base load for the development, where the base load would be classed as all essential supplies.



Combined Heat & Power (CHP)

Ground Source Heat Pumps

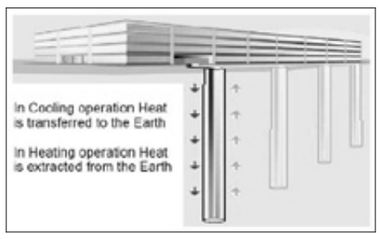
A system of closed loops or open bore holes will be located below ground, all to be connected into a common pumped manifold within the Basement. Ground water will be circulated between the manifold and the closed ground loops or bore holes.

Each piped connection at the manifold will include an isolation valve to facilitate isolation and repair of the loops/boreholes when required.

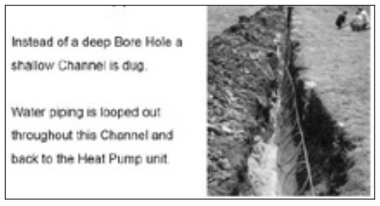
A secondary pumped circuit will be connected to the manifold, supplying cooling water to each of the water-cooled VRF condensers (for this purpose referred to as ground source heat pumps, GSHP). This secondary circuit will allow the GSHP condensers to dissipate the unwanted heat removed by the air-conditioning cooling process.

Each house will have its own Mitsubishi Electric GSHP condenser located in a dedicated Basement Plant Room. The condensers themselves will require no ventilation, as all heat generated by the compressors will be removed by the secondary cooling water circuit.

Since the design uses water-cooled air conditioning condensers as GSHP's there will be no specialist maintenance needs, with the system being identical to standard air-cooled types except with water as a cooling media in place or ambient air.



Open loop bore holes



Closed loop 'slinky'

Solar Thermal

Both Solar Thermal and Photovoltaics will be considered as an alternative to CHP.

Evacuated tube or flat plate solar thermal panels will be located at roof level on each of the townhouses, with pumped circuits to the twin coil hot water cylinders in each. The systems will provide all the hot water needs, or HWS top-up when the air-con. is the primary heat source through heat rejection.

Solar thermal is a 'free' source of domestic water heating, with minimal electrical input required for the water circulation and controls.

Photovoltaics

Along with Solar Thermal, Photovoltaics (PV) will be considered as an alternative to CHP.

PV panels will be located at roof level on each of the townhouses, providing 'free' electricity for either the solar circulation pump and/or the base lighting loads within each of the townhouses.

Ventilation

A Multi-Extract Ventilation system (MEV) or similar to be provided for each town house for removal of odours and moisture from Bathrooms, wc's and Kitchen areas.

Inlet air to be introduced to living spaces by means of window trickle ventilators or similar, as designed by the Architect.

MEV systems to operate at trickle rate with boost by either of the following; humidistat; interlock with light switching; or manual over-ride at the electric cooker hob.

Electrical Supplies

Provide low voltage electricity from the public utility service cut-outs to the houses and Landlord areas.

The tenants' services provided to each house by a system of individual incoming supplies. The Landlord services supplied from a separate incoming supply.

In each house a suitable consumer unit of the split load type shall be provided for the lighting and small power systems installations.

Lighting

General and decorative lighting supplied to the Landlord areas and the houses, this to be compatible with the design brief and in keeping with the architectural layout of the development utilising energy efficient design solutions. Lighting control/dimming systems to be utilised in the houses.

Specialist lighting luminaires including landscape lighting to be included.

Emergency Lighting

To provide escape lighting under mains failure conditions, in order to illuminate designated escape routes and areas.

Telecommunications

Provide wiring and wireways for speech and data transmission to each house, including; voice; data; A/V; and security cable. Distribution to include provision of the Landlord areas – all as designed by an A/V Specialist.

Security and Access

Secure controlled entry and exit facility to the houses for tenants and visitors to be considered, with key fob entry for access through main common entrances and car parking areas.

Alarm systems to be provided in each house for detection of intruders and to raise the alarm, including panic alarms in the car park areas – all as per the A/V and Security Specialist.

Automatic fire and smoke detection system to be included – all as per the A/V and Security Specialist.

Renewables

As highlighted earlier in the Strategy, a combination of the following renewable energy sources will be employed:-

1) Combined Heat & Power (CHP)

   To manage the thermal load of the swimming pools and the domestic hot water, and generate electricity to cover 30% of the load / cover the base load

2) Ground Source Heat Pumps (GSHP)

   In this case water-cooled VRF air-conditioning (variable refrigerant flow), with heat rejection to/from a ground source circuit (either open or closed loop, tbc), ensuring very high coefficients of performance (c.o.p)

3) Solar Thermal

   Either to be used as a secondary means of hot water heating, to boost the water temperature to 60ºC from that achieved by the air-conditioning systems (typically 45ºC max.), or as a primary HWS heating source

4) Photovoltaics (PV)

   For 'free' electricity to cover the basic lighting loads in each of the townhouses

Energy Saving

CHP plant will manage the thermal load for the development whilst also generating sufficient electricity for the base load.

GSHP's will operate at much higher efficiencies (c.o.p) than standard air-cooled air-conditioning systems.

Alternative to the CHP Solar Thermal will provide domestic water heating, and PV will provide a free and reliable electrical supply.

Rejection of unwanted heat into a ground water circuit allows the air-conditioning condensers to operate at much higher coefficients of performance than typical air-cooled equivalents, potentially resulting in reduced electrical input and increased operational life of the plant.

Heat rejection to the hot water cylinders from the air-conditioning and the inclusion of solar thermal systems will virtually remove the need for additional HWS heating by fossil fuels.

By using 'heat recovery' air-conditioning heat removed by any part of the system in cooling mode can be transferred directly to another part of the system requiring heating, allowing both flexibility for the tenants and reduced electrical input to the condenser by simply transferring heat around the building. This particularly when using the system to pre-heat the hot water i.e. heat removed by cooling can be injected straight into the HWS system, with the compressor acting purely as the motive force for the refrigerant – vastly reducing the electrical consumption.

All pumps and compressors in both water and refrigeration systems to be inverter driven to reduce electrical consumption in periods of low demand.

Kitchen appliances to have low energy usage and low water consumption.

Energy meters to be installed for each premises for calculation of exact energy consumption, further each tenant to be apportioned a percentage of the energy costs for the central systems and common areas.

Low energy lighting to be used where possible, particularly the common and Landlord areas.

Grey water & rainwater recycling for irrigation purposes, and possibly for wc flushing.

3.6 Energy Statement

GOLDEN PALMS
HOLETOWN, ST JAMES
BARBADOS

ENERGY AND SUSTAINABILITY PROPOSALS
for

M&E BUILDING SERVICES

JBL/MS/5302-rev D : February 2008

GOLDEN PALMS
HOLETOWN, ST JAMES
BARBADOS

ENERGY AND SUSTAINABILITY PROPOSALS

for

M&E BUILDING SERVICES

This Document has been prepared to confirm the Energy and Sustainability proposals for the related M&E Building Services, as part of the Development Sustainability Appraisal.

For details of the proposed Development refer to Harper Downie drawings and details, GA plans attached.

The Kut Partnership are committed to providing Sustainable and Environmental solutions for Building Engineering Services

INDEX

INTRODUCTION

Background

The Kut Partnership have been appointed by BJSB Ltd to provide site-wide Energy and Sustainability Option Appraisal for the M&E of the proposed buildings.

These proposals highlight the possible sustainable design approaches along with integrated Renewable Energy options, as part of a holistic development approach.

Description of the Site

The site is situated between Highway 1 and the shoreline, St James and is approximately 2 acres in size, adjacent to a restaurant and other residential properties.

The proposed scheme comprises 20 No. residential townhouse Units arranged over basement to Fourth Floor level in a staggered terrace arrangement facing a westly direction.

SUMMARY

The table below sets out the CO_2 reduction of each M&E solution together with the additional construction cost to achieve this reduction, in comparison to the baseline standard fit-out level. The results are showing that it is possible to achieve up to **55% reduction in CO_2 emissions from baseline option**. The total amount of CO_2 saved by incorporating renewable technologies and measures increasing energy efficiency is approx. 48,000 kg of CO2 per year per unit. This equals to CO_2 emissions of 10 typical cars during 1 year (if driving 15,000 miles per year).

Option	Description of Enhancements	% CO_2 reduction	£ Cost
A	Baseline	Baseline	Baseline
B	Increased Solar Shading Solar Control Glass Low Energy Lamps (part)	- 19%	+ £11,000
C^1	Option 'B' items included, plus:– High Efficiency Heat Pump Solar PV Panels Solar Hot Water Low Energy Lighting Double Glazing with Solar Control	- 48%	+ £54,000
C^2	Option 'C^1' items included Except now ground source heat pump	- 55%	+ £64,000

1.0 SCHEME OPTION 'A' (Base Line)

1.0 SCHEME OPTION 'A' (Base Line)

This basis for the M&E systems and energy usage is a current standard fit out level for new dwellings.

