OCEANO
CARIBBEAN LIVING

OCEANO ENVIRONMENTAL MANAGEMENT PLAN

"To live in harmony with nature – to take nothing and leave nothing behind"

"To create a treasured village for man, in one of the most treasured places on the planet and make it better (environmentally, aesthetically and socially) than before we got there"

INTRODUCTION

The objective of the Oceano Environmental Management Plan is to provide direction for the evolution of Oceano village with the objective of creating a closed system, just as does nature – to arrive at a "Net Zero" community. The Net Zero approach means that we take no non- renewable resources from nature, nor do we give nature back anything – which usually translates to pollution. We define pollution as simply a wasted, non-collected resource.

The *Net Zero* approach at Oceano is based upon creating a closed system, just like any ecosystem on our planet. The 3 closed system components are energy, water and waste.

WATER

The use of water within Oceano is consistent with our net zero philosophy. The Domestic water, sanitary treatment system and storm water management infrastructure are all intimately linked to create a closed system. The Oceano Water Management Plan includes the 13 million gallon Oceano Lake within the village. The lake serves two purposes. Firstly, it acts as a storm water management lake that protects the Village from water in very high rainfall events associated with tropical storms. Secondly, the lake acts as green infrastructure using vegetation and soil to naturally purify and constantly recharge the underground aquifer, from which we will pump water and purify for domestic use. The purification system will be based upon water quality testing from our water wells. The quality of groundwater within the boundaries of Oceano will be diligently maintained by ensuring that all underground utilities are constructed to the highest levels of longevity to ensure that there is no leakage into the aquifer. Our landscape maintenance plan also includes the use all natural pesticides

DOMESTIC WATER

Our objective is to reduce water usage from 70 gallons per day (current California water usage per person per day) to 40 gallons per day. This is accomplished through the use of:

1. low flow showerheads - 1.5 gallons per minute
2. low flush toilets - 1.6 gallons per flush
3. low water use clothes and dishwashers

4. low flow aerated faucets - bathrooms - 1gallons per minute
   - kitchens - 2 gallons per minute
5. Water metering to reduce consumption
6. All Irrigation is accomplished by way of a community brown water line that is dedicated solely to irrigation only. Planting will be encouraged to be native to the area so that excessive irrigation is not needed
7. Water will be treated at the source if required, with additional back up filter systems attached to a drinking water faucet in the kitchen and refrigerator. This ensures that drinking water within Oceano will always be safe.

SANITARY TREATMENT SYSTEM

Our sanitary treatment system is based upon the installation of a solar aquatic greenhouse system as designed by Living Technologies (Dr. John Todd). This approach to wastewater treatment uses natural microbes and plants in a series of vats to clean and clarify the water to a potable, non-palatable state. The treated wastewater is then distributed by way of a separate brown water line throughout the community and used for irrigation.

STORM WATER MANAGEMENT

Offsite storm water is collected in the 13 million gallon Oceano Lake. On site storm water is handled by way of surface swales, cisterns, permeable surface drainage and surface streams and ponds. The collecting of storm water in underground pipes that end up concentrating the problem is not our approach. Buildings will be designed to collect rainwater in swales or through permeable landscaping. Cisterns may be installed to collect rainwater as well, however it is anticipated that our lake will have far more capacity to recharge the aquifer and provide an abundant supply of potable water than we need.

ENERGY

In some areas, most notably energy – the cost effective technologies simply do not exist at this point, yet the breakthroughs are imminent in cost and efficiency, so the Oceano Environmental Management Plan plans for their inclusion – even if not possible at this point in time. In the meantime, reducing energy requirements is the best approach, anticipating the day when we can use renewable resources such as solar photovoltaics on roofs and wind energy to close the loop and arrive at NET ZERO in energy usage.

AIR CONDITIONING

In Roatan, there is no heating requirement whatsoever and air conditioning can account for 70% of the total energy bill. The reduction of a requirement for air conditioning is the

most important step coupled with energy efficient air conditioning systems. To reduce the need for air conditioning, buildings are designed to reduce the solar heat gain through well insulated roofing systems, thermal mass walls and floors (concrete) and carefully positioning buildings and windows to create cross ventilation. Ceiling fans are also used to reduce the need for air conditioning. Sensors are used, so that when doors are open, the air conditioning automatically is turned off. When homes are not occupied a card system will not allow air conditioning to come on. The air conditioners used at Oceano are high efficiency SEER 14 or greater. We are exploring the use of geothermal energy for cooling which will further reduce the energy requirements for air conditioning.

APPLIANCES

All energy appliances used at Oceano are Energy Star rated. This means the appliances typically operate at an average of 60% of the energy used by a typical unrated appliance.

These energy star appliances include dishwashers, washers, dryers, refrigerators and ceiling fans.

LIGHTING

All lighting used at Oceano has the same warm light as incandescent bulbs with 30% of the energy use and a 10 year life span. All site lighting will use high efficiency LED fixtures as well solar streetlights and site lighting.

ELECTRICAL ENERGY GENERATION

Our 5 year goal is to reduce consumption by 60% from typical development and to then, through the use of renewable energy sources such as wind and solar photovoltaics, bring Oceano to a point of a *Net Zero* energy consumer. Our 15 year plan is to eventually produce electricity through these sources to produce adequate electricity to power not only the buildings in Oceano but also electric vehicles (or hydrogen fuel cell vehicles which would use the power to electrolyze water and create the hydrogen needed) that owners in the Village drive. At the outset, we will provide optional roof mounted solar photovoltaic arrays to purchasers. The payback periods are currently very poor however, 25 years at the time of writing. Photovoltaic arrays are expected to drop drastically in price over the next 5-10 years.

SOLID WASTE

Although there is no recycling currently available on the island, Oceano will be proactive in trying to expedite this possibility and commit to support a recycling program on the island immediately upon adoption. It is our understanding that there is currently a proposal to provide a non-polluting incineration facility for the island which would alleviate land fill issues.

OCEANO
CARIBBEAN LIVING

SUSTAINABLE BUILDINGS

Buildings within Oceano are designed to be sustainable. Longevity and maintainability are one of the key factors in creating sustainable buildings. Oceano buildings are generally concrete structures which will last hundreds of years and provide the highest levels of resistance to termites and the forces of nature. Concrete walls and floors also provide an excellent thermal mass to even day and night temperatures. Oceano flooring materials and countertops are stone and cabinetry and doors are local non- endangered hardwoods. Windows are of safety glass which can withstand a 2x4 at 100 mph hitting the glass. Window frames are of a very high quality PVC – to reduce problems with constant maintenance of wooden windows. The glazing is single only – not double – because it is anticipated that through proper design, during the day, windows will be open encouraging the cooling natural tradewinds which blow directly into the bay. Overhangs shield the windows from the midday sun.

All materials are natural – including the furnishings to limit off-gassing products within the homes. Use of renewable woods, such as non-producing rubber, bamboo or Honduran pine are encouraged for interior finishes and furnishings.

Roofs are well insulated from the midday sun using a minimum R15 - 2”polyurethane foam board. Walls are clad with either stucco on concrete or prepainted hardiboard concrete siding. All hardware is bronze or brass in the marine environment of Roatan for longevity. All structures are designed to Dade County Florida structural standards for high wind resistance.

FOOD

Numerous valley lands on the property offer the opportunity to grow food for the Village. Herb gardens, fruit orchards and market gardens could offer the opportunity to close the organic waste system using waste sludge from the sanitary system as fertilizer. Options will be explored either on site or supporting off site island agriculture including the existing on-island hydroponic facility. We will support local fishermen by purchasing direct and fresh for hotels and a local general store in the village.