# PROPOSED REDEVELOPMENT OF THE TIPPLERS HUB

## CONCEPT PLAN SUPPORTING INFORMATION

TIPPLERS HUB
SOUTH STRADBROKE ISLAND

GOLD COAST CITY COUNCIL

JULY 2010

GC100012

VDM CONSULTING

NATURA EDUCATION

**ECOLOGICALLY SUSTAINABLE DEVELOPMENT OVERVIEW**

Utilities infrastructure (i.e. power, water, wastewater treatment, and waste disposal) within the Tipplers Hub will be designed and installed based on a model of Ecologically Sustainable Development (ESD).

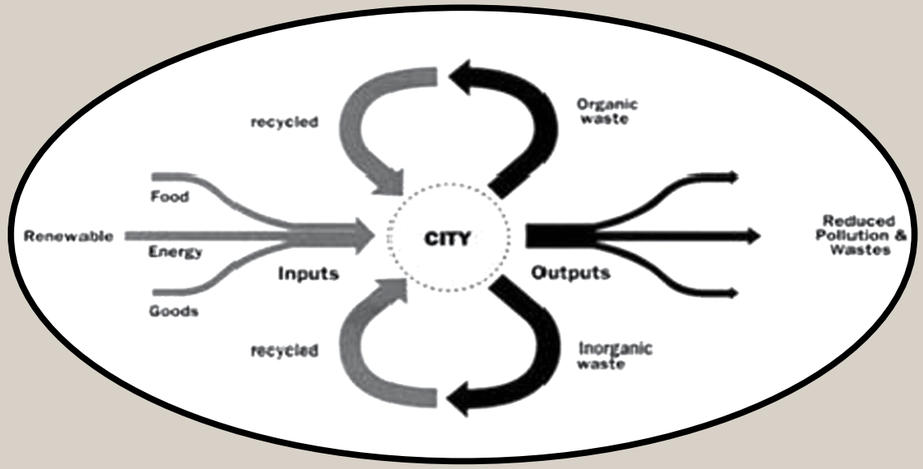
The federal government's National Strategy for Ecologically Sustainable Development (1992) defines Ecologically Sustainable Development as: "using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased". Within the context of the Tipplers Hub redevelopment, this relates to the use of resources and technology that are environmentally, socially and economically sustainable. These will not only result in a decrease in short and long term environmental impacts, but will also represent a more economically efficient operational model for the Tipplers Hub.

A number of different elements of ESD will be incorporated into the redevelopment of the Tipplers Hub. These include:

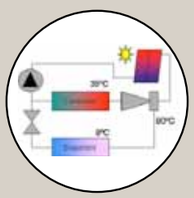
- Roof insulation for heating;
- Ventilators for cooling;
- Solar thermal Heating, Ventilation and Cooling (HVAC) unit for air conditioning, water heating, powering of refrigeration containers;
- Thermal mass building design to reduce temperature fluctuations and reduce heating and cooling requirements;
- Solar thermal electric power system to provide for electricity demand and replace reliance diesel power;
- Solar photovoltaic (PV) battery units to provide electricity;
- Radio Frequency (RF) shutdown switches for plug in appliances to minimise standby energy use;
- Infrared filtered skylights for lighting;
- High efficiency LED downlights for lighting;
- Biodigester treatment plant and compressor unit to generate biogas from septic tank blackwater;
- LPG or biogas for water heating, gas cooking, barbeques, transport fuel;
- High rated Water Efficiency Labelling Scheme (WELS) water consuming appliances and fixtures (e.g. toilets, urinals, showers, pedestals, taps, kitchen equipment) to reduce water consumption;
- Rainwater tanks to collect water;
- Grey water recycling unit to enable grey water reuse for non-potable water functions (e.g. toilet flushing, landscaping and irrigation, and hardstand wash down);
- Recycle bins to segregate general waste from food scraps and recyclables; and
- Compactor unit to process general waste.

The above list presents the full suite of ESD elements that could be used within the Tipplers Hub. The following pages indicate the recommended ESD technology for each precinct. It should be noted that not all components will be required in every situation; as such, it will be necessary to conduct a feasibility assessment of the appropriateness of each technology during the detailed design stage.

