

Purpose of this Report

This document is the draft National Solid Waste Management Strategy for the Cayman Islands. It sets out key policies and objectives for the future management of solid waste and the delivery of an Integrated Solid Waste Management System (ISWMS) within the Cayman Islands. It also identifies important steps and actions that will be taken to deliver the ISWMS. These actions will be targeted to improve the sustainability of waste management practices, make increased use of waste as a resource and ensure the protection of the environment and amenity of the islands.

Overview

Each year over 60,000 tons (short tons) of solid waste is produced on the Cayman Islands. The majority of this waste is produced on Grand Cayman (62,386t in 2014) with smaller quantities managed on Cayman Brac (est. 2,240t in 2014) and Little Cayman (est. 200t in 2014).

The vast majority of solid waste produced on the Cayman Islands is disposed of in three landfills that are operated by the Department of Environmental Health (DEH). These are located on Grand Cayman (George Town), Cayman Brac and Little Cayman. George Town landfill is by far the largest of these facilities and has been in continuous use since the mid 1960's. Records indicate that the landfill on Cayman Brac has been in operation since the 1970's and landfill on Little Cayman since the early 1990's. However the Cayman Islands Government (CIG) recognises that there are strong drivers to change solid waste management practices with increasing pressure to minimise the overall amount of waste produced and to be more responsible in the way that the waste that is produced is then managed in a sustainable way

The future collection, treatment and disposal of waste in Cayman Islands will be underpinned by the National Solid Waste Management Policy which has been established by the CIG. This sets out the vision values, and strategic direction for the delivery of a new ISWMS following a public consultation exercise undertaken in June/July 2015.

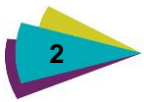
Long and short listed options for change and improvement in the way that waste is managed on the islands have been systematically appraised to develop options that the CIG will seek to develop and deliver as part of the implementation of the National Solid Waste Management Strategy (NSWMS). These options cover a variety of areas ranging from recycling depots through-out provisions through to the treatment of the residual waste that remains after recycling. These options collectively contribute to:

- ▶ The enhanced sustainability of waste management practices;
- ▶ Waste reduction;
- ▶ Increased reuse and recycling;
- ▶ The recovery of energy from residual waste;
- ▶ Substantially reduced dependence on increasingly expensive and unsustainable landfill;
- ▶ Protection of environment;
- ▶ Self-sufficiency as far as this is pragmatically deliverable; and
- ▶ The polluter pays principle.

The options analysis has also facilitated the development of a reference project that shows that the aspirations and aims encompassed within the National Solid Waste Management Policy (NSWMP) and strategic waste management objectives can be attained and approximate costs associated with key elements of reference project delivery.

The Reference Project

The reference project comprises the waste management options that have been assessed as having the most potential for fulfilling the vision; values, and strategic direction established by the NSWMP and which



are likely to be successful in the unique setting of the Cayman Islands. The purpose of developing a reference project can be two-fold:

1. To show that the NSWMP can be delivered by a particular solution and the estimated cost of doing so (demonstrating that the objectives are attainable and so that the affordability of their delivery can be assessed), without constraining any future procurement/delivery options (allowing innovation within the market). Most commonly the lowest cost option that meets the NSWMP and CIG objectives is selected for this purpose.
2. Alternatively, the reference project can be used to define the solution that best fits the NSWMP, CIG objectives and affordability criteria and sets out clearly that this is what the CIG intends to deliver (i.e. the that CIG will go to market for a specific technology/solution). This may not be the lowest cost option and can include specific criteria with particular local significance (e.g. political commitment, site constraints).

In summary the reference project comprises the following:

- ▶ Waste reduction measures – including waste education and pragmatic waste minimisation initiatives (e.g., home composting/ material return schemes such as bottles);
- ▶ The reuse and refurbishment of bulky waste;
- ▶ Community recycling depots and HWRC recycling facilities;
- ▶ Transfer and bulking facilities (one per island);
- ▶ The windrow composting of yard/garden waste from landscapers' and HWRC's;
- ▶ The potential introduction of kerbside yard and garden waste (post 2020)
- ▶ The potential introduction of kerbside dry recyclable collections with a Materials Recovery Facility (post 2020); and
- ▶ The treatment of residual waste in a waste recovery plant (Waste to Energy Facility-CHP enabled is used as an example of this).