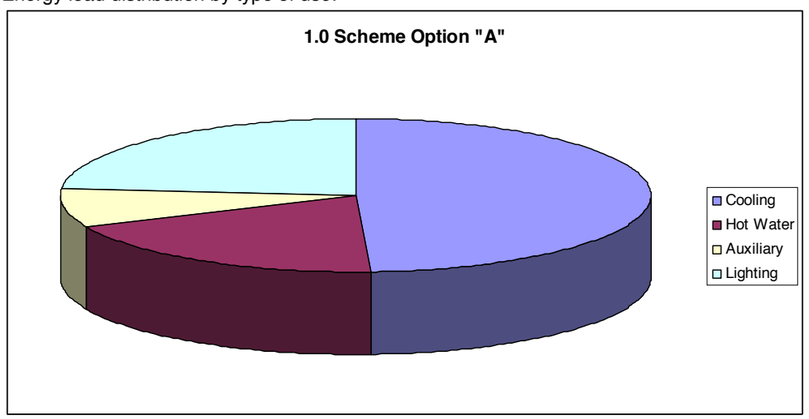
M&E System Parameters:

- Comfort Cooling to all principal rooms, heat pump efficiency 240% (British building regulations HVAC compliance guide minimum standard for new buildings).
- Hot water from electric cylinder (Solar hot water is not mandatory).
- Low efficiency tungsten lamps throughout.
- Minimal solar shading.
- Single clear glazing
- Rainwater collection for irrigation and reduction of SW run-off. Size of rainwater collection tank shall be 4500 litres per unit.

Results:

		GJ/annum	kWh/annum	$kgCO_2$/annum
1.0 Option 'A'	Cooling	366.59	101,831	42,972
	Hot Water	143.62	39,894	16,835
	Auxiliary	59.73	16,592	7,002
	Lighting	176.42	49,005	20,680
			SUM:	**87,490**

Energy load distribution by type of use:



2.0 SCHEME OPTION 'B'

2.0 SCHEME OPTION 'B'

Improvement against Option 'A': 19%

This basis for the M&E systems and Energy Usage is a more passive solution to lower cooling loads and energy consumption.

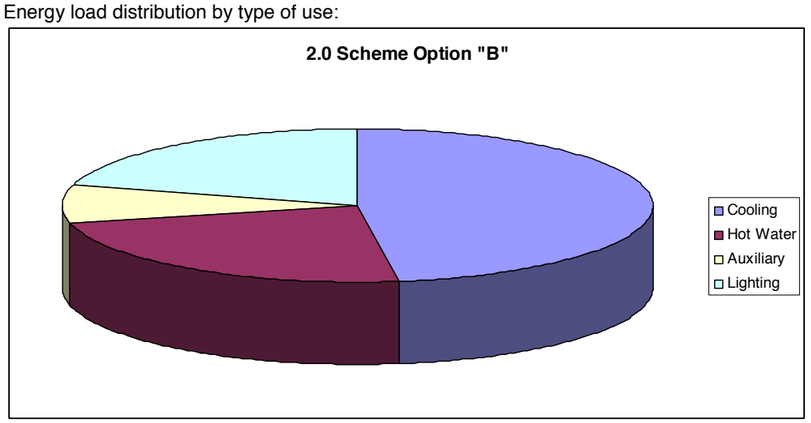
M&E System Parameters:

- Comfort Cooling to all principal rooms, heat pump efficiency 240% (British building regulations HVAC compliance guide minimum standard for new buildings).
- Hot water from electric cylinder (Solar hot water is not mandatory).
- Increased solar shading to reduce comfort cooling loads.
- High efficiency lamps to secondary rooms (compact fluorescent lamps).
- Single glazing with enhanced solar control (8mm Optifloat Green)
- Natural Ventilation enhancement reviewed – Minimal benefit.
- Rainwater collection for irrigation and reduction of SW run-off. Size of rainwater collection tank shall be 4500 litres per unit.

Results:

		GJ/annum	kWh/annum	$kgCO_2$/annum
2.0 Option 'B'	Cooling	290.45	80,681	34,047
	Hot Water	143.62	39,894	16,835
	Auxiliary	48.65	13,514	5,703
	Lighting	125.10	34,749	14,664
			SUM:	**71,250**

Energy load distribution by type of use:



3.0 SCHEME OPTION 'C'

Improvement against Option 'A': 48%

This basis for the M&E systems and Energy Usage is an enhanced passive design coupled with the use of Renewable Energy sources, to provide a low carbon and ECO friendly solution. (High efficiency air source heat pump is used for cooling).

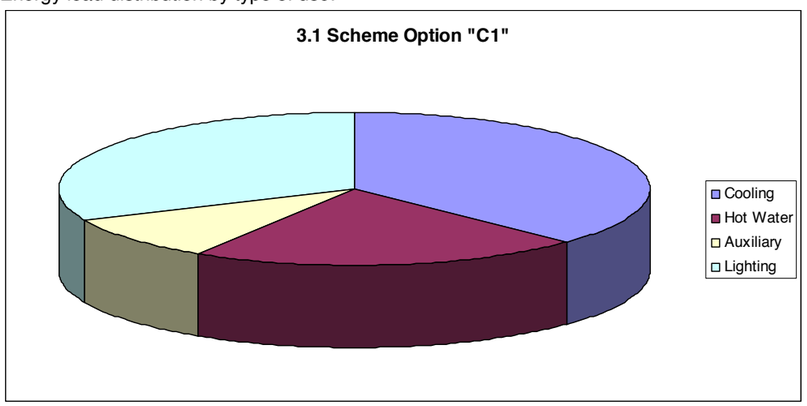
M&E System Parameters:

- High efficiency air heat pump (efficiency 350%)
- Solar PV panels to roof area: 10m^2 Monocrystalline horizontal panels (215 kWh/m^2.annum)
- Solar hot water collectors to roof area: 10m^2 @ 1600 kWh/m^2.annum
- High Efficiency lamps to secondary rooms (compact fluorescent lamps). The fittings shall generally be high frequency dimmable type.
- Solar shading to reduce comfort cooling loads
- Double glazing with enhanced solar control and blinds
- Rainwater collection for irrigation and reduction of SW run-off. Size of rainwater collection tank shall be 4500 litres per unit.

Results:

		GJ/annum	kWh/annum	$kgCO_2$/annum
3.1 Option 'C1'	Cooling	146.82	40,783	17,211
	Hot Water	86.02	23,894	10,083
	Auxiliary	37.26	10,350	4,368
	Lighting	125.10	34,749	14,664
	PV panels	-7.74	-2,150	-907
			SUM:	**45,419**

Energy load distribution by type of use:



3.2 SCHEME OPTION 'C2'

Improvement against Option 'A': 55%

This basis for the M&E systems and Energy Usage is an enhanced passive design coupled with the use of Renewable Energy sources, to provide a low carbon and ECO friendly solution. (Ground source heat pump is used for cooling.)

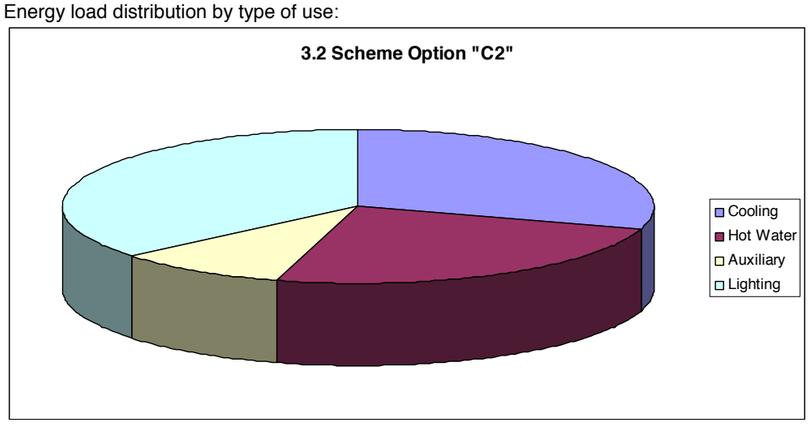
M&E System Parameters:

- Ground source heat pump (efficiency 500%). Type of heat pump used will be a closed-loop heat pump, preventing contamination from any discharged liquids.
- Solar PV panels to roof area: 10m^2 Monocrystalline horizontal panels (215 kWh/m^2.annum)
- Solar hot water collectors to roof area: 10m^2 @ 1600 kWh/m^2.annum
- High Efficiency lamps to secondary rooms (compact fluorescent lamps). The fittings shall generally be high frequency dimmable type.
- Solar shading to reduce comfort cooling loads
- Double glazing with enhanced solar control and blinds
- Rainwater collection for irrigation and reduction of SW run-off

Results:

		GJ/annum	kWh/annum	$kgCO_2$/annum
3.2 Option 'C2'	Cooling	102.77	28,547	12,047
	Hot Water	86.02	23,894	10,083
	Auxiliary	32.13	8,925	3,766
	Lighting	125.10	34,749	14,664
	PV panels	-7.74	-2,150	-907
			SUM:	**39,654**

Energy load distribution by type of use:



4.0 RENEWABLE TECHNOLOGIES

4.1 SOLAR PHOTOVOLTAIC PANELS

Solar PV (photovoltaic) uses energy from the sun to create electricity to run appliances and lighting or to be exported to grid. PV requires only daylight, not direct sunlight to generate electricity and so can still generate some power on a cloudy day.

How does it work?

Photovoltaic systems use cells to convert sunlight into electricity. The PV cell consists of one or two layers of a semi conducting material, usually silicon. When light shines on the cell it creates an electric field across the layers causing electricity to flow. The greater the intensity of the light, the greater the flow of electricity.