**CIRCULAR METABOLISM ESD™**

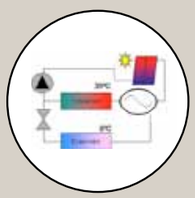



INSULATION



SOLAR THERMAL AIR CONDITIONING SYSTEM FOR MAIN BUILDING & REFRIGERATION CONTAINERS

THERMAL MASS

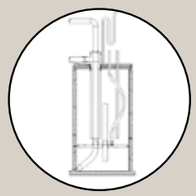


SOLAR THERMAL ELECTRICITY SYSTEM TO REPLACE DIESEL GENERATOR

RF SHUTDOWN SWITCHES FOR PLUG-IN APPLIANCES IN OFFICE AREA

DAYLIGHT PIPING

LED LIGHTING



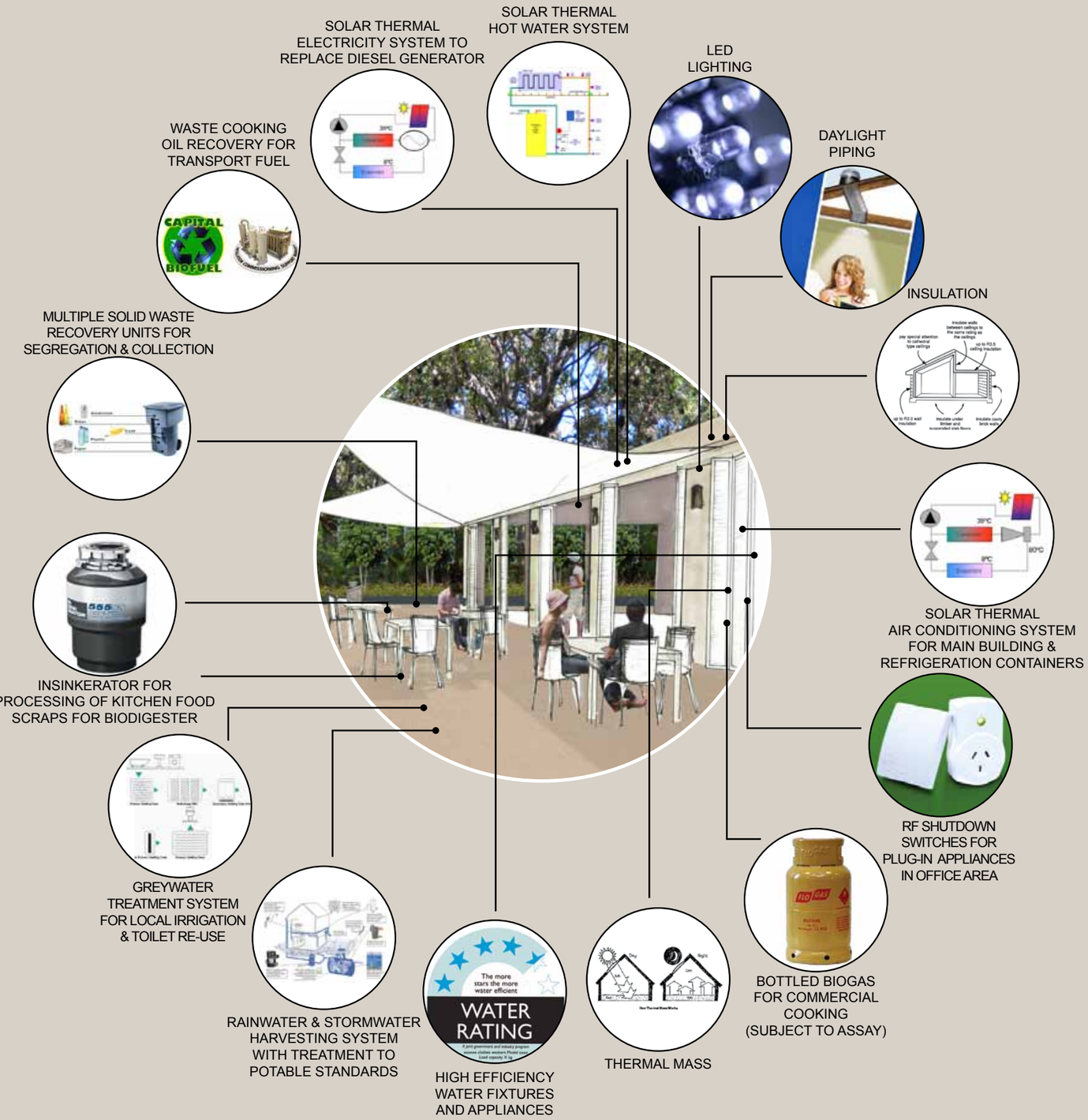
BIODIGESTER SYSTEM FOR ADDITIONAL HOT WATER & POSSIBLY COOKING GAS (SUBJECT TO ASSAY)

