LA VILLA DURABLE

UNE INITIATIVE MOKA SMART CITY

PROLOGUE

As thorough students of History, we know of humanity's long and perilous march on the treacherous path of progress.

"En route" to our own Ithaca, Sustainability is but one necessary stepping stone along the way - and like Odysseus, our homecoming shall, without doubt, be eventful and profoundly formative.

"Sustainability", as an human endeavour, is not an end in itself but rather a means towards a fair and equitable future. Same will, without any doubt, eventually settle into accepted ubiquity. One should therefore be wise not succumb to passing fads and the tyranny of technology.

In this transitional moment in time towards a better future, who else but Humanists to drive the process of change and evolution? Creative and innovative minds, equipped with problem solving skills and capable of curiosity; lateral thinkers, driven by a profound empathy with their own kind and the natural world we live in.

We are therefore pleased to participate in this ENL Villa Durable competition. Our humble design proposal showcases our sensibility in all matters Sustainable but also our sensitivity to our blessed Mauritian lifestyle. We trust that it be a positive contribution in the greater Sustainability debate.

"If ever there was a problem, there is no doubt that we would be at its source, yet, paradoxically, we would somehow be part of its solution..."

THE ARCHITECTS.

INTRODUCTION

THE CURRENT CONTEXT.

The **Mauritian Architectural scene** is in constant mutation. Post World War II planning strategies and world reconstruction programs, post colonialism, industrialisation and naturally occurring calamities took their toll on the **vernacular architecture** of the island. Globalisation, demographics, new planning and development policies and a real demand for **quality housing** have further influenced the built environment.

Climate change, its many associated challenges and **sustainability** could be the final “nail in the coffin” of Mauritian Architecture as we know it, or maybe not?

A BRIEF HISTORY.

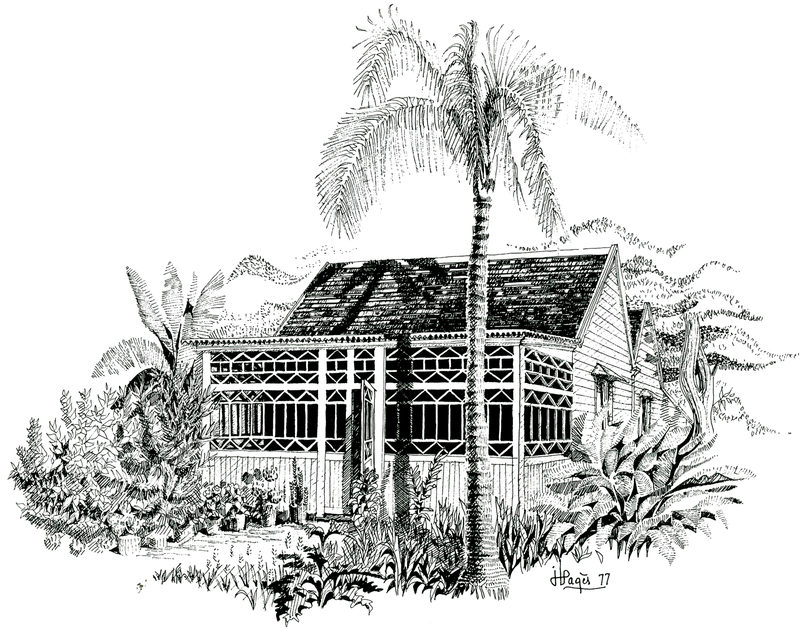
We are the heirs to a long tradition of **Mauritian master builders**. Our traditional architecture, its evocative forms, intelligent use of site and materials and its plethora of **passive climate control** solutions – commands that we revisit our built **traditions & fundamentals**, that we be inspired by the work of our forefathers in view of putting forward modern solutions whilst addressing today’s many challenges.

A NECESSARY EVOLUTION.

La Villa Durable addresses today’s challenges with a modern twist whilst being deeply rooted in its **localism and revisiting** its rich past.

La Villa Durable is viewed as a necessarily robust design – one that addresses the fundamentals of the abode: well adapted to the local context, climate, construction industry and its time. It is an **honest proposal**, a **simple meaningful design,** engaged in a real dialogue, covering the greater topics of **climate change**, **resilience** and **sustainability.**

La Villa Durable, as envisioned by its creators is first and foremost about Architecture, the mother of all arts, still vigorous and green.



Chapter 1 :

the design concept

LOCATION & CONTEXT

1832 MM
ANNUAL PRECIPITATION

25.0 °C
AVERAGE WARM

22.0 °C
AVERAGE YEAR

18.8 °C
AVERAGE COOL

THE GATHERED TOPOGRAPHY, HYDROLOGY, CLIMATE, VEGETATION, PRESENT USE, ORIENTATION AND SOLAR PATH DATA WILL GUIDE THE DESIGN AND HELP CONCEPTUALISE THE FORM, MASS, MATERIALITY, APPROACH, LANDSCAPE AND MUCH MORE TO OPTIMISE FOR **PASSIVE DESIGN PRINCIPLES.**

SITE PLAN

URBAN FOREST.

Endemic Trees and shrubs planted along the boundary to shield the dwelling from the strong winds and provide shade.

CARBON OFFSETTING.

Tree planting and agrihood will positively compensate carbon emissions and contribute to carbon sequestration.

WET SWALE.

Permeable landscape and localised swales whereby water can slowly percolate into the ground & replenish the sub-terranean aquifers.

URBAN AGRI.

Vegetable Garden integrated within the landscape & architecture to enable owners to grow their own organic produce.

LANDSCAPING.

Choice of Landscape Palette with endemic plants which will require less maintenance and consume less water.

LEED (Leadership in Energy & Environmental Design)
SUSTAINABLE SITES

- Protect or Restore Habitat
- Open Space
- Rainwater Management
- Heat Island Reduction
- Non Toxic pest control

LEED WATER EFFICIENCY

- Outdoor Water Use Reduction

SITE AREA : 898m²
Building Footprint : 176m²
(including Covered Terrace & Covered Carport)

Plot Coverage : 20.7%

COMPLIANCE WITH GUIDELINES.

Villa Durable meets the Moka City Phase 2 **CONTROL & GUIDELINES.** It is worth noting that some modifications to the latter could result in a slightly better design with **ENHANCED PERFORMANCE AND METRICS.**

PROJECT TARGETS.

NET ZERO Energy consumption + Net Embodied Energy through **HIGH ENERGY PERFORMANCE** and e□cient water use + **CARBON OFFSET STRATEGIES.**

PROJECT PHILOSOPHY.

Villa Durable includes all the principles embedded in the concepts of **POSITIVE DEVELOPMENT** - development that has a **NET POSITIVE ECOLOGICAL AND SOCIAL IMPACT.**

SAFETY.

CAREFUL SELECTION OF MATERIALS AND TECHNOLOGIES TO AVOID RISK OF INTOXICATION THROUGH HARMFUL SURFACE FINISHES, LEAKING FLUID OR COMPROMISED INDOOR AIR QUALITY AND WATER USAGE.

SERVICES.

OPTIMISES SERVICES TO BE MINIMUM AND BURIED SO AS TO **MAXIMISE LANDSCAPE AREA**. EXCAVATION REDUCED BY SETTING THE DIRECTION OF THE FLOW ALONG THE TOPOGRAPHY OF THE SITE.

HEAT ISLAND REDUCTION.

REDUCING THE AMOUNT OF HARD SURFACES, SHADING PROJECT AREAS WITH TREES AND OTHER FOLIAGE, PLACING PARKING LOTS UNDER COVER, AND USING PERMEABLE PAVER SYSTEMS.

PLANT SELECTION.

A CAREFUL SELECTION OF ENDEMIC AND **PEST-REPELLING** PLANTS IN LINE WITH THE **XERISCAPING** PRINCIPLES.