Types of system available

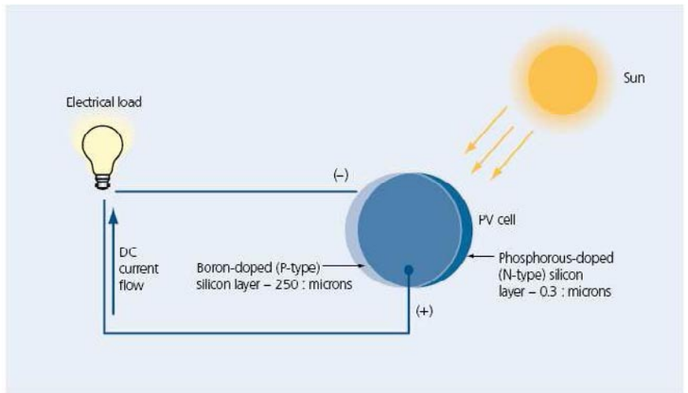
There are three main types of solar cells available:

- Monocrystalline – very thin wafers of silicon cut from a small seed crystal. More efficient than polycrystalline, but more expensive due to the manufacturing process.
- Polycrystalline – instead of one crystal, several different crystals are used for producing the slices. The result is cheaper PV cells than monocrystalline but lower efficiencies.
- Amorphous silicon – silicon is made into a continuous strip of film. Cells can be produced more quickly and hence cheaply than mono or polycrystalline, but with substantially lower efficiencies.

Installation and maintenance

- Systems should only be situated where they are completely unshaded. Panel performance can be significantly affected if only partially shaded.
- PV arrays need to be adequately ventilated to prevent overheating and a subsequent drop in panel efficiency.
- PV panels can suffer power reduction of up to 10 per cent if they are not regularly cleaned to prevent dust and other debris from accumulating.
- Estimated durability of monocrystalline panels is 25-30 years

Generating electricity using PV



4.2 SOLAR HOT WATER

Solar water heating systems use heat from the sun to work alongside your conventional water heater. The technology is well developed with a large choice of equipment to suit many applications.

How does it work?

Solar thermal or solar hot water (SHW) systems for use in dwellings, use a heat collector which is generally mounted on a roof, and contains a fluid (usually water with glycol) which is heated by the sun. The heated liquid is then passed through a coil in a hot water storage cylinder. The water in the cylinder may then be supplied directly, or raised to a higher temperature (if required) by a boiler or electric immersion heater. In this way the 'free' energy obtained from the sun can be used to offset the amount of energy required for providing domestic hot water, and will reduce both running costs (due to the fuel being displaced – electricity, natural gas, or oil) and the associated CO2 emissions.

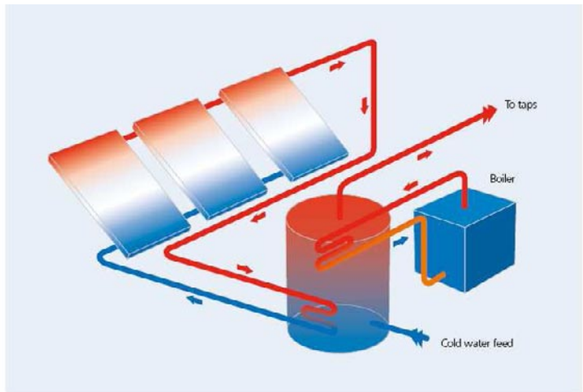
Types of system available

- Flat plate systems - which are comprised of an absorber plate with a transparent cover to collect the sun's heat. Flat plate systems have lower level of insulation between liquid and outside air and are therefore more suitable for locations with high temperatures.
- Evacuated tube systems - which are comprised of a row of glass tubes that each contains an absorber plate feeding into a manifold which transports the heated fluid. Better level of insulation makes this system more suitable for locations with moderate climate.

Installation and maintenance

- To maximise the efficiency of systems, larger hot water storage cylinders than would normally be installed for gas or oil-fired systems are usually required.
- The intended location for the collector should not be shaded by any obstructions (such as trees and other buildings)
- System generally requires little maintenance

Schematic of a solar hot water system



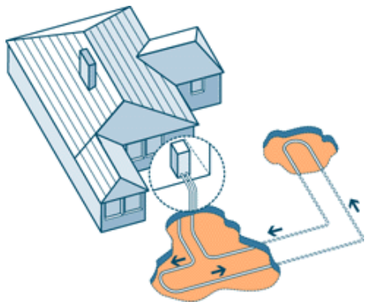
Ground source heat pumps use a buried ground loop which transfers heat from the building into the ground using refrigerant pipes.

How does it work?

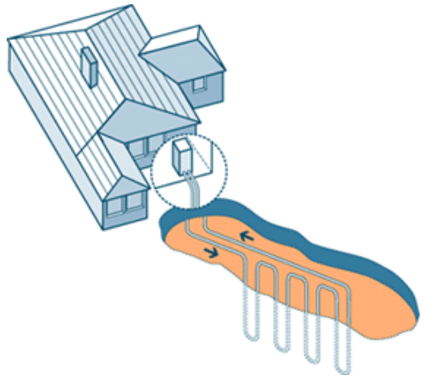
The refrigerant circulates through the underground piping system and transfers heat to the soil and then is brought back to the heat pump unit inside the house. The house refrigerant loop which serves fan-coil units is connected to the heat pump which transfers the heat to the ground loop.

Types of system available

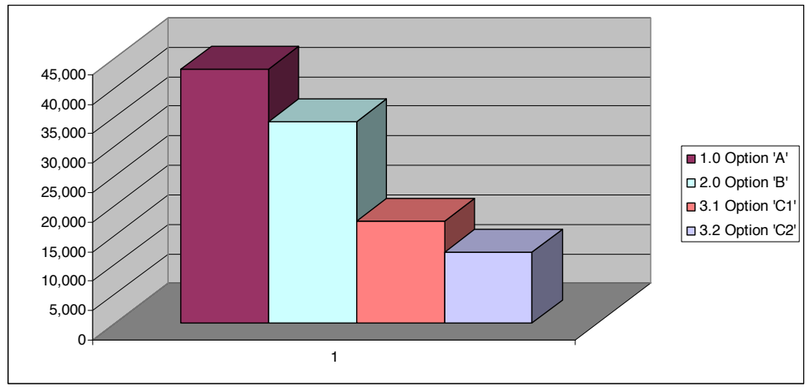
- Horizontal loop is suitable for applications where sufficient area is available to accommodate horizontally buried pipes.



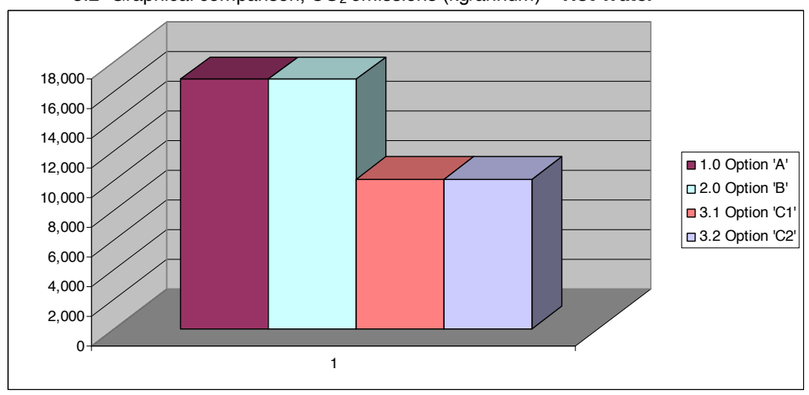
- Vertical loop system can be used where ground space is limited, but will require boreholes typically 15-150m deep, and is consequently more expensive to install than horizontal systems.



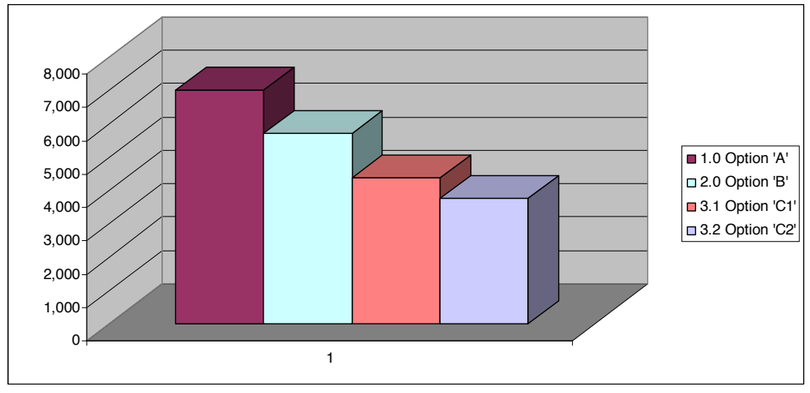
5.0 RESULTS ANALYSIS

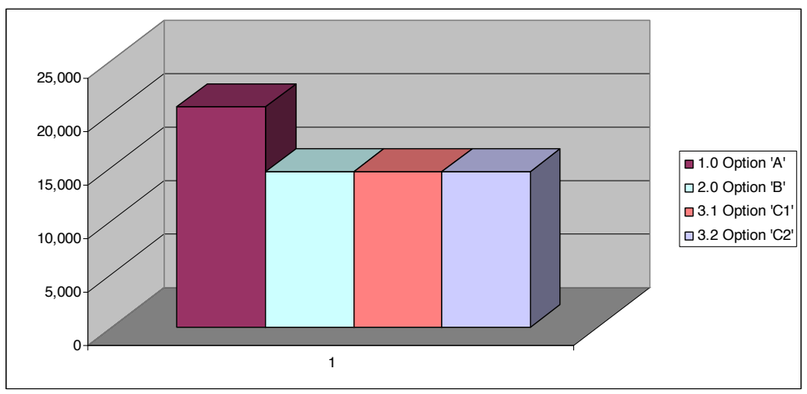


5.2 Graphical comparison, CO_2 emissions (kg/annum) – **Hot Water**

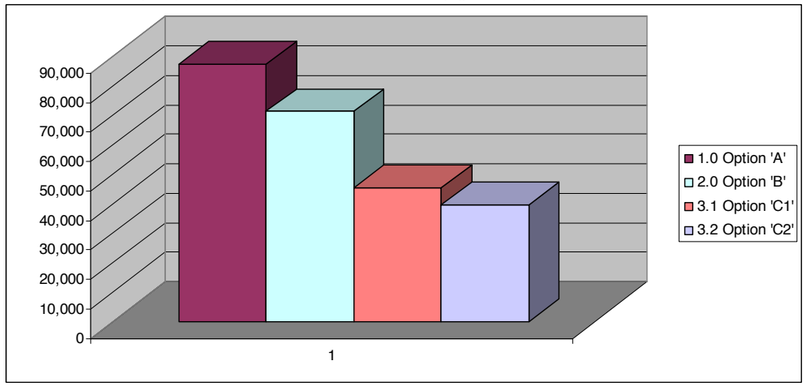


5.3 Graphical comparison, CO_2 emissions (kg/annum) – **Auxiliary**





5.5 Graphical comparison, CO_2 emissions (kg/annum) – **Total**



5.0 COSTINGS

(Costs indicated are per unit)