BIOGAS COMPRESSOR SYSTEM FOR REFUELLING UTILITIES TRUCK & MANAGEMENT VEHICLE & BOTTLED BIOGAS (SUBJECT TO ASSAY)


BOTTLED BIOGAS FOR COMMERCIAL COOKING (SUBJECT TO ASSAY)

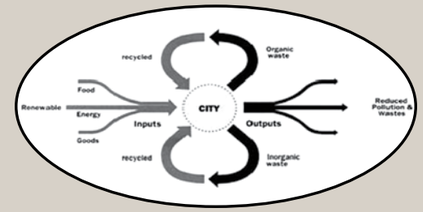

HIGH EFFICIENCY WATER FIXTURES AND APPLIANCES

MULTIPLE SOLID WASTE RECOVERY UNITS FOR SEGREGATION & COLLECTION




DESIGN, BUILD, OPERATE & MAINTAIN CONTRACTS FOR ACTIVE ESD ELEMENTS

CIRCULAR METABOLISM ESD™

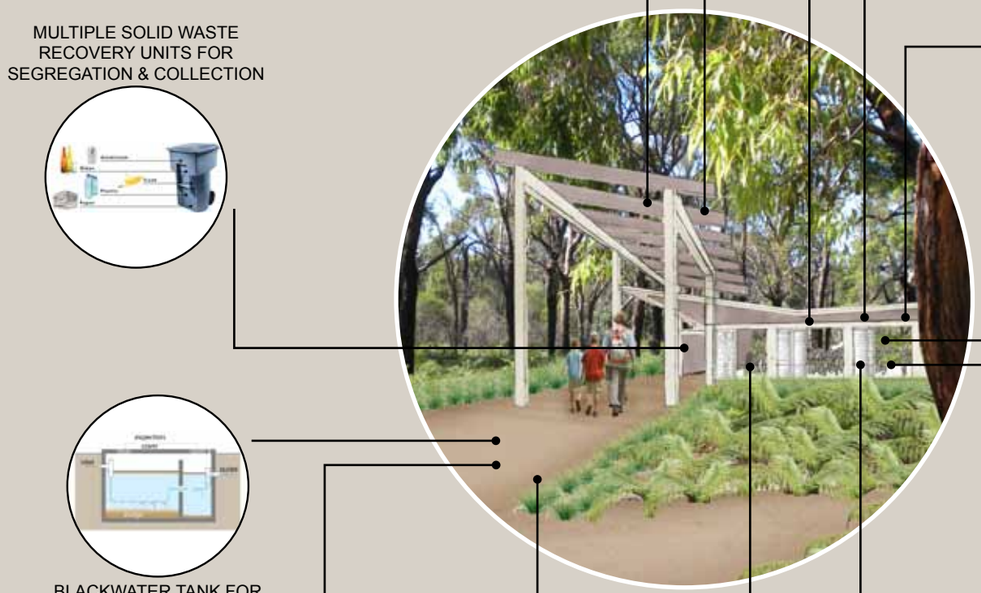



The café and kiosk precinct will have the highest energy density (kWh/m² and MJ/m²) of all the precincts in the proposed redevelopment due to the requirement for space heating and cooling in the proposed café/restaurant, the two external food refrigeration containers for the commercial kitchen, and the commercial cooking and water heating in the kitchen. Similarly, this precinct will have the highest potable water usage (kL/m²) together with the highest levels of solid and liquid waste generation (m³/m² and kL/m²) due to its location as the main transit node for visitors and the presence of the commercial kitchen.