THE DESIGN PROPOSAL

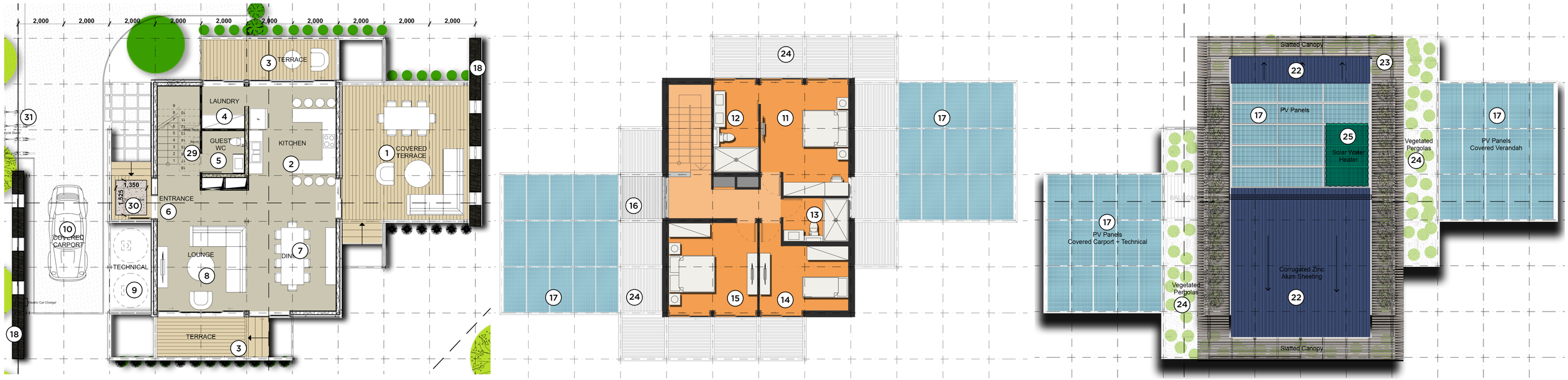
GROUND FLOOR.

AREA : 86M² + 68M²+ 32M² (EXTERNAL COVERED VERANDAH & CAR PORT)

FIRST FLOOR.

AREA : 86M²

ROOF.



NOT TO SCALE

1. COVERED TERRACE
2. KITCHEN
3. TERRACE - SUSPENDED TIMBER DECK
4. LAUNDRY
5. GUEST WC
6. ENTRANCE
7. DINING
8. LOUNGE
9. TECHNICAL AREA
10. DRIVEWAY + COVERED CAR PORT
11. MASTER BEDROOM
12. MASTER EN-SUITE
13. SHARED BATHROOM
14. BEDROOM 1
15. BEDROOM 2
16. BALCONY
17. RECESSED PV PANELS
18. LOCAL FIELD STONE GABION WALL
19. VEGETATED SCREEN
20. COMPOSITE WALL SYSTEM + LOW VOC PAINT FINISH
21. TIMBER SCREEN
22. ZINC ALUMINIUM ROOF SHEETING
23. TIMBER SLATS
24. VEGETATED PERGOLAS
25. SOLAR WATER HEATER
26. RECYCLED METAL FRAME STRUCTURE
27. LOW-E GLASS
28. ROOF PLANTS
29. SHOE RACK + BENCH
30. PERMANENT WALK-OFF MATT
31. BICYCLE STAND