SCHEME OPTION 'A'

Baseline Costs

SCHEME OPTION 'B'

Estimated Cost for Increased Solar Shading	£ 5,000
Estimated Cost for Glazing Enhancement	£ 5,000
Estimated Cost for Low Energy Lamps	£ 1,000
Total Option 'B' Estimate	**£11,000**

SCHEME OPTION 'C1'

Option 'B' Enhancement included	£11,000
Estimated installation cost for solar hot water collectors is	£10,000
Estimated installation cost for PV panels is	£14,000
Estimated Enhancement to Heat Pump system	£ 3,000
Estimated Window/Blind Enhancement	£15,000
Estimated Low Energy Lighting Enhancement	£ 1,000
Total Option 'C1' Estimate	**£54,000**

SCHEME OPTION 'C2'

Option 'C1' costs included except Ground Source Cooling £10,000	£54,000
Total Option 'C2' Estimate	**£64,000**

6.0 DISCLAIMER

The findings, conclusions and recommendations of this report are based on the information supplied. The Kut Partnership disclaim responsibility in respect of incorrect information imparted to them or for the actual performance of any of the building services installations.

This Report is prepared for the use of The Golden Palms Development, Barbados; a duty of care is not owed to other parties.

The Kut Partnership are committed to providing Sustainable and Environmental solutions for Building Engineering Services

3.7 Initial (Ecohomes) Design Stage Pre-assessment

Initial EcoHomes (2006)

Design Stage Pre Assessment of

Golden Palms, Holetown, Barbados

Pre Assessment Report

22nd November 2007 revised 29.02.08

Southfacing Services Ltd.

101 North View Road
London N8 7LR

tel 020 8348 7001
fax 020 8340 1002
info@southfacing.co.uk

Review Status

Revision No.	Date	Ref	Comments
1.	22/11/07	188/1	Draft report issued to KUT Partnership and Harper Downie for comment
2.	29/02/08		For 20No. houses

Prepared by:		**Approved by:**	
Signature -		Signature -	
Name -	Lucy Harris	Name -	Ben Cartmell
Position -	Director	Position -	Director
Date -		Date -	

Registered assessor Lucy Harris (EcoHomes)

Licensed organisation Southfacing Services Ltd.

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CONTENTS

1.0 Introduction

In order to show high environmental performance and a commitment to sustainability issues, an initial EcoHomes pre-assessment has been carried out on the designs of the Golden Palms development, at the request of the client.

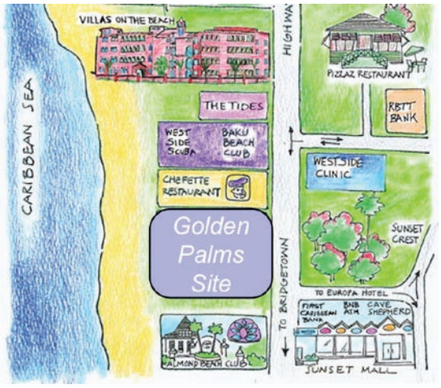
The scheme is a medium sized beach development in Holetown, Barbados, on the site of a hotel on Highway 1, and consists of 20 terraced units.

Though the development is in Barbados, it was felt that there was enough commonality, in terms of sustainability, to use the British Building Research Establishment's EcoHomes 2006 scheme (an accepted UK standard) as the basis for assessing this project. The target rating for this development is currently '**EXCELLENT'**.

2.0 Summary

During the pre-assessment exercise, the assessor discussed all of the EcoHomes 2006 credit criteria with the design team. The total credits identified as potential targets in this exercise were used to give a present case pre-assessment score which fell within the 'EXCELLENT' category. Though the location (outside of the UK) presented some challenges and some assumptions needed to be made, it was felt that with a definite commitment and drive from the client to provide a truly sustainable development to the island, this EcoHomes equivalent rating could be potentially achievable.

The details in section 4.0 show how this could be achieved given the site constraints in a cost effective manner, along with further considerations for alternative routes to 'EXCELLENT'.



3.0 The EcoHomes Rating

3.1 Introduction

EcoHomes is a voluntary scheme in the UK that aims to quantify and reduce the environmental burden of buildings by rewarding designs and operational procedures that take positive steps to minimise their environmental impact.

Projects are assessed using a system of credits. These credits are grouped into the following categories (including the EcoHomes 2006 addition of a management category):

- Energy
- Transport
- Pollution
- Materials & Waste
- Water
- Land & Ecology
- Health & Wellbeing
- Management

The assessment process results in a report covering the above credit categories. The full assessment is required in the UK to be submitted to the Building Research Establishment (BRE) for quality assurance checking and certification. Certificates are awarded depending on a rating scale and will result in a building being awarded a PASS, GOOD, VERY GOOD or EXCELLENT rating. In the case of this development, it will not be possible to register with the BRE, using the standard EcoHomes scheme, however, there is no reason why the process using a registered assessor cannot still be undertaken, without the formal certification at the end.

3.2 EcoHomes 2006 Scoring

In order for an EcoHomes score to give an appropriate balance across such a broad selection of issues, the BRE have developed a weighting system through consultation with a range of industry representatives. This weighting system provides a relative importance to each of the credit categories. The current weightings are as follows:

Category	Weighting for EcoHomes
Energy	22%
Transport	8%
Pollution	10%
Materials and Waste	14%
Water	10%
Land Use and Ecology	12%
Health and Well Being	14%
Management	10%

The number of environmental criteria within each of the categories varies and as a result, there are a different number of credits within each category. Due to the different number of credits within each category and the differing category weightings, the overall value of each individual credit (as a percentage of the total number of credits in the assessment) is different depending on the category.

In order to achieve credits, information must be submitted to the assessor who will then award credits based on the current EcoHomes compliance criteria. The EcoHomes weightings are then applied to the sum total for each credit category to achieve an overall score. In the case of a pre-assessment, this is an informal process; for the full assessment, this information needs to be provided in full as confirmation of commitment to achieve each credit. This score is then used to identify the overall EcoHomes rating using the following ranges:

Rating	EcoHomes Score
Pass	36 – 47
Good	48 – 57
Very Good	58 – 69
Excellent	70 - 100

Once the final assessment has been carried out, based on information submitted to the assessor, a report is written which describes which credits have been awarded. In the UK, this report then goes to the BREEAM team at the BRE for QA procedures. If the QA is passed then a certificate is issued.

4.1 Credit Summary

The following table gives a summary of credits identified:

		Available	EXCELLENT
Energy			
ENE 1	Carbon Dioxide Emissions	15	8
ENE 2	Building Fabric U Values	2	0
ENE 3	Drying Space	1	1
ENE 4	Eco-labelled Goods	2	2
ENE 5	Internal Lighting Efficiency	2	2
ENE 6	External Lighting Efficiency	2	2
		24	15
Transport			
TRA 1	Good Local Transport	2	2
TRA 2	Cycle Storage	2	2
TRA 3	Local Amenities	3	3
TRA 4	Home Office	1	1
		8	8
Pollution			
POL 1	Insulant GWP (and ODP)	1	1
POL 2	NOx Emissions	3	3
POL 3	Reduction of Surface Run-Off	2	2
POL 4	Zero Emission Energy Source	3	2
POL 5	Flood Risk	2	0
		11	8
Materials and Waste			
MAT 1	Environmental Impact of Materials	16	7
MAT 2	Basic Elements, Responsible Sourcing	6	2
MAT 3	Finishing Elements, Responsible Sourcing	3	1
MAT 4	Recycling Facilities	6	6
		31	16
Water			
WAT 1	Internal Water Consumption	5	2
WAT 2	External Water Recycling	1	1
		6	3
Land Use and Ecology			
ECO 1	Ecological Values of Site	1	1
ECO 2	Ecological Enhancement	1	1
ECO 3	Protection of Ecological Features	1	1
ECO 4	Change of Ecological Value of Site	4	4
ECO 5	Building Footprint	2	2
		9	9
Health and Well Being			
HEA 1	Daylighting in Room Spaces	3	3
HEA 2	Sound Insulation in Room Spaces	4	2
HEA 3	Private Space	1	1
		8	6
Management			
MAN 1	Home User Guide	3	3
MAN 2	Considerate Contractors	2	1
MAN 3	Construction Site Impacts	3	2
MAN 4	Security	2	1
		10	7
	Total credits	**108**	**72**
	Total Weighted Score (%)	**100**	**70.7**