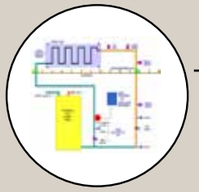
Particular attention will need to be paid to the refurbishment of the existing building shell for the proposed café/restaurant. The addition of roof insulation and ventilators is recommended in order to enhance the air flow created by the existing “Polynesian” style of architecture, whilst infrared filtered skylights and high efficiency LED downlights should be provided to minimise energy requirements for space heating, cooling and lighting. The main roof mounted Heating, Ventilation and Cooling (HVAC) unit should be retrofitted with a solar thermal system so as to provide reduced energy usage and residual domestic grade hot water for the wash basins, with LPG or biogas instantaneous back-up. It is recommended that the external food refrigeration containers are linked to the building’s proposed solar thermal HVAC system in order to further reduce electrical demand. LPG gas cooking will form LPG gas cooking will form the basis of energy usage in the commercial kitchen which will help to further reduce electrical demand and may also provide the opportunity for future conversion to bottled biogas (subject to assay results). Radio frequency (RF) shutdown switches are also recommended for the proposed office and café/restaurant to help minimise standby electrical load from plug-in appliances. Diesel generation currently provides all electrical demand at present (25kW+ based on previous peak demand meters) which can be replaced with a solar thermal electric power system.

The existing toilets in the recreation hall have water efficient urinals; however, the pedestals and taps will need to be replaced with the highest possible Water Efficiency Labelling Scheme (WELS) rated units in order to reduce usage of potable water. Similarly the water consuming appliances and fixtures in the new commercial kitchen will need to be specified to the highest possible WELS standard in order to help further reduce potable water demand. Potable water is currently provided by a mix of rainwater harvesting and bore water, hence it is recommended that the existing rainwater tanks be upgraded in capacity to better match the available roof area on the proposed café/restaurant and be fitted with additional treatment to lift the quality to potable standard for use in the commercial kitchen and help reduce reliance on bore water. A grey water recycling unit should also be installed for re-use in non-potable applications such as toilet flushing and local landscaping irrigation.

It is noted that solid waste is currently stored in standard 240 L bins without any segregation, hence it is recommended that multiple solid waste recovery units be installed for segregation of recyclables and food scraps from non-recyclable general solid waste. Biogas will be used in the generation of commercial grade hot water for the kitchen and in the operation of BBQs. Subject to assay, biogas may also be used for transport equipment. Food scraps and kitchen insinkerator output can also be directed to the biodigester unit in the utilities precinct to help increase biogas recovery rates. Liquid outflow from this unit can be directed to an organic garden to help supply the commercial kitchen with a range of herbs and spices. Waste cooking oil can also be recovered from the commercial kitchen to help provide diesel substitution for one or more of the GCCC’s transport fleet on the island (subject to assay). The existing transport depot at the immediate south of the existing recreation hall is to be relocated to the proposed utilities compound.