ELEVATIONS

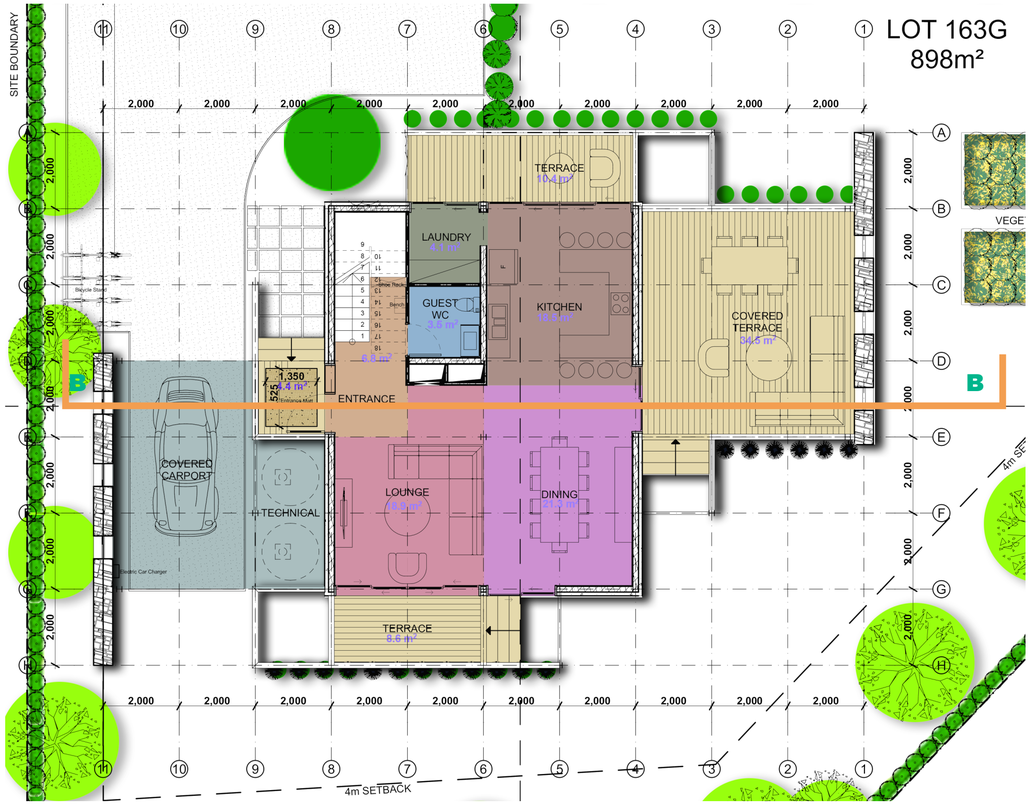
NORTH ELEVATION

EAST ELEVATION

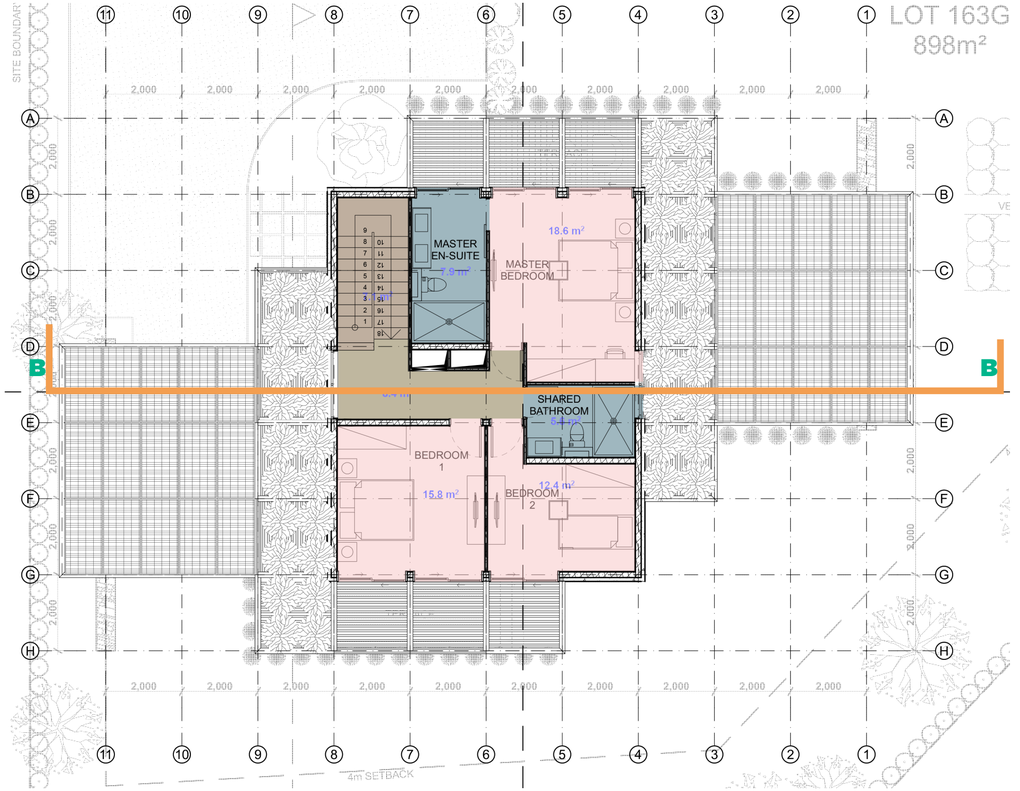
WEST ELEVATION

SOUTH ELEVATION

LAYOUT PLAN & SCHEDULE OF AREAS



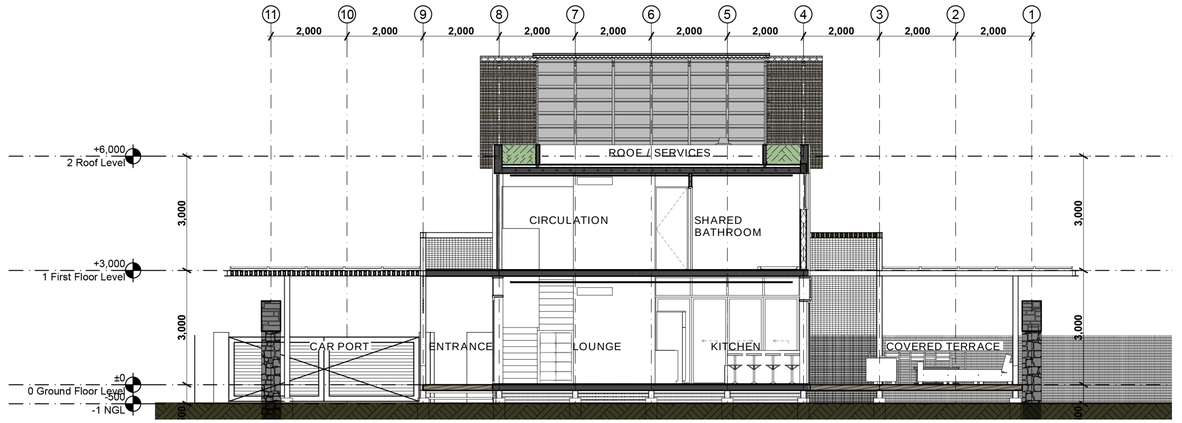
GROUND FLOOR PLAN



FIRST FLOOR PLAN

LOCATION PLAN

GENERAL NOTES :
- ALL DIMENSIONS ARE TAKEN FROM STRUCTURAL WALL / SLAB EXCLUDING FINISHES
- INTERNAL FURNITURES ARE FOR INDICATION ONLY AND ARE NOT PROVIDED BY THE DEVELOPER.
- PROPOSED LOCATION FOR AC UNITS INDICATED.
- GROSS AREAS ARE MEASURED FROM EXTERNAL WALL SURFACES OR CENTRELINE OF WALLS (FOR ADJOINING SPACES)
- NET AREAS ARE MEASURED FROM INTERNAL OF WALLS.
- ALL AREAS ARE MEASURED IN SQUARE METERS.



SECTION

DESCRIPTION:	AREA :
GROUND FLOOR	m²
ENTRANCE	6.8
LIVING	18.9
DINING	21.3
KITCHEN	18.5
GUEST WC	3.5
LAUNDRY	4.1
COVERED TERRACE	57.9
COVERED CARPORT	32
SUB-TOTAL	163
FIRST FLOOR	
STAIRCASE	7.1
CIRCULATION	8.4
BEDROOM 1	15.8
BEDROOM 2	12.4
SHARED BATHROOM	5.6
MASTER BEDROOM	18.6
MASTER EN-SUITE	7.9
SUB-TOTAL	75.8
TOTAL NET AREA :	238.8

GROSS AREA :

GROUND FLOOR : **86m² + 68m² +32m²**
(INCLUDING COVERED TERRACE & CARPORT)

FIRST FLOOR : **86m²**

TOTAL : **272m²**

ENTRANCE VIEW


ENTRANCE VIEW


GARDEN VIEW

CARPORT VIEW

TERRACE VIEW


LOUNGE & DINING VIEW

BATHROOM VIEW

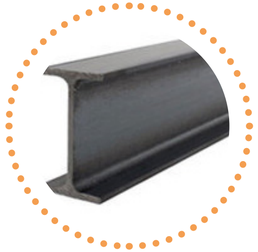
MATERIAL PALETTE

SUSTAINABLY SOURCED TIMBER SCREEN

FSC (Forest Stewardship Council) ensures forests are environmentally appropriate, socially beneficial and economically viable.

SUSTAINABLY SOURCED TIMBER FLOORING

Recycled flooring can be obtained from 100% FSC label or FSC mix label with partial non-certified materials.



RECYCLED METAL STRUCTURE

Low-alloyed steel from 100% steel scrap.
88% recycling at end of life, 11% Re-use & 1% in Landfill.

MINERAL WOOL INSULATION

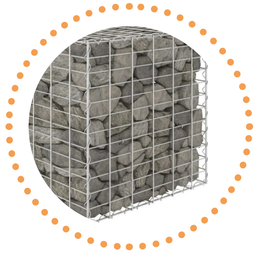
Cradle-to-installation with end-of-life'.
Provide a 75 years building service life.

VEGETATED ECO-MESH WITH CREEPERS

Made with LEED-friendly recycled materials.
Durable corrosion resistant wire.

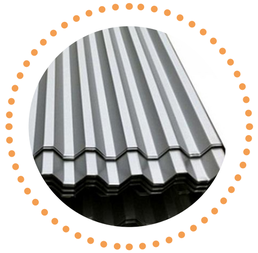
LOW VOC PAINT

contains less than 50g/ltr of volatile compound.



LOCAL FIELDSTONE GABION WALL

A gabion is a cage, cylinder or box filled with rocks.



ZINC ALUMINIUM SHEETING

1% in landfill at end of life.
97% recycling & 2% reuse.

LOCALLY MANUFACTURED ECOBLOCK SYSTEM

The Ecoblock epresents a real innovation with its thermal and acoustic insulating properties.

LOW-E GLASS

Reduces up to 95% of damaging UV radiation.

USE OF ENVIRONMENTALLY FRIENDLY PRODUCTS, RESOURCES AND PRACTICES

MATERIAL USE

EMBODIED ENERGY
MATERIALS WITH REDUCED CARBON FOOTPRINT

RECYCLING
MATERIALS THAT HAVE A PERCENTAGE OF RECYCLED MATERIALS
- Concrete (30% FLY-ASH content)
- Steel (25% recycled material)
- Aggregate (50% recycled content)

MATERIALS THAT CAN BE RECYCLED AFTER THE LIFETIME OF THE DWELLING
- Aluminium openings
- Glass panels
- Steel