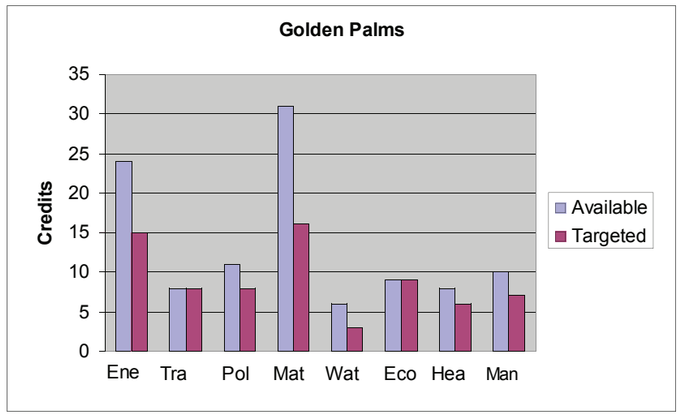
These credit totals are translated into scores in Section 4.2

4.2 EcoHomes Results

4.2.1 Route to EXCELLENT

The bar chart that follows shows where credits are in principle awarded against those that are available for each credit category. The total credits for each category are applied to the environmental weighting to achieve an overall score. This score is then compared against the ranges mentioned earlier to achieve an EcoHomes rating. The key features and suggested approximations have been elaborated upon in the next section.

A total of 72 credits have been identified as being available. **This in turn equates to an EcoHomes score of 70.7%.** This score is just over the **'EXCELLENT'** rating lower limit of 70%. Further investigations into how this could be achieved, and with a greater margin of error, would be discussed during the full assessment.



4.2.1.1 Key Features of the Present Case Pre-assessment

Energy

- ENE1: The development is being built in Barbados, with greater carbon emissions to a comparable development in the UK due to year round cooling demand. However, there will be incorporation of a Ground Source Heat Pump (GSHP) for comfort cooling and solar hot water panels to fuel the hot water needed and passive measures used to reduce solar gain giving a reduction in CO_2 emissions, from a Barbadian baseline, of 66%. This is clearly a great improvement over a standard build in Barbados and it was felt that this should be reflected in targeting 8 credits, achieving CO_2 emissions of less than 22kg/m^2/yr (66% over UK baseline of 62.2) for an equivalent development in the UK. Please see associated Energy Statement for more information.
- ENE2: Since the building is to be built in Barbados where Heat Loss Parameter is not really an issue, this credit was not really relevant and therefore not targeted for this development.
- ENE4: Both credits have been targeted for this section, since energy efficient, A rated white goods (washing machines, fridge/freezers etc) will be supplied to all occupants.
- ENE3, ENE5&6: The design team is also committed to providing a natural drying space area (either externally or internally in a laundry room), over 75% energy efficient internal light fittings and fully efficient external light fittings for a further five credits in these sections.

Transport

- TRA1: There is at least one bus route on Highway 1 at the back of the development, which is the main arterial route through Holetown. It is believed that there is a bus at least every 15 minutes at peak periods and half hourly off peak. Two credits currently targeted.
- TRA2: Two credits have been targeted here, since on the plans there is space allocated for cycle storage. Adequate secure, covered cycle storage needs to be provided for over 90% of the development determined by the EcoHomes provision criteria of:
  - 1 and 2 bedroom flat/house – I cycle
  - 3 bedroom flat/house – 2 cycles
  - 4+ bedroom flat house – 4 cycles.
- TRA3: There are also some amenities close by in Holetown. It is assumed that there will likely be a food shop and a post facility within 500m of the development. Further afield it is assumed there a number of other local amenities and good pedestrian routes. Therefore, full credits can be targeted.
- TRA4: The design team hopes to provide facilities for a home office to all dwellings e.g. two double sockets, two phone points, a 1.8m wall for the desk and an openable window. Therefore this credit is currently targeted.

Pollution

- POL1: Insulation with GWP (Global Warming Potential) of less than five and Ozone Depleting Potential (ODP) of zero will be provided, it is hoped from the suppliers either in Miami or Trinadad.
- POL2: In this category, the NOx emissions section (POL2) is targeted. Since there is no boiler needed due to the climate and use of solar collectors for hot water, all three credits can be awarded.
- POL3: With a high probability of flooding, but with the land previously being occupied by buildings, 75% attenuation of water run off from hard surfacing and roofs at peak period would allow both credits to be achieved. Since there is a strategy to collect all run-off water since water is a particularly precious resource on the island, it was felt this was achievable.
- POL4: A renewable energy feasibility study has been carried out to achieve over 15% energy demand by renewable energy sources, so all credits are currently targeted.
- POL5: It is currently presumed that there is a high probability of flood since the development is on the beach, and therefore these credits are currently not targeted.

Materials

- MAT1: The following elements, it is suggested, will be targeted as consisting of 'A' Rating materials in the BRE 'Green Guide to Housing Specification' leading to seven credits (numbers in brackets show possible credits available for each).
  - Roof (3)
  - External walls (3)
  - Internal walls – internal partition and party walls (3)
  - Floors (ground and upper) (3)
  - Windows (2)
  - hard surfacing (pavers etc) (1)
  - boundary mostly brick so not 'A' rated (1)
- MAT2: Two credits will initially be targeted, with an aim to source as much of the materials for basic elements from recycled or responsible sources e.g. FSC (Forest Stewardship Council) or EMS (Environmental Management Systems).
- MAT3: None of three credits will initially be targeted, for sourcing of materials for finishing elements from recycled or responsible sources e.g. FSC (Forest Stewardship Council) or EMS (Environmental Management Systems). There is potential to gain credits here and for MAT2 when more information is known.
- MAT4: A local recycling collection service, combined with three internal storage bins of adequate size (no individual bin smaller than 7 litres, overall capacity of bins no less than 30 litres) e.g. under the sink in every dwelling would allow all credits to be targeted.

Water

- WAT1: Internal water use was considered. The design team has currently specified toilets with a 6/4l flush, taps with flow regulators, standard bath, showers with a flow rate of between 9 and 12 litres per minute, kitchen sink usage with dishwasher and washing machine provided to high water efficiency. This allows two credits to be targeted for this section.
- WAT2: There will be rainwater collection provided to all units for irrigation so this credit can be targeted.

Land Use and Ecology

- ECO1: Since the development is to be built on land of no previous ecological value, on the plot of an existing hotel, then this credit can be targeted.
- ECO2: An Oceanographer has been involved to enhance the beach-side development for promotion of wildlife such as turtles, therefore this credit is currently targeted.
- ECO3: What ecological features there are on the existing site will be protected and enhanced, so one credit can be awarded for this section.
- ECO4: As an Oceanographer is currently involved, it can be assumed that the development will leave the land at least as ecological rich as before it was built, and hopefully improve the biodiversity by more than 9 species, therefore all four credits are currently targeted.
- ECO5: All units in the development will consist of more than 3 floors, therefore this credit is targeted.

Health and Well Being

- HEA1: British Standards daylighting should be achievable for the living rooms and kitchens of all dwellings since they all have windows and the climate provides better light generally than the UK, and a view of the sky should be visible for each. Therefore a full three credits can be targeted.
- HEA2: Sound insulation tests will be carried out to the level prescribed by EcoHomes criteria, without currently a commitment to achieving better than Building Regulations standards for impact and airborne sound. Two credits are currently targeted for the second, more exhaustive groups of tests prescribed by EcoHomes.
- HEA3: The Private Space credit is targeted since all houses have private space.

Management

- MAN1: A Home User Guide will be produced incorporating features of the house and local information to target all three credits in this section.
- MAN2: It is hoped that the client will employ a contractor who is part of an equivalent scheme to the Considerate Constructor Scheme in the UK. Currently one credit is targeted here.
- MAN3: The contractor will also develop a strategy to sort, reuse and recycle waste onsite and to monitor two of the following six construction site impacts:
  - Monitor & report CO_2/energy arising from site activities
  - Monitor & report CO_2/energy arising from transport to and from the site
  - Monitor & report on water consumption form site activities
  - Adopt best practice policies for air (dust) pollution
  - Adopt best practice policies for water (ground and surface) pollution
  - 80% of site timber to be reclaimed, reused or responsibly sourced.
- MAN4: Adequate security will be provided but a Secure By Design Award will not be needed so one of the security credits can be targeted.

4.3 Further Consideration

The beauty of the EcoHomes assessment is there is always some flexibility in achieving the desired rating. Due to the nature of this development in Barbados, some credits are just not feasible, and it may be discovered that some of the credits discussed above prove more challenging than anticipated. Should it not be possible to target all the credits listed above, or if the client wishes to exceed the above targets, a number of further potential options could be considered below:

- Further inroads into the CO_2 emissions section (ENE1) e.g. exceeding 22kg/m^2/yr UK equivalent, equating to 8 credits, or above.
- Look into making further improvements in the Materials section by sourcing more 'A' rated materials (e.g. by using recycled brick for the boundary wall) and more from sustainable sources such as FSC.
- Improve internal water use by providing more efficient fittings or look at harvesting some of the rainwater (or seawater?) to flush the toilets for example.
- Achieve further credits in the sound insulation section by achieving, for example, airborne sound 3dB higher and impact sound 3dB lower than Building Regulation standards (HEA2).