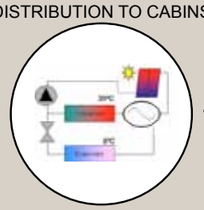


SOLAR THERMAL HOT WATER SYSTEM WITH LPG OR BIOGAS BACK-UP



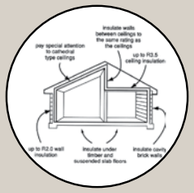
LED LIGHTING IN EDUCATION CENTRE, CABINS & PATHWAYS

SOLAR THERMAL ELECTRICITY SYSTEM FOR EDUCATION CENTRE WITH DISTRIBUTION TO CABINS



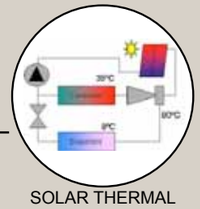
DAYLIGHT PIPING

INSULATION



MULTIPLE SOLID WASTE RECOVERY UNITS FOR SEGREGATION & COLLECTION





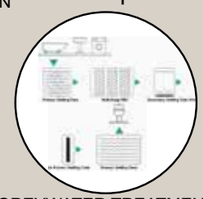
SOLAR THERMAL AIR CONDITIONING SYSTEM IN EDUCATION CENTRE ONLY



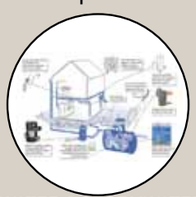
BLACKWATER TANK FOR COLLECTION



RF SHUTDOWN SWITCHES FOR PLUG-IN APPLIANCES IN EDUCATION CENTRE

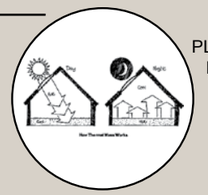


GREYWATER TREATMENT SYSTEM IN TOILET & SHOWER BLOCK FOR LOCAL IRRIGATION & TOILET RE-USE



RAINWATER & STORMWATER HARVESTING SYSTEM IN EDUCATION CENTRE & SHOWER BLOCK FOR TOP UP OF MAIN BORE WATER TANK

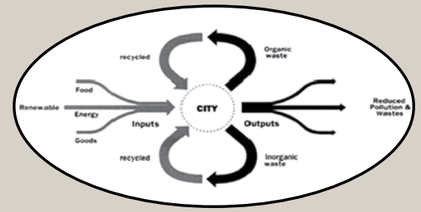

HIGH EFFICIENCY WATER FIXTURES AND APPLIANCES IN TOILET & SHOWER BLOCK



THERMAL MASS

DESIGN, BUILD, OPERATE & MAINTAIN CONTRACTS FOR ACTIVE ESD ELEMENTS

CIRCULAR METABOLISM ESD™



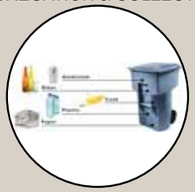

The environmental education/ecotourism precinct will have medium energy density (kWh/m² and MJ/m²) when compared with the other precincts in the proposed redevelopment. This is a result of the requirement for space heating and cooling in the proposed environmental education centre building together with domestic water heating in the proposed toilet/shower block. Similarly this precinct will have medium potable water usage (kL/m²) associated with the proposed toilet/shower block together with medium levels of solid and liquid waste generation (m³/m² and kL/m²) due to its co-location with student bunkhouses which are to be refurbished from the existing South Stradbroke Island Resort accommodation cabins.

Particular attention will need to be paid to the passive design of the building shell for the proposed environmental education centre with thermal mass, roof insulation and ventilators recommended in order to help minimise the need for active Heating, Ventilation and Cooling (HVAC). Infrared filtered skylights and high efficiency LED downlights are also recommended to minimise energy requirements for lighting. The main HVAC unit should be a solar thermal system so as to provide reduced energy usage and residual domestic grade hot water for the showers and wash basins, with LPG or biogas instantaneous back-up. The recycled cabins are to have light and power only, hence this can be provided via connection to a primary solar thermal electric power system in the proposed environmental education centre or via solar photovoltaic (PV) battery units installed within each cabin. Radio frequency (RF) shutdown switches are recommended for the proposed environmental education centre in order to help minimise the standby electrical load from plug-in appliances. High efficiency LED lighting should also be provided along connecting pathways for security.

The new fixtures and fittings in the proposed toilet/shower block will be specified with the highest possible Water Efficiency Labelling Scheme (WELS) rated units in order to reduce usage of potable water. Potable water will be provided by a mix of rainwater harvesting and bore water with the new rainwater tanks to be specified in capacity to match the available roof area on the environmental education centre – this will help replenish the main underground tank on the southern side of the precinct. A grey water recycling unit should also be installed in the proposed toilet/shower block for re-use in non-potable applications such as toilet flushing and local landscaping irrigation. As the existing wash basins and toilets in the recycled cabins will be removed there will be no potable water demand from the student bunkhouses.

It is recommended that multiple solid waste recovery units be installed in a recycling station at the rear of the proposed environmental education centre for segregation of recyclables and food scraps from non-recyclable general solid waste. Segregated waste will be transferred to the biodigester unit in the utilities precinct. It is also recommended that a septic tank be provided as part of the proposed toilet/shower block to facilitate the regular transfer of blackwater to the biodigester plant, thus assisting with the production of biogas. Liquid outflow from the septic tank can be directed to the rehabilitation area on the border of the café and kiosk precinct.