The table below sets out how this reference project described performs against the vision, values and strategic directions set out the National Solid Waste Management Policy (NSWMP). The reference project exhibits a high degree of compatibility with the NSWMP and demonstrates that vision, values and strategic directions can be delivered by an integrated waste management solution.



The Mapping of Vision, Values, and Strategic Directions against the Reference Project

Ref		Criteria	Vision	Values	Strategic Direction	Objectives	Performance of the Reference Project
1a		Compatibility with PPP		We will pursue multi-sectorial partnerships and collaboration for the integrated and efficient delivery of waste management services and programmes	Establish partnerships with community and business groups with a view to achieve the strategic directions for sustainable waste management in the Cayman Islands.	Promote multi-sectorial partnerships and collaboration for the integrated and efficient delivery of waste management services and programmes.	The reference project provide for major capital facilities (e.g. a Waste to Energy plant) that is likely to be commercially viable and attractive for a PPP initiative. The reference project will also provide opportunities for the community and business through the reuse, recycling and recovery of waste that would otherwise be landfilled.
1c		Whole Lifecycle Cost		We believe that the generators of waste should be responsible and bear their proper share of costs for waste management.	Implement a waste management system that is principally financed on the basis that the waste producer pays.	Evaluate and adjust the current financing framework for waste management to ensure that the waste producer pays proportionate to the waste that they generate.	Options for the financing of the reference project will include the charging of fees for waste collection and treatment as well as revenue opportunities from the sale of recyclates and recovered energy.
1d		Short term cost/funding		We believe that the generators of waste should be responsible and bear their proper share of costs for waste management.	Implement a waste management system that is principally financed on the basis that the waste producer pays.		Options for the financing of the reference project will include the charging of fees for waste collection and treatment as well as revenue opportunities from the sale of recyclates and recovered energy.



Ref		Criteria	Vision	Values	Strategic Direction	Objectives	Performance of the Reference Project
2a		Waste Hierarchy		We will apply the waste hierarchy preference for reduce, reuse, recycle, and recover prior to the final resort of disposal.	Reduce the proportion of solid waste being landfilled by diverting waste in accordance with the sustainable waste management hierarchy.	Promote the development of improved practices and facilities for solid waste management which are demonstrably consistent with the waste management hierarchy.	The reference project provides a considerable movement up the waste hierarchy by providing for waste reduction, increased reuse and recycling and the recovery of energy from residual waste in preference to landfill.
						CIG will lead by example by examining how it purchases, uses, and manages materials, with the objective of reducing consumption and waste.	The reference project will assist the delivery of this objective by providing enhanced waste reduction, re-use, recycling and recovery opportunities for use by CIG in the decision making process.
2b		Recycling potential				<p>Implement and expand programmes to reduce, re-use, and recycle waste materials.</p> <p>Develop and implement initiatives to support waste segregation at the source, both at households and businesses, for the purpose of reducing, reusing, and recycling.</p>	The reference project provides greater access to residents for recycling through the provision of recycling depots, windrow composting and household waste recycling centres in the short term with the later introduction of kerbside collection systems and a materials recovery facility.



Ref		Criteria	Vision	Values	Strategic Direction	Objectives	Performance of the Reference Project
2c		Carbon impact/greenhouse gas		We will pursue waste management opportunities that have the potential to reduce greenhouse gas emissions and reduce our dependence on fossil fuels.			The reference project produces a substantially reduced carbon impact over the existing landfill arrangements.
2d		Energy generation/green energy		We will pursue waste management opportunities that have the potential to reduce greenhouse gas emissions and reduce our dependence on fossil fuels.			The waste to energy facility used for the treatment of residual waste in the reference project will generate renewable and sustainable from waste that would otherwise be landfilled. This will produce green energy for use on the Cayman Islands and reduce dependence on electricity derived from fossil fuels.
2e		Life cycle environmental impact		We will ensure that environmental impacts of waste management are assessed and understood, and that measures are undertaken to protect human health and the environment.			The reference projects produce substantial lifecycle benefits across all measured lifecycle indicators over the existing waste management system.
				We will implement sustainable waste management in a manner that respects the needs of future generations.			By following the waste management hierarchy the reference project will deliver a more sustainable integrated waste management system for the Cayman Islands.