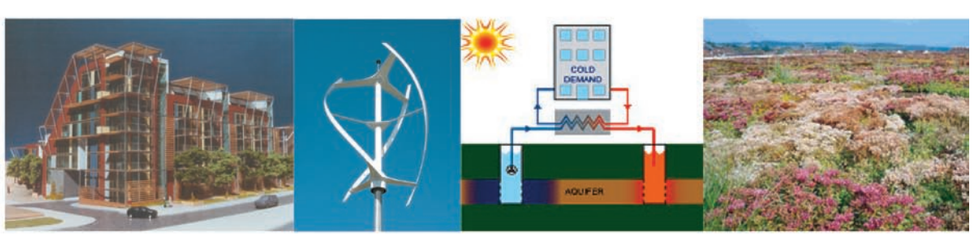
Golden Palms, Barbados

Preliminary LEED Assessment

May 2008

Prepared for Prestbury Developments Barbados Ltd.

by URS Corporation Limited



3.8 Initial LEED Assessment

Project Title:	Golden Palms, Barbados
Report Title:	Preliminary LEED Homes Assessment
Project No:	
Report Ref:	
Status:	Draft for Comment
Client Contact Name:	
Client Company Name:	Prestbury Developments Barbados Ltd.
Issued By:	URS Corporation Limited St George's House, 5, St George's Road, Wimbledon, London SW19 4DR

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	Name	Signature	Date	Position
Prepared by	Clinton Spiteri		16/05/2008	Principal Engineer
Checked by				
Approved by				

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Issue No	Date	Details of Revisions
1	16/05/2008	Draft for Comment

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Table of Contents

1. Introduction

This report has been prepared by URS Corporation Ltd in support of a planning application submitted to the Town and Country Development Planning Department by Prestbury Developments Barbados Ltd (herein referred to as Prestbury) for the redevelopment of a site occupied by the Regent Hotel and Cheffette Restaurant in Holetown, St James, Barbados.

The proposed development seeks planning permission for a high quality regeneration scheme, which involves the demolition of the existing hotel and restaurant on the site and the construction of 20 new highly serviced dwellings arranged as five staggered terraces across a 1-hectare site.

The development will be an exemplar of sustainable design and will feature low and zero carbon technologies, on-site sewage treatment and

This document reports on a preliminary assessment of the Golden Palms Development against the LEED for Homes criteria during a workshop held at Harper Downie's offices on the 13th of May 2008. The main objective of the workshop was to ascertain the 'level' of sustainability achievable by the proposed development, taking into consideration design, environmental, social, economic and financial considerations.

The Preliminary LEED Assessments findings presented in this report will serve to establish the commitments that need to be made to achieve a 'Platinum' rating and show where potentially achievable credits are being missed, allowing the design to be refined.

The method adopted to obtain a preliminary LEED assessment rating consisted of using the LEED for Homes checklist estimator spreadsheet (updated 09/04/2008). URS cannot be held responsible for any errors in the LEED estimator spreadsheet.

Note that URS cannot be held responsible for discrepancies between the rating obtained from the LEED Pre-assessment estimator spreadsheet and any formal assessment; the Pre-assessment estimator allows a quick evaluation of the likely rating to be achieved under a formal LEED assessment. The checklist is a simplified version of the full method, for this reason predicted ratings are likely to change once a formal assessment has been completed. Note also that the LEED for Homes Reference Guide was not yet published at the time of writing therefore it was not possible to ascertain credit compliance.

2. Overview of the Proposed Development

2.1 Development Description

The proposal comprises the demolition of the existing Regent Hotel and Cheffette Restaurant buildings and the erection of 20 houses each comprising ground floor, first to fourth floor levels with basement car parking and storage with the exception of the two most northern units that have been lowered to be sympathetic to the properties to the north. The houses are arranged as five staggered terraces. The proposed development is largely placed within the existing footprint of the two buildings on the site.

Pedestrian access to the properties will be via the beach walkway or the front through a pedestrian gate by the main vehicle entrances. Generally the property is accessed by car either through the Southern or central gates leading to the basement car parking. The central gates will be used for visitors and deliveries.

2.2 Site and Surrounding Area

The existing Regent Hotel and Cheffette properties are well established landmarks along the West coast. They occupy narrow sites between the main coastal highway and the shoreline. To the southern boundary of the two sites is a walkway providing public access to the sea.

Currently the Regent Hotel is unoccupied and in a state of disrepair and the Ceffette Restaurant is occupied and trading.

2.3 Accommodation Schedule

The following table summarizes the accommodation schedule for this development.

Table 1: Accommodation Schedule

Type	No. of beds	GIA (sqf)
Units 1- 18 (typical)	5 private + maid	8,321
Unit 19	3 private + maid	6,943
Unit 20	4 private + maid	6,706
Total GIA		**163,427**

3. Overview of LEED for Homes

LEED for HOMES is an initiative designed to promote the transformation of the mainstream homebuilding industry toward more sustainable practices. LEED for Homes is targeting the top 25% of new homes with best practice environmental features. LEED for Homes is a collaborative initiative that actively works with all sectors of the homebuilding industry.

By recognising sustainable design and construction in homes nationwide, LEED for Homes helps homebuilders differentiate their homes as some of the best homes in their markets, using a recognised national brand. Furthermore, homebuyers can more readily identify third-party verified green homes.

While there are already a number of local or regional green homebuilding programs, LEED for Homes is attempting to provide national consistency in defining the features of a green home and to enable builders anywhere in the country to obtain a green rating on their homes. LEED for Homes represents a consensus standard for green homebuilding developed and refined by a diverse cadre of national experts and experienced green builders. The LEED for Homes Rating System is part of the comprehensive suite of the LEED assessment tools offered by USGBC to promote sustainable design, construction, and operations practices in buildings nationwide.

The LEED for Homes Rating System measures the overall performance of a home in eight categories:

1. *Innovation & Design Process (ID).* Special design methods, unique regional credits, measures not currently addressed in the Rating System, and exemplary performance levels.
2. *Location & Linkages (LL).* The placement of homes in socially and environmentally responsible ways in relation to the larger community.
3. *Sustainable Sites (SS).* The use of the entire property so as to minimise the project's impact on the site.
4. *Water Efficiency (WE).* Water-efficient practices, both indoor and outdoor.
5. *Energy & Atmosphere (EA).* Energy efficiency, particularly in the building envelope and heating and cooling design.
6. *Materials & Resources (MR).* Efficient utilization of materials, selection of environmentally preferable materials, and minimisation of waste during construction.
7. *Indoor Environmental Quality (EQ).* Improvement of indoor air quality by reducing the creation of and exposure to pollutants.
8. *Awareness and Education (AE).* The education of homeowner, tenant, and/ or building manager about the operation and maintenance of the green features of a LEED home.

The LEED for Homes Rating System works by requiring a minimum level of performance through prerequisites, and rewarding improved performance in each of the above categories. The level of performance is indicated by four tiers- Certified, Silver, Gold and Platinum- according to the number of points earned (Table 2).

Table 2: LEED for Homes Certification Levels

LEED for Homes Certification Levels	Number of LEED for Homes points Required
Certified	45-49
Silver	60-74
Gold	75-89
Platinum	90-136

The number of points for each certification level is adjusted for smaller-than-average and larger-than-average home using a mechanism called the Home Size Adjustment.

The Rating System guarantees minimum levels of sustainable practice through 18 prerequisites in the eight credit categories. At the same time, projects enjoy flexibility with the wide variety of credits available to achieve certification. Credit Interpretation Requests (CIRs) are also available to projects that seek clarification or special consideration on specific credits.

4. Overview of the Rating System

4.1 Basic Structure of the Rating System

The LEED for Homes Rating System has 35 topic areas, each with a unique intent or goal. Under the requirements section of each topic area, specific measurements are identified that may be included in the home. Typically, these measurements are structured as follows:

- Good Practice: usually a prerequisite (i.e., mandatory measure)
- Better Practice: usually worth 1 point
- Best Practice: usually worth 2 points

Prerequisites are mandatory measures and must be completed during the design of construction phase. There are 18 prerequisite measures in LEED for Homes:

Innovation & Design Process (ID)
1.1 Preliminary Rating
2.1 Durability Planning
2.2 Durability Management

Sustainable Sites (SS)
1.1 Erosion Controls (During Construction)
2.1 No Invasive Plants

Energy & Atmosphere (EA)
1.1 Performance of ENERGY STAR for Homes
2.1 Refrigerant Charge Test

Materials & Resources (MR)
1.1 Framing Order Waste Factor Limit
2.1 FSC- Certified Tropical Woods
3.1 Construction Waste Management Planning

Indoor Environmental Quality (EQ)
2.1 Basic Combustion Venting Measures
4.1 Basic Outdoor Air Ventilation
5.1 Basic Local Exhaust
6.1 Room by Room Load Calculations
7.1 Good Filters
9.1 Radon- Resistant Construction in High Radon Risk Areas
10.1 No HVAC in Garage

Awareness & Education (AE)
1.1 Basic Operations Training

The 67 credits in the Rating System are optional measures. However, a minimum number of points must be earned in some of the credit categories. The credit categories with minimum point requirements are listed in Table 3.

Table 3: Prerequisites and Minimum Point Requirements

Credit category	Prerequisites (mandatory) measurements	Minimum point requirements	Maximum points available
Innovation & Design Process (ID)	3	0	11
Location & Linkages (LL)	0	0	10
Sustainable Sites (SS)	2	5	22
Water Efficiency (WE)	0	3	15
Energy & Atmosphere (EA)	2	0	38
Materials & Resources (MR)	3	2	16
Indoor Environmental Quality (EQ)	7	6	21
Awareness & Education (AE)	1	0	3
Total	**18**	**16**	**136**

5. Results of the Assessment

The following table gives a summary of credits identified during the preliminary LEED for Homes workshop.