MULTIPLE SOLID WASTE RECOVERY UNITS FOR SEGREGATION & COLLECTION



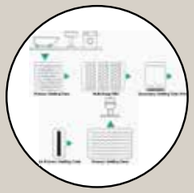
LED LIGHTING FOR BBQ SHELTERS, TOILET BLOCK & PATHWAYS

SOLAR THERMAL ELECTRIC POWER SYSTEM LINK FROM EDUCATION PRECINCT FOR LIGHTING

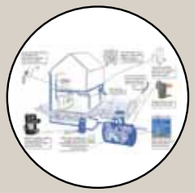




BLACKWATER TANK FOR COLLECTION



GREYWATER TREATMENT SYSTEM FOR LOCAL IRRIGATION & TOILET RE-USE



RAINWATER & STORMWATER HARVESTING SYSTEM WITH LINK TO MAIN BORE WATER TANK

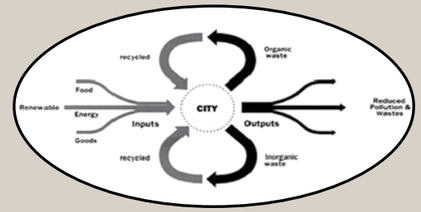

HIGH EFFICIENCY WATER FIXTURES AND APPLIANCES FOR TOILET BLOCK & BBQS



LPG OR BOTTLED BIOGAS FOR BBQS (SUBJECT TO ASSAY)

DESIGN, BUILD, OPERATE & MAINTAIN CONTRACTS FOR ACTIVE ESD ELEMENTS

CIRCULAR METABOLISM ESD™




The day use precinct will have low energy density (kWh/m² and MJ/m²) when compared with the other precincts in the proposed redevelopment due to the requirement for lighting and BBQ cooking only. Similarly, this precinct will have low potable water usage (kL/m²) associated with the toilet block together with medium levels of solid and liquid waste generation (m³/m² and kL/m²) due to its co-location with the environmental education precinct.

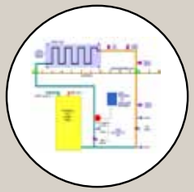
High efficiency LED downlights should be retrofitted in place of existing fluorescent units in the BBQ shelters in order to minimise energy requirements for lighting. They should also be specified for new connecting path lighting along the esplanade and to the toilet block. Power to these lights can be provided via connection to a primary solar thermal electric power system in the proposed environmental education centre or via solar PV battery units installed within each BBQ shelter if the electrical reticulation run lengths prove cost prohibitive. As existing electric element BBQs are progressively being replaced with bottled LPG units, this may facilitate a change to locally bottled biogas in the future (subject to assay).

The fixtures and fittings in the day use precinct toilet block and BBQs will be specified with the highest possible Water Efficiency Labelling Scheme (WELS) rated units in order to reduce usage of potable water. Potable water will be provided by a mix of rainwater harvesting from the toilet block and bore water, with the new rainwater tanks to be specified in capacity to match the available roof area on the toilet block – this will help replenish the main underground tank on the northern side of the precinct which will also feed potable water to each of the BBQ units. A grey water recycling unit should also be installed in the toilet block for re-use in non-potable applications such as toilet flushing and local landscaping irrigation. This unit should be used together with smaller grey water holding tanks next to each BBQ unit for subsequent transfer to the main unit (next to the toilet block).

It is recommended that multiple solid waste recovery units be installed in the area near the toilet block and also in a central area near the BBQs for segregation of recyclables and food scraps from non-recyclable general solid waste. Segregated waste will be transferred to the biodigester unit in the utilities precinct. It is also recommended that the septic tank attached to the toilet block be retained in order to facilitate regular transfer of blackwater to the biodigester plant, thus assisting with the production of biogas. Liquid outflow from the septic tank can be directed to the rehabilitation area on the border of the environmental education precinct.

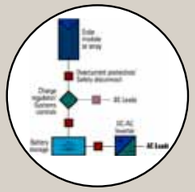
MULTIPLE SOLID WASTE RECOVERY UNITS FOR SEGREGATION & COLLECTION

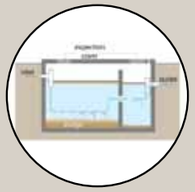
SOLAR THERMAL HOT WATER SYSTEM



LED LIGHTING FOR POWERED CABINS, BBQ SHELTERS, TOILET BLOCK & PATHWAYS

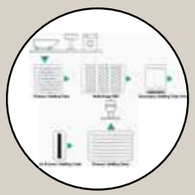
SOLAR THERMAL ELECTRIC POWER SYSTEM LINK FROM EXISTING GENERATOR COMPOUND FOR LIGHTING & POWERED CABINS