REUSE
DESIGNED SO THAT COMPONENTS CAN BE FURTHER REUSED AFTER DISMANTLING

AFFORDABILITY
BALANCING LOW & HIGH PERFORMANCE MATERIALS TO OPTIMISE COST VS PERFORMANCE

PREFABRICATION
FABRICATED OFF-SITE IN A CONTROLLED ENVIRONMENT FOR QUICK AND EASY ON-SITE ASSEMBLY

EASY TO INSTALL CLADDING SYSTEM

DRY CONSTRUCTION FOR INTERNAL PANELS

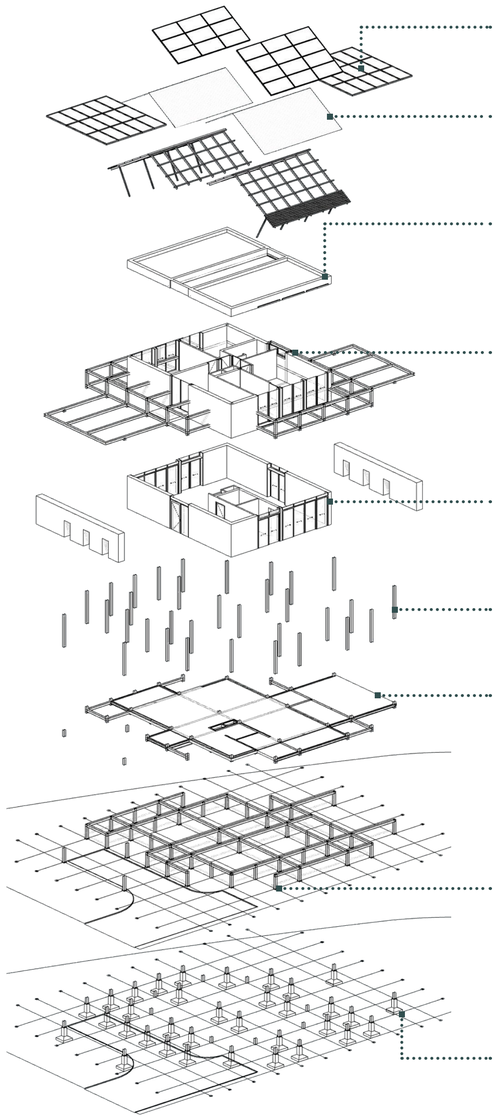


PHOTO-VOLTAIC PANELS
Energy generation
Heat island reduction

METAL PITCH ROOF
30degree inclination
Provide support to PV panels
Acts as insulation

COMPOSITE DECK SYSTEM
Light weight design
Reduced slab thickness
Time saving
Efficient material use

INTERNAL PARTITIONING
Lightweight
Efficient use of material
Speed construction
Reduced environmental impact
Low embedded carbon

COMPOSITE WALL SYSTEM
Internal prefab paneling
Insulation
Outer skin prefab panels

STEEL FRAME SYSTEM
Light weight & prefab
Recyclable material

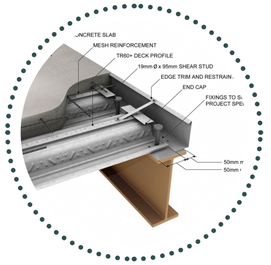
COMPOSITE DECK SYSTEM
Recyclable material
Efficient use of material

RAISED STRUCTURE SYSTEM
Minimum natural ground disruption
Allowing suspended services
Airflow under building

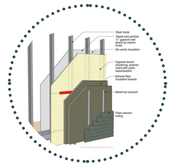
FOUNDATION
Localised Footing system
Minimum natural ground disruption

PHOTO-VOLTAIC PANELS

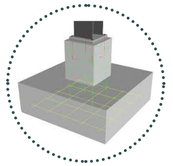
METAL PITCH ROOF



COMPOSITE DECK SYSTEM



INTERNAL PARTITIONING



RAISED STRUCTURE SYSTEM

CREATIVITY & INNOVATION

- **FRAME SYSTEM AND CONSTRUCTION METHOD**

  DESIGNED TO BE PREFABRICATED OFF-SITE IN CONTROLLED ENVIRONMENT AND EASILY ASSEMBLED ON-SITE THUS REDUCING THE DISTURBANCE AND WASTE CREATED ON-SITE:
  30% REDUCED WASTE

WASTE MINIMISATION

LEAN CONSTRUCTION
CHANGE OF CONSTRUCTION SYSTEM TO REDUCE PROCESSES / WASTE ON SITE

END OF LIFE MATERIALS
SELECTION OF MATERIALS TO HAVE MINIMUM WASTE WHEN DISMANTLED

PREFABRICATED / MODULAR
HAND PICKED FOR INSTALLATION TO BE EFFICIENT WITH REDUCED WASTE

FINISHES
PRIORITISE NATURAL FINISHES TO REDUCE MAINTENANCE AND ASSOCIATED WASTE

MAINTENANCE
DESIGNED FOR EASY MAINTENANCE ACCESS TO REDUCE WASTE PRODUCED

APPLIANCES
APPLIANCES WITH AN ENERGY STAR RATING SHOULD BE CONSIDERED IN ORDER TO REDUCE THE ENERGY DEMAND AND EVENTUAL AFTER-LIFE DISPOSAL

REUSE
KITCHEN WASTE TO BE USED FOR COMPOSTING

TOILET / WASHBASIN / SHOWER WATER TREATED AND REUSED IN CLOSED SYSTEM

PLANTS AND BIODIVERSITY SCHEDULE

DECORATIVE AND FLOWERING PLANTS

HIBISCUS GENEVII

TROCHETIA BOUTONIANA

CLERODENDRUM

BARLERIA OBSERVATRIX

MEDIUM SHRUBS AND PALMS

LABOURDONNAISIA

LATANIA LODDIGESII

DRACAENA REFLEXA

DICTYOSPERMA ALBUM

TREES - LARGE AND MEDIUM SIZED

DIOSPYROS TESSELLARIA

FOETIDIA MAURITIANA

GASTONIA MAURITIANA

CYPHOSTEMMA MAPPIA

PEST REPELLING PLANTS - A selection pest-repelling plants in line with the xeriscaping principles.

CHRYSOPOGON ARGUTUS

CITRONELLA

NEPETA CATARIA

ARTEMISIAS

XERISCAPING PRINCIPLES

A sustainable garden is designed to be both attractive and in balance with the local climate and environment and it should require minimal resource inputs. Thus, the design must be “functional, cost-e□cient, visually pleasing, environmentally friendly and maintainable”. As part of sustainable development, it pays close attention to preserving limited resources, reducing waste, and preventing air, water and soil pollution. Compost, fertilization, integrated pest management, using the right plant in the right place, appropriate use of turf and xeriscaping (water-wise gardening) are all components of sustainable landscaping Xeriscaping is the practice of designing landscapes to reduce or eliminate the need for irrigation. This means xeriscaped landscapes need little or no water beyond what the natural climate provides.

SUPPORTERS OF XERISCAPING SAY IT CAN REDUCE WATER USE BY 50 OR 75%, SAVING WATER AND MONEY.

WILDLIFE HABITAT REGENERATION

Habitat loss has had a major impact on most of the island’s unique and endemic invertebrates, birds and reptiles by encouraging the implementation of native plants and trees this will create a bredding ground the endemic wild life.