The LEED checklist included as Appendix A shows that Platinum rating can be achieved for developments that exceed an adjusted rating threshold of 115.5. From the commitments and aspirations expressed during the LEED workshop a preliminary score of 119 points was estimated which translates to a Platinum rating.

Golden Palms, Barbados
Preliminary LEED Homes Assessment

Table 4: Summary Scores

Ref	Description	Points Avail	Points Avail
ID1	Integrated Project Planning	4	4
ID2	Durability Management Process	3	3
ID3	Innovative or Regional Design	4	3
	Percentage ID credits achieved: 90.9%	**11**	**10**
LL1	LEED ND	10	N/a
LL2	Site Selection	2	2
LL3	Preferred locations	3	3
LL4	Infrastructure	1	1
LL5	Community Resources/ Transit	3	3
LL6	Access to Open Space	1	1
	Percentage LL credits achieved: 100%	**10**	**10**
dSS1	Site Stewardship	1	1
SS2	Landscaping	7	6
SS3	Local Heat Island Effects	1	1
SS4	Surface Water Management	7	5
SS5	Non-toxic Pest Control	2	2
SS6	Compact Development	4	2
	Percentage SS credits achieved: 77.3%	**22**	**17**
WE1	Water Reuse	5	5
WE2	Irrigation System	4	4
WE3	Indoor Water Use	6	2
	Percentage WE credits achieved: 73.3%	**15**	**11**
EA1	Optimise Energy Performance	34	N/a
EA2	Insulation	2	2
EA3	Air infiltration	3	2
EA4	Windows	3	3
EA5	Heating and cooling distribution system	3	2
EA6	Space heating and cooling equipment	4	4
EA7	Water heating	6	6
EA8	Lighting	3	3
EA9	Appliances	3	2.5
EA10	Renewable Energy	10	10
EA11	Residential Refrigerant Management	1	1
	Percentage EA credits achieved: 93.4%	**38**	**35.5**
MR1	Material-efficient framing	5	5
MR2	Environmentally preferable products	8	5
MR3	Waste management	3	1.5
	Percentage MR credits achieved: 71.9%	**16**	**11.5**
EQ1	ENERGY STAR with IAP	13	N/a
EQ2	Combustion venting	2	2
EQ3	Moisture control	1	1
EQ4	Outdoor air ventilation	3	3
EQ5	Local exhaust	2	2
EQ6	Distribution of space heating and cooling	3	3
EQ7	Air filtering	2	2
EQ8	Contaminant control	4	4
EQ9	Radon protection	1	1
EQ10	Garage pollutant protection	3	3
	Percentage EQ credits achieved: 100%	**21**	**21**
AE1	Education of the homeowner/tenant	2	2
AE2	Education of the Building Manager	1	1
	Percentage AE credits achieved: 100%	**2**	**2**
	TOTAL	**136**	**119**

Appendix A

LEED for Homes Simplified Project Checklist

LEED for Homes Simplified Project Checklist

Builder Name:	***Prestbury Developments Barbados Ltd.***
Project Team Leader (if different):	***n/a, Harper Downie***
Home Address (Street/City/State):	***Golden Palms, Holetown, N/a***

Project Description:

Building type: ***Single attached*** # of bedrooms: ***6***

Adjusted Certification Thresholds

Project type: ***Custom*** Floor area: ***8321***

Certified: ***70.5*** Silver: ***85.5*** Gold: ***100.5*** Platinum: ***115.5***

Project Point Total:	***119***	***ID: 10***	***SS: 17***	***EA: 35.5***	***EQ: 21***
Certification Level:	***Platinum***	***LL: 10***	***WE: 11***	***MR: 11.5***	***AE: 3***

date last updated :
last updated by :

Innovation and Design Process (ID) (No Minimum Points Required)				**Max Points Available**	**Project Points** Y / Pts	No	Maybe
1. Integrated Project Planning	1.1	Preliminary Rating		Prerequisite	***1***		
	1.2	Integrated Project Team		1	***1***		
	1.3	Professional Credentialed with Respect to LEED for Homes		1	***1***		
	1.4	Design Charrette		1	***1***		
	1.5	Building Orientation for Solar Design		1	***1***		
2. Durability Management Process	2.1	Durability Planning		Prerequisite	***1***		
	2.2	Durability Management		Prerequisite	***1***		
	2.3	Third-Party Durability Management Verification		3	***3***		
3.Innovative or Regional Design	3.1	Innovation #1	***SHW + GSHP***	1	***1***		
	3.2	Innovation #2	***Sewage treatment plant***	1	***1***		
	3.3	Innovation #3	***Biomass CHP***	1	***1***		
	3.4	Innovation #4		1		*1*	
			Sub-Total for ID Category:	***11***		***10***	

Location and Linkages (LL) (No Minimum Points Required)			*OR*		Y / Pts	No	Maybe
1. LEED ND	1	LEED for Neighborhood Development	**LL2-6**	10	***n/a***		
2. Site Selection	2	Site Selection		2	***2***		
3. Preferred Locations	3.1	Edge Development		1	***n/a***		
	3.2	Infill	**LL 3.1**	2	***2***		
	3.3	Previously Developed		1	***1***		
4. Infrastructure	4	Existing Infrastructure		1	***1***		
5. Community Resources/ Transit	5.1	Basic Community Resources / Transit		1	***n/a***		
	5.2	Extensive Community Resources / Transit	**LL 5.1, 5.3**	2	***n/a***		
	5.3	Outstanding Community Resources / Transit	**LL 5.1, 5.2**	3	***3***		
6. Access to Open Space	6	Access to Open Space		1	***1***		
		Sub-Total for LL Category:		***10***		***10***	

Sustainable Sites (SS) (Minimum of 5 SS Points Required)			*OR*		Y / Pts	No	Maybe
1. Site Stewardship	1.1	Erosion Controls During Construction		Prerequisite	***1***		
	1.2	Minimize Disturbed Area of Site		1	***1***		
2. Landscaping	2.1	No Invasive Plants		Prerequisite	***1***		
	2.2	Basic Landscape Design	**SS 2.5**	2	***n/a***		
	2.3	Limit Conventional Turf	**SS 2.5**	3	***n/a***		
	2.4	Drought Tolerant Plants	**SS 2.5**	2	***n/a***		
	2.5	Reduce Overall Irrigation Demand by at Least 20%		6	***6***		
3. Local Heat Island Effects	3	Reduce Local Heat Island Effects		1	***1***		
4. Surface Water Management	4.1	Permeable Lot		4	***4***		
	4.2	Permanent Erosion Controls		1		*1*	
	4.3	Management of Run-off from Roof		2	***1***		
5. Nontoxic Pest Control	5	Pest Control Alternatives		2	***2***		
6. Compact Development	6.1	Moderate Density		2	***2***		
	6.2	High Density	**SS 6.1, 6.3**	3		*1*	
	6.3	Very High Density	**SS 6.1, 6.2**	4		*1*	
			Sub-Total for SS Category:	***22***		***17***	

LEED for Homes Project Checklist (continued)