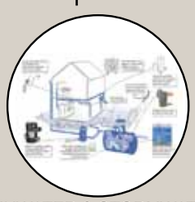


BLACKWATER TANK FOR COLLECTION

LPG OR BOTTLED BIOGAS FOR GAS BBQ (OPTION SUBJECT TO ASSAY)



GREYWATER TREATMENT SYSTEM FOR LOCAL IRRIGATION & TOILET RE-USE

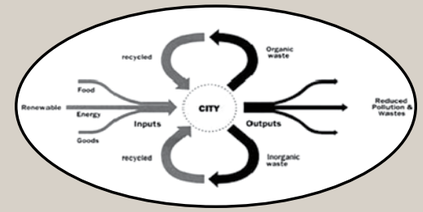


RAINWATER & STORMWATER HARVESTING SYSTEM WITH LINK TO MAIN BORE WATER TANK


HIGH EFFICIENCY WATER FIXTURES & APPLIANCES FOR SHOWER & TOILET BLOCKS, BBQS & POWERED CABINS

DESIGN, BUILD, OPERATE & MAINTAIN CONTRACTS FOR ACTIVE ESD ELEMENTS

CIRCULAR METABOLISM ESD™



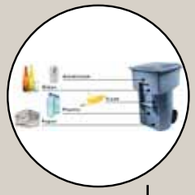

The camping/cabin precinct will have medium energy density (kWh/m² and MJ/m²) when compared with the other precincts in the proposed redevelopment due to the requirement for space heating and cooling in the powered cabins together with water heating for the showers and powered cabins. Similarly this precinct will have medium potable water usage (kL/m²) associated with the powered cabins and toilet/shower blocks together with the medium levels of solid and liquid waste generation (m³/m² and kL/m²) due to the powered cabins and toilet/shower blocks.

Particular attention will need to be paid to the refurbishment of the existing building shells for the powered cabins with the addition of roof insulation and ventilators, which are recommended in order to enhance the air flow created by the existing “Polynesian” style of architecture. Infrared filtered skylights and high efficiency LED downlights should also be provided to minimise energy requirements for space heating, cooling and lighting. A solar thermal Heating, Ventilation and Cooling (HVAC) system should be installed in each powered cabin so as to provide reduced energy usage and residual domestic grade hot water for the interior wash basins, with LPG or biogas instantaneous back-up. Solar thermal hot water, with LPG or biogas instantaneous back-up, should also be specified for the toilet/shower blocks. Radio frequency (RF) shutdown switches are recommended for the powered cabins in order to help minimise standby electrical load from plug-in appliances. High efficiency LED downlights should also be retrofitted in place of existing fluorescent units in the BBQ shelters in order to minimise energy requirements for lighting. They should also be specified for new connecting path lighting along the esplanade and to the toilet/shower blocks. Existing electric element BBQs are progressively being replaced with bottled LPG units, which may facilitate a change to locally bottled biogas in the future (subject to assay). Diesel generation currently provides all electrical demand at present (80kW+ based on Coates unit nameplate data); this can be replaced with a solar thermal electric power system.

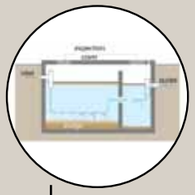
The existing toilets in the powered cabins and the toilet/shower blocks will need to be replaced with the highest possible Water Efficiency Labelling Scheme (WELS) rated units in order to reduce usage of potable water. Potable water will be provided by a mix of rainwater harvesting from the toilet/shower blocks together with bore water, with the new rainwater tanks to be specified in capacity to match the available roof area on each block. This will help replenish the main underground tank on the northern side of the precinct which will also feed potable water to each of the BBQ units. A grey water recycling unit should be installed in the toilet/shower blocks for re-use in non-potable applications such as toilet flushing and local landscaping irrigation. This unit should be used together with smaller grey water holding tanks next to each BBQ unit and powered cabins for subsequent transfer to the main unit (next to the toilet/shower block) or for local use in the powered cabin toilets.

It is recommended that multiple solid waste recovery units be installed in the area near the toilet/shower blocks and also in a central area near the BBQs and powered cabins for segregation of recyclables and food scraps from non-recyclable general solid waste. Segregated waste will be transferred to the biodigester unit in the utilities precinct. It is also recommended that the septic tanks attached to the toilet/shower blocks be retained and that new septic tanks be installed in order to facilitate regular transfer of blackwater to the biodigester plant in the utilities precinct, thus assisting with production of biogas. Liquid outflow from the septic tanks can be directed to the rehabilitation areas on the border of the surrounding precincts.