REDUCE WATER USE

RAINWATER HARVESTING

1832 MM/YEAR
OF RAINFALL IN MOKA

56m²
RAINWATER COLLECTION AREA

103m³
OF RAIN COLLECTED PER YEAR

EFFICIENT WATER FIXTURES

20% SAVINGS
from baseline Indoor Water Use Credit (in Water usage from the LEED baseline)

MINIMISE OUTDOOR WATER USE

Garden design to be non-potable water dependent

LEAKAGES

Services designed so that leakages are quickly spotted and easily repairable

WATER CONSUMPTION

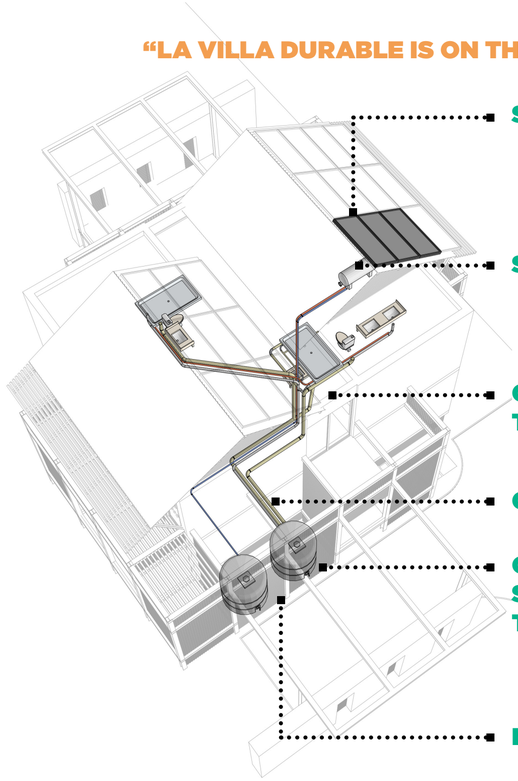
200 L/DAY
average consumption in Mauritius (2018)

08% WATER SAVINGS
Use of Grey Water for toilets and washing machine

121 L/DAY
reduced consumption with efficient water fixtures / rain water harvesting / Grey water harvesting

40%
TOTAL WATER SAVINGS

"LA VILLA DURABLE IS ON THE FRONTLINES WHEN IT COMES TO PROTECTING AND CONSERVING OUR CRITICAL WATER RESOURCES."



SOLAR WATER HEATER COLLECTOR

SOLAR WATER TANK

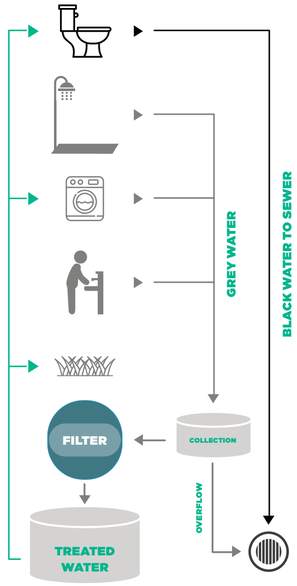
CENTRALISED PIPEWORK THROUGH VERTICAL RISER

CLOSED LOOP WATER SYSTEM

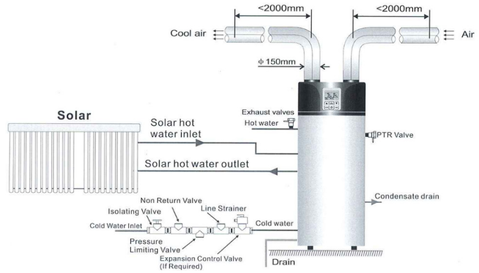
GREY + RAIN WATER TREATMENT SYSTEM + TANK FOR IRRIGATION, TOILET AND WASHING MACHINE

POTABLE WATERTANK

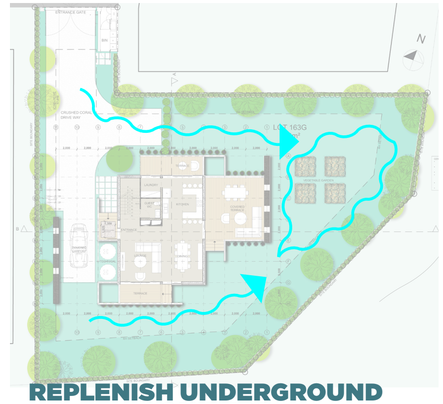
CLOSED-LOOP SYSTEM



SOLAR AND HEAT PUMP WATER HEATING

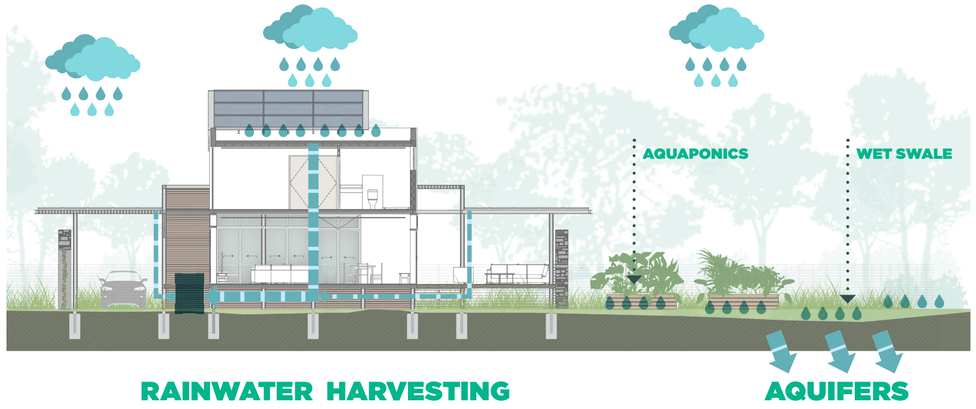


STORM WATER MANAGEMENT



REPLENISH UNDERGROUND AQUIFERS

USE OF POROUS HARDSCAPE MATERIAL - MINIMUM IMPACT TO THE GROUND TO RETAIN PERMEABILITY



RAINWATER HARVESTING

AQUIFERS

CREATIVITY & INNOVATION

- AQUAPONICS - INTEGRATION WITH RAINWATER HARVESTING SYSTEM
- XERISCAPING - USE OF ENDEMIC PLANTS TO REDUCE WATER CONSUMPTION
- SYSTEM DESIGN - INTEGRATED WITHIN THE ARCHITECTURE AND MAXIMISE USE OF GRAVITATIONAL FLOW

HEALTHY AND COMFORTABLE LIVING

PASSIVE DESIGN

WEATHER IN MOKA

70% RELATIVE HUMIDITY
For more than 82% of a typical year

27°C
Or above from November to April
The ASHARAE Climate Zone is 2A
i.e. Hot-Humid

THERMAL COMFORT - REDUCED HEAT GAIN
Double skin roof
Bespoke screen design
Recessed facade

ORIENTATION - FAÇADE DESIGN
Solid east/west elevation with insulation
Openings maximised on north/south facade

NATURAL VENTILATION
Stack effect created by floor / wall operable vents
Openings designed to allow air flow
Fans in rooms and living spaces