				OR	Max Points Available	Y / Pts	No	Maybe
Water Efficiency (WE)		(Minimum of 3 WE Points Required)						
1. Water Reuse	1.1	Rainwater Harvesting System	**WE 1.3**		4	*4*		
	1.2	Graywater Reuse System	**WE 1.3**		1	*1*		
	1.3	Use of Municipal Recycled Water System			3		*1*	
2. Irrigation System	2.1	High Efficiency Irrigation System	**WE 2.3**		3			
	2.2	Third Party Inspection	**WE 2.3**		1			
	2.3	Reduce Overall Irrigation Demand by at Least 45%			4	*4*		
3. Indoor Water Use	3.1	High-Efficiency Fixtures and Fittings			3	*2*		
	3.2	Very High Efficiency Fixtures and Fittings			6		*1*	
				Sub-Total for WE Category:	*15*		*11*	
Energy and Atmosphere (EA)		(Minimum of 0 EA Points Required)		*OR*		Y / Pts	No	Maybe
1. Optimize Energy Performance	1.1	Performance of ENERGY STAR for Homes			Prerequisite	*n/a*		
	1.2	Exceptional Energy Performance			34	*0*		
7. Water Heating	7.1	Efficient Hot Water Distribution			2	*n/a*		
	7.2	Pipe Insulation			1	*n/a*		
11. Residential Refrigerant Management	11.1	Refrigerant Charge Test			Prerequisite	*n/a*		
	11.2	Appropriate HVAC Refrigerants			1	*n/a*		
				Sub-Total for EA Category:	*38*		*35.5*	
Materials and Resources (MR)		(Minimum of 2 MR Points Required)		*OR*		Y / Pts	No	Maybe
1. Material-Efficient Framing	1.1	Framing Order Waste Factor Limit			Prerequisite	*1*		
	1.2	Detailed Framing Documents	**MR 1.5**		1	*1*		
	1.3	Detailed Cut List and Lumber Order	**MR 1.5**		1	*1*		
	1.4	Framing Efficiencies	**MR 1.5**		3	*3*		
	1.5	Off-site Fabrication			4	*n/a*		
2. Environmentally Preferable Products	2.1	FSC Certified Tropical Wood			Prerequisite	*1*		
	2.2	Environmentally Preferable Products			8	*5*		
3. Waste Management	3.1	Construction Waste Management Planning			Prerequisite	*1*		
	3.2	Construction Waste Reduction			3	*1.5*		
				Sub-Total for MR Category:	*16*		*11.5*	
Indoor Environmental Quality (EQ)		(Minimum of 6 EQ Points Required)		*OR*		Y / Pts	No	Maybe
1. ENERGY STAR with IAP	1	ENERGY STAR with Indoor Air Package			13	*n/a*		
2. Combustion Venting	2.1	Basic Combustion Venting Measures	**EQ 1**		Prerequisite	*1*		
	2.2	Enhanced Combustion Venting Measures	**EQ 1**		2	*2*		
3. Moisture Control	3	Moisture Load Control	**EQ 1**		1	*1*		
4. Outdoor Air Ventilation	4.1	Basic Outdoor Air Ventilation	**EQ 1**		Prerequisite	*1*		
	4.2	Enhanced Outdoor Air Ventilation			2	*2*		
	4.3	Third-Party Performance Testing	**EQ 1**		1	*1*		
5. Local Exhaust	5.1	Basic Local Exhaust	**EQ 1**		Prerequisite	*1*		
	5.2	Enhanced Local Exhaust			1	*1*		
	5.3	Third-Party Performance Testing			1	*1*		
6. Distribution of Space Heating and Cooling	6.1	Room-by-Room Load Calculations	**EQ 1**		Prerequisite	*1*		
	6.2	Return Air Flow / Room by Room Controls	**EQ 1**		1	*1*		
	6.3	Third-Party Performance Test / Multiple Zones	**EQ 1**		2	*2*		
7. Air Filtering	7.1	Good Filters	**EQ 1**		Prerequisite	*1*		
	7.2	Better Filters			1	*n/a*		
	7.3	Best Filters	**EQ 7.2**		2	*2*		
8. Contaminant Control	8.1	Indoor Contaminant Control during Construction	**EQ 1**		1	*1*		
	8.2	Indoor Contaminant Control			2	*2*		
	8.3	Preoccupancy Flush	**EQ 1**		1	*1*		
9. Radon Protection	9.1	Radon-Resistant Construction in High-Risk Areas	**EQ 1**		Prerequisite	*1*		
	9.2	Radon-Resistant Construction in Moderate-Risk Areas	**EQ 1**		1	*1*		
10. Garage Pollutant Protection	10.1	No HVAC in Garage	**EQ 1**		Prerequisite	*1*		
	10.2	Minimize Pollutants from Garage	**EQ 1**		2	*2*		
	10.3	Exhaust Fan in Garage	**EQ 1**		1	*1*		
	10.4	Detached Garage or No Garage	**EQ 1, 10.2, 10.**		3	*n/a*		
				Sub-Total for EQ Category:	*21*		*21*	
Awareness and Education (AE)		(Minimum of 0 AE Points Required)				Y / Pts	No	Maybe
1. Education of the Homeowner or Tenant	1.1	Basic Operations Training			Prerequisite	*1*		
	1.2	Enhanced Training			1	*1*		
	1.3	Public Awareness			1	*1*		
2. Education of Building Manager	2	Education of Building Manager			1	*1*		
				Sub-Total for AE Category:	*3*		*3*	
LEED for Homes Point Totals:					*136*		*119*	
(Certification level)							*Platinum*	

LEED for Homes Project Checklist

Addendum: Prescriptive Approach for Energy and Atmosphere (EA) Credits

Points cannot be earned in both the Prescriptive (below) and the Performance Approach (pg 2) of the EA section.

				OR	Max Points Available	Y / Pts	No	Maybe
Energy and Atmosphere (EA)		(No Minimum Points Required)						
2. Insulation	2.1	Basic Insulation			Prerequisite	*1*		
	2.2	Enhanced Insulation			2	*2*		
3. Air Infiltration	3.1	Reduced Envelope Leakage			Prerequisite	*1*		
	3.2	Greatly Reduced Envelope Leakage			2	*2*		
	3.3	Minimal Envelope Leakage		**EA 3.2**	3		*1*	
4. Windows	4.1	Good Windows			Prerequisite	*1*		
	4.2	Enhanced Windows			2	*n/a*		
	4.3	Exceptional Windows		**EA 4.2**	3	*3*		
5. Heating and Cooling Distribution System	5.1	Reduced Distribution Losses			Prerequisite	*1*		
	5.2	Greatly Reduced Distribution Losses			2	*2*		
	5.3	Minimal Distribution Losses		**EA 5.2**	3	*n/a*		
6. Space Heating and Cooling Equipment	6.1	Good HVAC Design and Installation			Prerequisite	*1*		
	6.2	High-Efficiency HVAC			2	*n/a*		
	6.3	Very High Efficiency HVAC		**EA 6.2**	4	*4*		
7. Water Heating	7.1	Efficient Hot Water Distribution			2	*2*		
	7.2	Pipe Insulation			1	*1*		
	7.3	Efficient Domestic Hot Water Equipment			3	*3*		
8. Lighting	8.1	ENERGY STAR Lights			Prerequisite	*1*		
	8.2	Improved Lighting			2	*2*		
	8.3	Advanced Lighting Package		**EA 8.2**	3	*3*		
9. Appliances	9.1	High-Efficiency Appliances			2	*1.5*		
	9.2	Water-Efficient Clothes Washer			1	*1*		
10. Renewable Energy	10	Renewable Energy System			10	*10*		
11. Residential Refrigerant Management	11.1	Refrigerant Charge Test			Prerequisite	*1*		
	11.2	Appropriate HVAC Refrigerants			1	*1*		
				Sub-Total for EA Category:	*38*		*35.5*	

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the LEED for Homes requirements, as specified ir the LEED for Homes Rating System, have been met for the indicated credits and will, if audited, provide the necessary supporting documents.

Project Team Leader	*n/a*	Company	***Harper Downie***
Signature		Date	

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the required inspections and performance testing for the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been completed, and will provide the project documentation file, if requested.

Green Rater's Name	*n/a*	Company	***n/a***
Signature		Date	

By affixing my signature below, the undersigned does hereby declare and affirm to the USGBC that the required inspections and performance testing for the LEED for Homes requirements, as specified in the LEED for Homes Rating System, have been completed, and will provide the project documentation file, if requested.

Provider's Name	***Clinton Spiteri***	Company	***URS Corporation***
Signature		Date	

3.9 Development Employment Forecast

Overview

Our intention is to create a development of 20 luxury houses. Each house will provide approximately 8,500 ft² of accommodation arranged over 5 floors.

Although each property will be privately owned, the owners will be legally bound to partake in services (see Table 1) provided by the development.

The provision and quality of services is to be similar if not better than that of a 5 star hotel and we view this as one of the major reasons why people will want to acquire one of our properties.

Services & Employment

It is envisaged that most of the properties will be rented throughout the year with the owners themselves occupying the property when they desire. As a result of the leasing, the majority of the services should be required all year round.

To achieve the exceptionally high level of service, we estimate the total all year round employment required will total at least 100 people (Table 1).

Table 1.

SERVICE	NUMBER OF EMPLOYEES	FULL TIME/ PART TIME[1]
Villa rental service, a full in-house rental agency.	5	3 / 2
Complex managers	5	5 / 0
24 hour manned security.	16	16 / 0
24 hour concierge service.	10	8 / 2
Airport pick up and drop offs in development owned vehicles.	4	2 / 2
Pool maintenance.	4	2 / 2
Landscape maintenance.	4	4 / 0
Plant and machinery maintenance.	4	2 / 2
Pre arrival assistance including everything from arrangement of car hire through to stocking of fridges.	8	0 / 8
Maid and housekeeping services.	40	20 / 20
TOTAL	**100**	

[1] Part Time employment = employment of less than 8 hours per day

The services will be provided by a development management company. Each owner will own a share in the management company and therefore have input into the type of services offered.

3.10 Area Schedule

Golden Palms JOB 471

HARPER DOWNIE 1-Aug-08

AREA SCHEDULE

	GEA (sq.m)	GEA (sq.ft)	GIA (sq.m)	GIA (sq.ft)	Tce (sq.m)	Tce (sq.ft)
Basement						
Carpark	2,780	29,924				
House 1-20	139	1,496	82	883	0	0
	5,560	**59,847**	**1,640**	**17,653**	**0**	**0**
Ground						
House 1-20	168	1,808	154	1,658	81	872
	3,360	**36,167**	**3,080**	**33,153**	**1,620**	**17,438**
First						
House 1-20	145	1,561	125	1,345	13	140
	2,900	**31,215**	**2,500**	**26,910**	**260**	**2,799**
Second						
House 1-20	146	1,572	127	1,367	13	140
	2,920	**31,431**	**2,540**	**27,340**	**260**	**2,799**
Third						
House 1-20	146	1,572	127	1,367	13	140
	2,920	**31,431**	**2,540**	**27,340**	**260**	**2,799**
Fourth						
House 1-20	125	1,345	109	1,173	20	215
	2,500	**26,910**	**2,180**	**23,465**	**400**	**4,306**
Total	**20,160**	**217,000**	**14,480**	**155,861**	**2,800**	**30,139**
Roof Area						
House 1-20	194	2,088	0	0	0	0
	3,880	**41,764**	**0**	**0**	**0**	**0**

G.E.A. Gross External Area
G.I.A. Gross Internal Area
Tce. Terrace
(all calculations to RICS Code of Measuring Practice)

4.0 Architectural Drawings

Harper_Downie
design architecture

Gate House
No1 St John's Square
London EC1M 4DH
T +44(0)20 74 90 76 74
F +44(0)20 74 90 49 41
E studio@harperdownie.com
www.harperdownie.com