Ref		Criteria	Vision	Values	Strategic Direction	Objectives	Performance of the Reference Project
3b		Training/Education		We believe in the enhancement of personal responsibility for waste management Through advocacy, education and the creation of opportunities to help realize the national vision for waste management.	Broaden the understanding of sustainable waste management issues and practices throughout the entire community of the Cayman Islands.		Waste education and the promotion of waste reduction is a key focus for the reference project. The reference project will also provide opportunities for training and education by introducing new waste management practices (e.g. providing opportunities for waste re-use) and facilities (that are technically more sophisticated than landfill).
3c		Public acceptability aesthetics		We will pursue multi-sectorial collaborations and partnerships with various stakeholders to achieve our vision for waste management in the Cayman Islands.		Establish a framework to encourage multi-stakeholder collaboration. Institute a programme of awareness, promotion, education, and publicity in partnership with community groups, schools, and other organisations.	The focus on waste reduction and education within the reference project can only be achieved through widespread engagement with all stakeholders and community groups. In addition waste reuse and recycling will also provide opportunities for beneficial engagement with local charities and third sector organisations.
3d		Political buy in		We will ensure there is an appropriate legal, regulatory, and institutional framework,	Apply good governance principles to strengthen	Establish enabling public health and waste management	The delivery of the reference project will need to be accompanied by the introduction of a new



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				embracing good governance principles, to support achieving the national vision for waste management.	institutional capacity and leadership.	legislation, regulation, and enforcement.	regulatory and enforcement regime suited to control of the integrated waste management system.
4a		Track record/Proven technology				Apply a process, based on recognised best practice, for the assessment and mitigation of health and environmental impacts of existing and proposed waste management practices.	The practices and technologies encompassed within the reference project have an extensive operational track record and demonstrable record of commercial deliverability.
4c		Applicability to island environment		We will ensure that economies of scale are considered in determining suitable waste management practices, having due regard for the geographical aspects of the Cayman Islands.			The reference project will provide access to the integrated waste management system throughout the Cayman Islands including Cayman Brac and Little Cayman. The reference project would deliver the closure of the landfill facilities on the sister islands by providing alternative means of managing waste.
5a		Planning/site assessment			Manage waste in a manner protective of human health, the environment and local amenities.	Establish enabling public health and waste management legislation, regulation, and enforcement.	The delivery of reference project and the associated waste management facilities will be subject to planning approval including

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							environmental impact assessment.
5b		Integration across all islands	Integrated, sustainable, and effective waste management for the Cayman Islands.		Broaden the understanding of sustainable waste management issues and practices throughout the entire community of the Cayman Islands.		The reference project will require waste education across the sister islands as well as Grand Cayman. It will also provide access to the integrated waste management system throughout the Cayman Islands including Cayman Brac and Little Cayman. The reference project would deliver the closure of the landfill facilities on the sister islands by providing alternative means of managing waste.
5c		Remediation of existing landfills				Assess the capacity and develop a long-term management plans for each of the landfill sites, including measures to ensure that the sites do not pose an on-going risk to the environment or human health.	The reference project results in a much reduced demand for landfill on Grand Cayman and landfill mining (if feasible) may enable continuation at George Town while the landfill is remediated. The landfill on Cayman Brac and Little Cayman would close.
6a		Diversion of waste from landfill			Reduce the proportion of solid waste being landfilled by diverting waste per the		The reference project results on a substantial diversion of waste away from landfill through enhanced waste recycling and waste recovery.



Ref		Criteria	Vision	Values	Strategic Direction	Objectives	Performance of the Reference Project
					sustainable waste management hierarchy.		Diversion of residual waste from landfill will exceed 90%.

Key Recommendations and Actions

In developing this solid waste management strategy the CIG has developed the vision, value and strategic directions set out in the NSWMP and tested a variety of waste management options against them in order to develop the reference project. In doing so it sought to identify those options that;

Are most compatible with the policies;

- ▶ Will deliver best value to residents of Cayman Islands;
- ▶ Deliver sustainable waste management practices;
- ▶ Provide social benefit to local community; and
- ▶ Promote movement up the waste hierarchy.

The waste management hierarchy is at the heart of the modern approach to managing waste. The hierarchy firstly focuses on waste reduction, and then examines each subsequent option before disposal is finally considered.

The Waste Hierarchy



:

- ▶ Reduction Using less material in design and manufacture, keeping products for longer, using less hazardous materials;
- ▶ Re-use Checking, cleaning, repairing, refurbishing, repair, whole items or spare parts;
- ▶ Recycling Turning waste into a new substance or product. Includes composting if it meets quality protocols;
- ▶ Recovery Energy is recovered from waste through a variety of methods such as thermal treatment and digestion; and
- ▶ Disposal Landfill and incineration without energy recovery.