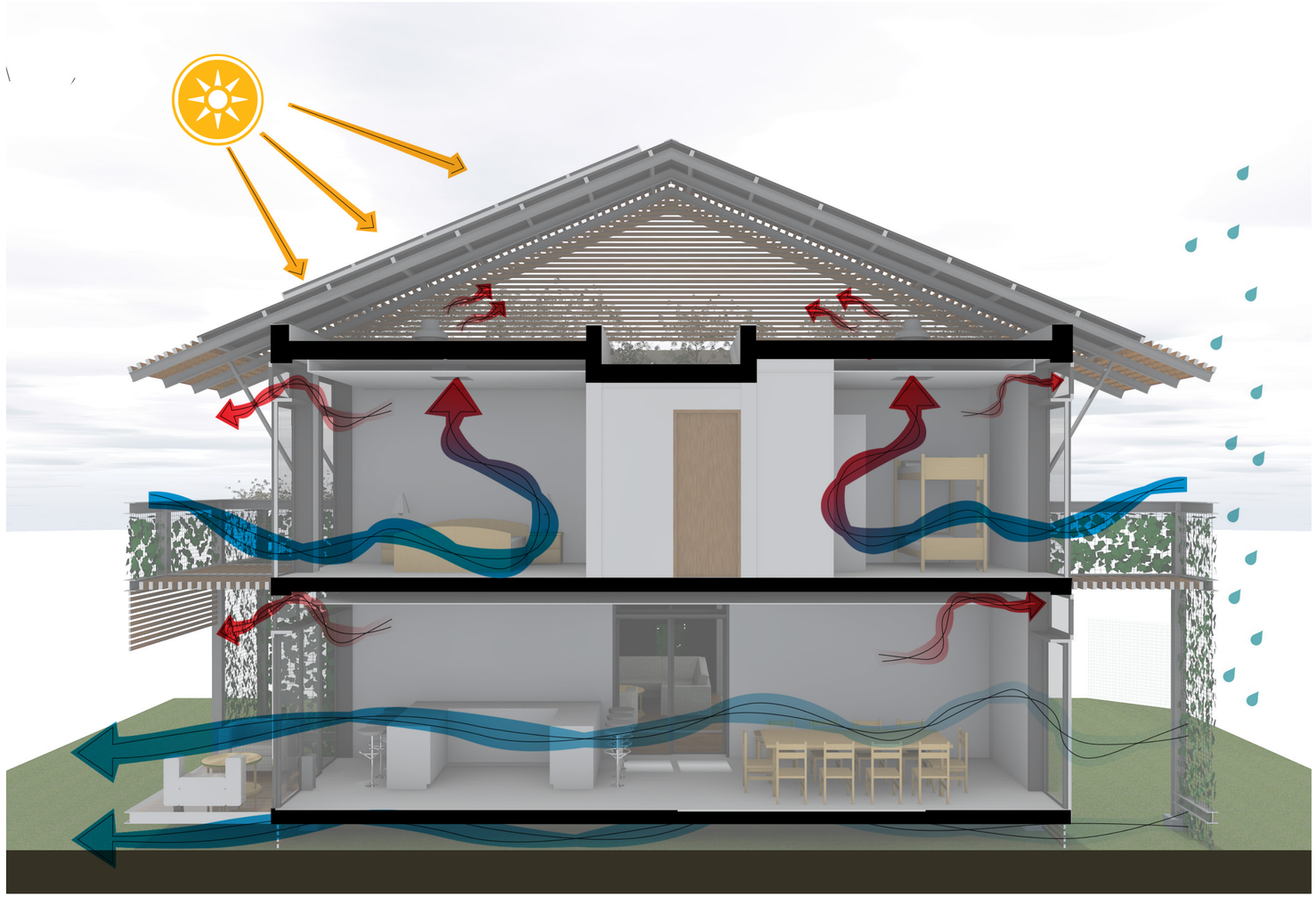
NATURAL DAYLIGHTING
Maximised opening for daylighting and views to the garden

WIND BREAKER
Gabion wall on exposed facades
Slit openings - cool breeze into the dwelling

RAISED GROUND FLOOR
Reservoir of cool air

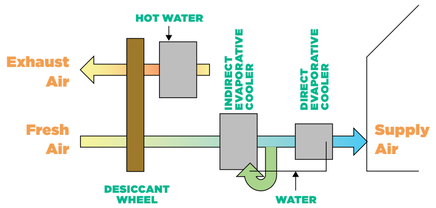
LANDSCAPE DESIGN
Trees planted strategically to provide shade to the facades
90% of reduced heat gain

ENERGY SAVING
Designed to be completely sealed when using air conditioning should the owner decide to do so.



SOLAR DESICCANT COOLING SYSTEM

A renewable air conditioning technology geared towards residential installations. Humidity is removed from the hot humid air in order to make it suitable for evaporative cooling, using water from the hot water system. As a pre-cooled and dehumidified fresh air system, this shall be used in conjunction with ceiling fans to achieve the required level of comfort.



CREATIVITY & INNOVATION

- TAILOR-MADE THERMAL CONTROL WITH MINIMAL ARTIFICIAL ASSISTANCE
- MODERN VERNACULAR DESIGN WITH PASSIVE CONTROL STRATEGIES BASED ON THE PRINCIPLES OF OLD MAURITIAN CREOLE ARCHITECTURE

THE HEALTHY HOME

CONTAMINANT CONTROL UNIT
All air filters to be minimum F7 or MERV14 and in the low-pressure energy efficiency type.

With sufficient ventilation in the Living Spaces, Villa Durable remains within the acceptable range of comfort ventilation zone (Bio-climatic Chart for Passive Design)

THERMAL COMFORT
Dehumidification to reduce moisture and to reach the thermal comfort of residents

INDOOR AIR QUALITY
Enhanced cross ventilation
CO2 monitor installed on each floor as per LEED requirement

OXYGEN PRODUCTION
Endemic forest to maximise fresh air around the dwelling
Enhanced ventilation

CONNECTION TO NATURE
Indigenous forest
Vegetable garden
Lawn garden

BIO LIFESTYLE
Food production from vegetable garden
Food production from aquaponics
Beehive (contributing as pollinators)

PEST CONTROL
Passive and bio pest control
Pest Proof mesh on all grill openings

NOISE CONTROL
Designed to be acoustic proof when openings are closed

LIGHT QUALITY
Fixtures selected for comfortable living & dark light spectrum

REDUCE BUILDING IMPACT ON NATURAL ENVIRONMENT

FRAME BUILDING SYSTEM
30% REDUCTION
in energy consumption during construction (wet works on site)

LIFE CYCLE OF MATERIALS
75% MATERIALS
REUSABLE
Timber, Steel, Gypsum
RECYCLABLE
Concrete, Stone, Glass, Aluminium

DRY CONSTRUCTION
30% REDUCTION
in materials used

RAISED ABOVE EXISTING TERRAIN
80% REDUCTION
Reduction in footprint of foundation

FINISHES & MAINTENANCE
LOW MAINTENACE FINISHES
LOW V.O.C
LOW CARBON FOOTPRINT

APPLIANCES / FIXTURES
30% WATER & ENERGY SAVINGS
Energy star for home version 3.0 with minimum embodied energy

LANDSCAPE DESIGN
50% MAINTENANCE SAVINGS
through a careful selection of endemic and pest-repelling plants in line with the xeriscaping principles.

EMBODIED CARBON OF BUILDING THROUGH LIFE CYCLE ASSESSMENT
68 TON OF CO^2

TOTAL CARBON OFFSET PER YEAR
7.5 TON / YR

YEARS REQUIRED TO BECOME CARBON NEUTRAL
9.1 YEARS

ESTIMATED LIFESPAN OF VILLA DURABLE
70 YEARS

CARBON NEGATIVE VALUE AT THE END OF THE LIFESPAN
450+ TON OF CO^2

ON SITE CONSTRUCTION (CONVENTIONAL)

PREFABRICATION CONSTRUCTION (OFF SITE)

CREATIVITY & INNOVATION

- NET PRODUCER OF FOOD, ENERGY AND OXYGEN
- CIRCULAR ECONOMY: 75% OF MATERIALS REUSABLE, THE REMAINING 25% CAN BE REUSED AS AGGREGATE

CARBON OFFSET FROM ENERGY PRODUCTION
6.77 TONNES/YEAR
Grid Emission Factor of Mauritius
1kWh = 1.0279 ton of CO2/MWh

CARBON OFFSET FROM TREES PLANTED ON SITE
30 TREES PLANTED ON SITE

UP TO 22.6 KG
Carbon Dioxide absorbed by a tree per year

0.68 TONNES/YEAR

CARBON NEUTRAL
9.1 YEARS
Years required to offset the embodied carbon using only PV Panels energy generation & on-site tree planting

OTHER POSSIBLE CARBON OFFSETTING SCHEMES
OFF-SITE REFORESTATION

AVOIDED DEFORESTATION

ENHANCEMENT AND SUSTAINABLE

MANAGEMENT OF FORESTRY

CONTRIBUTION TO CORAL REEFS REJUVENATION

REDUCE ENERGY USE

REDUCE CONSUMPTION
Designed as per LEED Energy Budget Method for the Annual Energy Use Credit, the HERS Index Target Procedure for National Program Requirements ENERGY STAR Certified Homes, Version 3

SOLAR WATER HEATER
SOLAR AND HEAT PUMP HOT WATER HEATING SYSTEM

23% ENERGY SAVINGS

WALL & ROOF INSULATION
Precast Concrete Panels with insulation & framing on the interior with a low U value