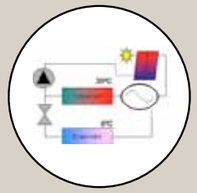
SOLID WASTE FROM OTHER PRECINCTS



LIQUID WASTE FROM OTHER PRECINCTS



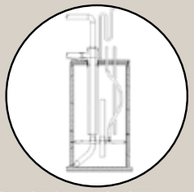
SOLAR THERMAL ELECTRICITY SYSTEM



COMPACTOR FOR REDUCING m³ VOLUME OF GENERAL WASTE TO MAINLAND

BIOGAS CNG UTILITIES TRUCK FOR COLLECTION & DELIVERY OF SOLID WASTE & BLACKWATER TO UTILITIES COMPOUND SPECIFIED TO SUIT ISLAND CONDITIONS

RECYCLABLES FOR RETURN TO MAINLAND



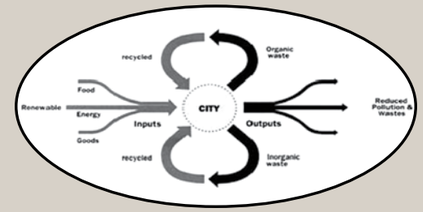
BIODIGESTER SYSTEM FOR ADDITIONAL HOT WATER & POSSIBLY COOKING GAS (SUBJECT TO ASSAY)

BIOGAS COMPRESSOR SYSTEM FOR REFUELLING UTILITIES TRUCK & MANAGEMENT VEHICLE & BOTTLED BIOGAS (SUBJECT TO ASSAY)

BIOGAS CNG FOR TRUCK & 4WD AND BOTTLED BIOGAS FOR BBQS & COMMERCIAL KITCHENS (SUBJECT TO ASSAY)

DESIGN, BUILD, OPERATE & MAINTAIN CONTRACTS FOR ACTIVE ESD ELEMENTS

CIRCULAR METABOLISM ESD™




The utilities precinct will have medium energy density (kWh/m² and MJ/m²) when compared with the other precincts in the proposed redevelopment due to the requirement for operation of the compactor unit and the biodigester treatment plant and compressor unit. Similarly this precinct will have medium potable water usage (kL/m²) associated with wash down of bins and trucks together with the highest levels of solid and liquid waste generation (m³/m² and kL/m²) due to its location as the main transit node for returning recyclables, green waste and compacted general waste to the mainland, and liquid waste from the biodigester treatment plant.

Particular attention will need to be paid to the design of the new utilities building shell with regards to roof insulation and ventilators in order to enhance air flow. Infrared filtered skylights and high efficiency LED downlights should be provided to minimise energy requirements for lighting. An internal toilet and shower can be provided with a solar thermal hot water system, with LPG or biogas instantaneous back-up, to allow for hot water wash-up by maintenance personnel. A solar thermal electric power system is recommended in preference to a diesel generation set which can be sized to power the biodigester treatment plant and compressor unit in this precinct.

The proposed toilet in the utilities building should have the highest possible Water Efficiency Labelling Scheme (WELS) rated units in order to reduce usage of potable water. Similarly the water consuming appliances and fixtures in a kitchen area in the new building will need to be specified to the highest possible WELS standard in order to help further reduce potable water demand. Potable water can be provided by a mix of rainwater harvesting and bore water, hence it is recommended that rainwater tanks be installed of a capacity to match the available roof area on the new utilities building and forecast demand for bin and truck wash down. A grey water recycling unit should also be installed for re-use in non-potable applications such as toilet flushing and hardstand wash down.

Solid waste is currently compacted without any segregation, therefore it is recommended that multiple solid waste recovery units be installed for segregation of recyclables and food scraps from non-recyclable general solid waste prior to compaction. This will also eliminate current issues with odours from the existing compactor unit. It is possible that the biodigester treatment plant and compressor could be installed in this facility in order to recover biogas for bottling for use in BBQs, the commercial kitchen in the café and kiosk precinct, and possibly transport equipment (subject to assay).