0.35 W/M²K

Paradial neutral type waterproofing membrane to reflect maximum solar radiation

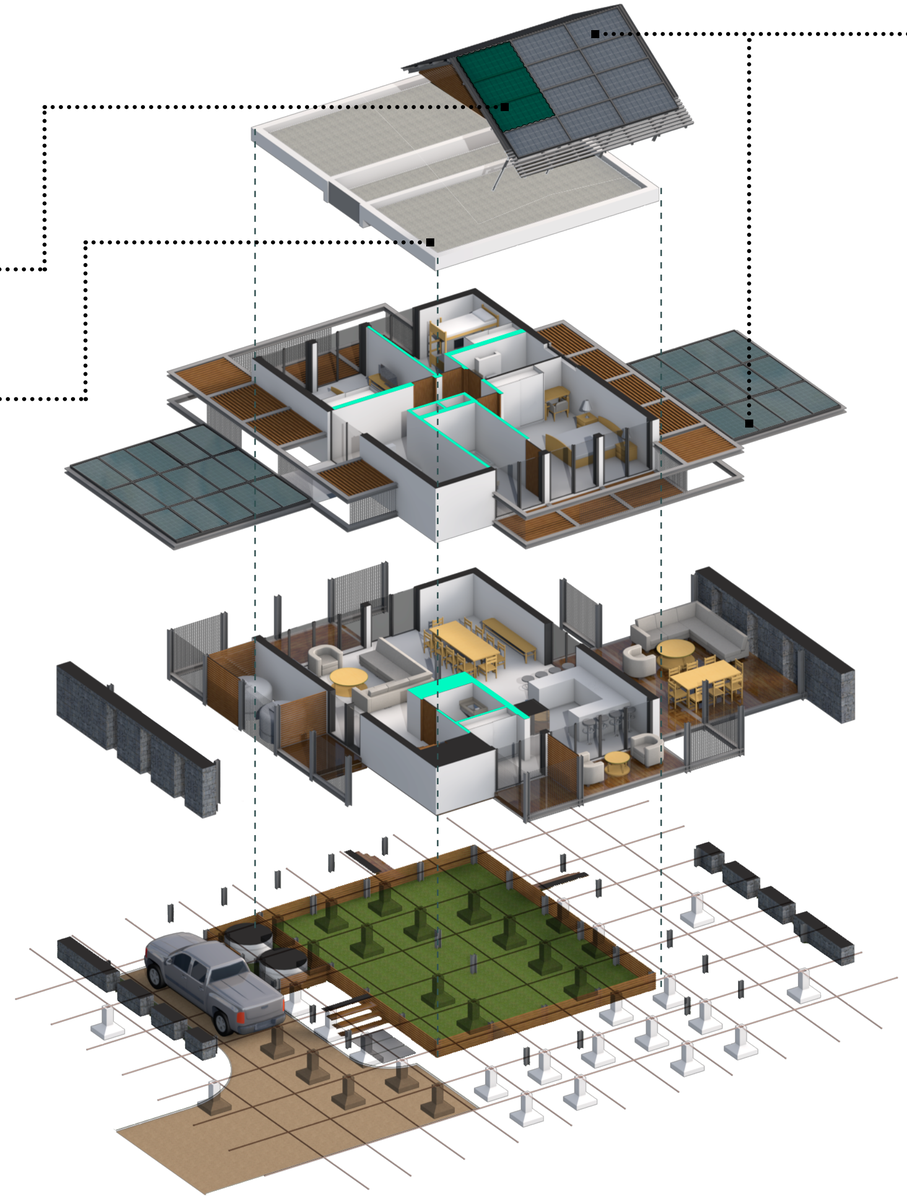
100mm insulation under roof to ensure no heat gain is directly transfered

USE OF LED LIGHTING FIXTURES
85%
more efficient from baseline
7% SAVINGS ON OVERALL CONSUMPTION

SOLAR DESICCANT COOLING SYSTEM
>75% INCREASED EFFICIENCY
on conventional system
(COP of 15 vs COP of 3.5)
Developed by Commonwealth Scientific & Industrial Research Organisation for residential installation.

30% ENERGY SAVINGS
following energy star for home version 3.0
1% Savings on Overall Consumption.

ELECTRIC PUMPS & FANS
Efficient equipment with proper sizing
All fans to be EC-DC driven with >70% efficiency at duty point.



LEED Energy & Atmosphere

RENEWABLE ENERGY
EFFICIENTY USE OF SOLAR ENERGY FOR WATER HEATING AND ELECTRICITY PRODUCTION

HOME AUTOMATION
IOT - INTERCONNECTED DEVICES ALLOWING CONTROL FUNCTIONS SUCH AS SECURITY ACCESS TO THE HOME, TEMPERATURE AND LIGHTING REMOTELY.

LOW ENERGY LIGHT
USE OF LED LIGHTING SYSTEM + SMART MONITORING SYSTEM

PASSIVE ENERGY
MAXIMUM USE OF PASSIVE ENERGY FOR VENTILATION AND LIGHTING

CREATIVITY & INNOVATION
- MONITORING OF ENERGY CONSUMPTION - SMART METERS, IN-HOME DISPLAY (REAL TIME ENERGY CONSUMPTION)
- SMART SYSTEM (ON-GRID) - PV ENERGY DIRECTLY TO GRID
- BUILDING MANAGEMENT SYSTEM / INTERNET OF THINGS - AUTOMATION FOR SELECTED FIXTURES / SENSORS
- ELECTRIC CAR - POTENTIALLY USED TO SUPPLY POWER TO THE HOUSEHOLD
- GLASS SOLAR - USED ON ROOF OF PERGOLAS

PV PANELS
30° INCLINATION
as per morcellement guidelines

NORTH FACING
Integrated in the roof design and above the tree canopy

ENERGY CONSUMPTION
15-20 KWH/DAY
TOTAL ENERGY CONSUMPTION BY A CONVENTIONAL HOUSE

10.5 - 14 KWH/DAY
TOTAL ENERGY CONSUMPTION WITH EFFICIENT APPLIANCES

ENERGY PRODUCED
48 PV PANELS

AVERAGE ENERGY PRODUCED
28.8 KWH/DAY
from PV on pitched roof and terraces

6,588 KWH/YEAR

NET ENERGY OUTCOME
TOTAL ENERGY DELIVERED MINUS TOTAL NON-RENEWABLE ENERGY DISPLACED

>14.8 KWH/DAY

REDUCE BUILDING IMPACT ON NATURAL ENVIRONMENT

FRAME BUILDING SYSTEM
30% REDUCTION
in energy consumption during construction (wet works on site)

LIFE CYCLE OF MATERIALS
75% MATERIALS
REUSABLE
Timber, Steel, Gypsum
RECYCLABLE
Concrete, Stone, Glass, Aluminium

DRY CONSTRUCTION
30% REDUCTION
in materials used

RAISED ABOVE EXISTING TERRAIN
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Reduction in footprint of foundation

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CREATIVITY AND INNOVATION

A VILLA INSPIRED

La Villa Durable revisits our vernacular architecture and pays its dues to our founding fathers, the master builders of old, whose refined architecture has set the canon of **"TROPICAL PASSIVE HOUSE DESIGN".**

La Villa Durable has been envisioned with a true Mauritian soul. It is a simple house design, generated by the architectural principle of asymmetric symmetry.

La Villa Durable showcases the power of Architecture – the mother of all Arts – and the importance of Creativity; in this instance addressing the need for visual interest, La Villa Durable is recognisable amongst all, yet it can easily be called home.

A HOUSE FOR ALL AGES

La Villa Durable is a house for all times and all ages. It has been designed with maximum flexibility in mind.

As time passes, families evolve and change, children grow and leave, and parents get old. La Villa Durable adapts to these changing conditions, it can be repurposed for senior living and young nuclear families as well.

The house is fit for the new concepts of "surrogate grand-parenting", "start-up housing", and co-sharing.

LA VILLA DURABLE IS A NET PRODUCER OF FOOD, ENERGY AND OXYGEN. IT CAN ACTIVELY PARTICIPATE IN THE CREATION OF SMART COMMUNITIES AND NEIGHBOURHOODS.

The net positive message it conveys aligns with the culture of Moka – Smartest City.

CARBON OFFSET

La Villa Durable is guaranteed zero-carbon, net positive energy, provided that embedded energy and carbon deficits are offsetted in carbon offsets schemes. These carbon offsets schemes make optimum use of carefully planned BLUE, GREEN and BROWN carbon sink sites.

We believe that ENL could set up such carbon offset strategic schemes. This carbon offsetting shall effectively contribute to forest, coral and soil regeneration.

Furthermore, onsite tree planting and agrihood will positively compensate carbon emissions and contribute to carbon sequestration.

DID YOU KNOW THAT THE LARGEST LIVING ORGANISM ON EARTH IS A 35,000 TON, 600 ACRE MYCELIUM, CAPABLE OF CARBON SEQUESTRATION?

SITE & ORIENTATION

The house sits on the correct north south orientation, slightly out of kilter, in view of optimising solar control. It is open on the north and south facades whilst blocking the east-west rising and setting sun.

It is worth noting that the living room unusually opens to the south side in response to site context and preferred views.

ELEMENTS OF ARCHITECTURE

La Villa Durable is wrapped in a peripheric Verandah, inspired by traditional architecture, revisited with a modern take. This Verandah is a designed trellised structure onto which grows plants and creepers. It provides the necessary protection against direct sunlight, driving rain and prevailing winds.

IT IS A VERANDAH, LIKE "TONNELLE CHOUCHOU", HAVING THE ADDED BENEFIT OF FRUIT AND FOOD PRODUCTION.

The house comes complete with its iconic evocative roofscape, that floats, hovers and shades the structural roof slab. This

ZERO CARBON

La Villa Durable makes use of low carbon footprint and low embedded energy materials. Long life cycles and recycling too, forms part of the selection criteria.

This type of modular frame construction system guarantees a minimum site disruption and efficient mobilisation.

The Villa design does not stray into tempting greener construction techniques such as

TECHNICAL EVALUATION CRITERIA

REDUCE WATER USE

REDUCE WATER DEMAND:
In Villa Durable, an effort was made to reduce water consumption by hand picking efficient fittings & appliances. Villa Durable garden also has a selection of local endemic plants that are adapted for local growing conditions and require minimal water.

REUSE STORMWATER/RAINWATER:
Rainwater harvesting can provide an alternative water supply to the home which can in turn be used for outdoor use.

RECYCLING WASTEWATER:
On-site wastewater in the form of “Grey Water” generated from sinks & showers can be treated & reused in order to reduce potable water demand in the home whereas the “Black Water” generated from toilets will be flushed away to sewer.

USE OF ENVIRONMENTALLY FRIENDLY PRODUCTS, RESOURCES AND PRACTICES

Villa Durable has been designed for adaptability, reuse and afterlife of the materials used. By choosing durable, low maintenance materials, the need for new materials and finishes over the building’s lifetime has been reduced.

Informed decisions about materials and construction systems in Villa Durable has significantly reduced the environmental impact of a home without major cost implications.

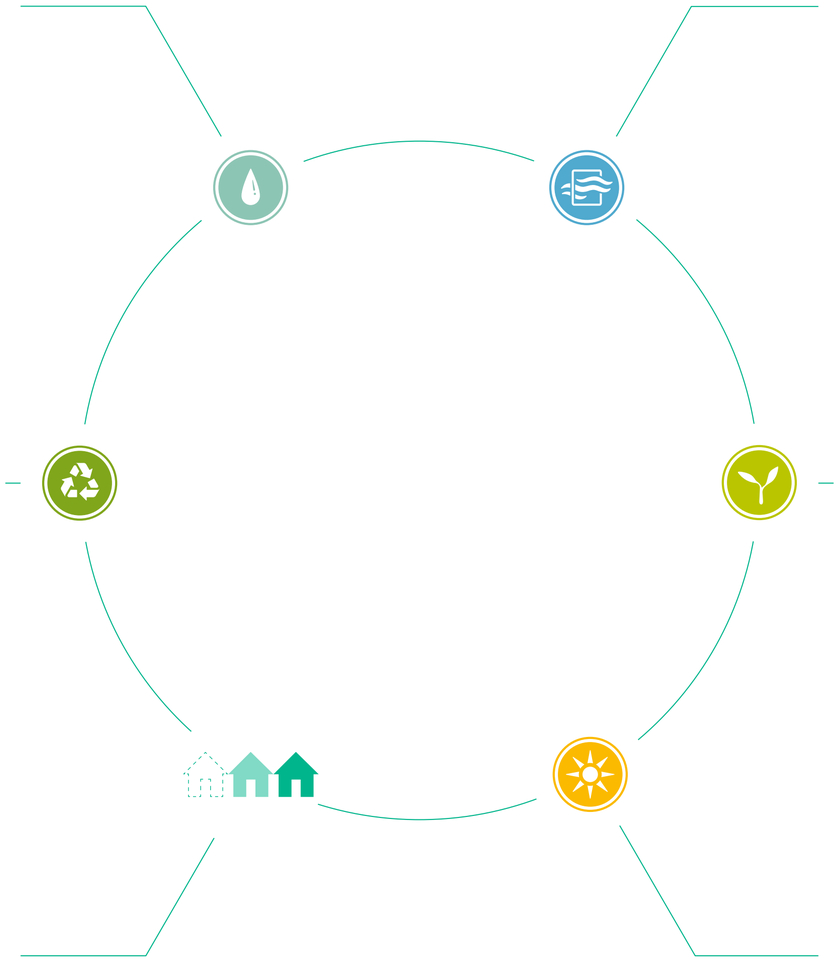
FLEXIBILITY, ADAPTABILITY, REPLICABILITY AND SCALABILITY

In Villa Durable we applied the following principles :-
- Liveable house - design to meet the changing needs of most occupants throughout their lifetime without the need for specification.

- Adaptable house - designed to be easily adapted to become an accessible house if the need should arise or due to a change of requirements from the owner.

For easy replicability, the key idea is to find a construction system that can be easily be modulated, mass produced and that can be transported / assembled on site with the minimum use of resources.

Prefabricated building elements:-
- Reduced disturbance to the site
- Better quality products due to a more controlled working environment in factories
- Affordability due to economy of scale
- Faster construction time
- Ease of future modifications to the house configuration
- Ability to reuse/recycle building elements once dismantled



REDUCE ENERGY USE

HEATING & COOLING:
For cooling, fans are the lowest energy consuming option to date.

WATER HEATING:
A combined Solar and heat pump water heating has been selected as the preferred renewable means of heating water.

LIGHTING:
In Villa Durable, openings have been maximised on the North & South Façade.
Integration of new more efficient technologies for energy use reduction.

APPLIANCES:

REDUCE BUILDING IMPACT ON THE NATURAL ENVIRONMENT

Materials with a low to zero carbon footprint prefered.
Carbon sink strategy: reforestation in order to offset the carbon footprint.

Additional design strategies:
- Touch the ground lightly – raise building off ground
- Modular structural design
- Reduce water consumption during construction: prefabricated or patented systems

HEALTHY AND COMFORTABLE LIVING

Villa Durable would include passive design principles such as :
- The site and weather analysis
- Daylighting techniques
- Thermal massing of the building
- Renewable energy for heating and cooling (Solar Desiccant cooling system)
- Natural ventilation
- Local extract fans
- Thermal Inertia (Insulation on West and East facades)

Villa Durable also provides its residents with BIO products such as :-
- Fruits, herbs and vegetables from the Vegetable Garden