In delivering this solid waste management strategy for Cayman Islands based on the reference project and the NSWMP, the Cayman Islands Government (CIG) through its implementation will promote the waste hierarchy. Furthermore, CIG will do this in a way that promotes sustainability, the use of waste as a resource and enhances the amenity of the Cayman Islands to the material benefit of its residents.

Waste Reduction and Re-use

Waste can be prevented by both business and the general public by thinking about what we need and buy. For example, residents can reduce waste by using cotton shopping bags instead of plastic shopping bags and avoiding over-packaged products where possible. The CIG is committed to deliver measures that help reduce the amount of waste produced within the Cayman Islands and this is enshrined within the NSWMP.

Re-using waste helps to reduce the impact that waste management has on the environment. This can be as simple as passing things we no longer need on to other people to use, for example by giving items to friends or charity shops.

The CIG will promote waste education and awareness initiatives, prevention measures and re-use activities. In particular the CIG seeks to work closely with local third sector organisations to promote the reuse of bulky waste for the benefit the local community. Key activities may include:

Promotional Activities

- ▶ Periodic residents leaflets – reinforcing the waste hierarchy;
- ▶ Newspaper, radio and television adverts and interviews;
- ▶ National competitions and awards;
- ▶ Advertising panels promoting the waste hierarchy and initiatives on refuse collection vehicles;
- ▶ Facebook and similar social media vehicles;
- ▶ Dedicated campaigns (e.g. reduce food waste); and
- ▶ The establishment of community and third sector waste re-use groups.

Waste Reduction and Education Activity

- ▶ The consideration of restrictions on the use of certain materials such as plastic shopping bags;
- ▶ School waste awareness education initiative;
- ▶ Community events and shows;
- ▶ Waste Reduction Volunteers;
- ▶ Junior Recycling Officers; and
- ▶ Potential visitor centre at a new waste management facility.

Recycling and Composting

Recycling and composting is one of the most visible ways in which waste can be managed more sustainably. The CIG will provide greater access to recycling facilities for residents of the Cayman Islands.

The CIG will target improved recycling performance. This will be initially achieved through the introduction of recycling depots facilities located at suitable locations (such as supermarket car parks) to which residents can deliver separated recyclables including paper, cardboard, metal cans, glass and plastics. This will be supplemented by improved recyclables segregation at the drop off facility at the George Town landfill which will be converted to a Household Waste Recycling Centre (HWRC). Further HWRC's will later be introduced for Cayman Brac and Little Cayman and will be considered for other locations on Grand Cayman.

Further recycling opportunities (including the introduction of kerbside recyclable collections for commercial and residual waste) will be explored as part of the procurement process for new waste management

facilities. This is because the collection of mixed dry recyclable materials will require a materials recovery facility to process the recyclables.

The solid waste currently received at the landfills located at George Town and Cayman Brac contain a considerable amount of organic/ yard waste. This material has the potential to be composted using relatively simple technology and converted into useful compost/soil conditioner that can then be beneficially applied to land. The CIG will undertake trials to establish the feasibility of composting the organic/yard waste with the aim of establishing a windrow composting plant on Grand Cayman and Cayman Brac.

Recovery

For residual waste that is not recycled or composted the next best option is to treat the waste so that energy can be recovered from it. This is a better alternative to sending waste to landfill where it can break down and produce harmful greenhouse gases.

The CIG would procure waste recovery capacity that is sufficient to treat all suitable residual waste arising on the Cayman Islands, so that waste sent to landfill can be minimised. The options appraisal process short listed a number of options that would be suitable for the treatment of residual waste. These are briefly described below.

Waste to Energy (WtE) with or without combined heat and power

In WtE facilities waste is combusted and the resulting energy is recovered through using the combustion gases produced to drive a steam turbine. The majority of the electricity produced is usually exported to the national grid.

Heat in the form of hot water or steam can also be used (e.g. to heat or cool nearby buildings) and where this is done the process is called Combined Heat and Power (CHP). Infrastructure is needed to transfer the heat to users using a pipe network and new boilers for end-users. Laying a pipe network can be expensive and the overall costs depend on the number of end-users who will commit to use the heat, their annual demand, and the distances the heat has to travel.

Outputs from WtE facilities include incinerator bottom ash which can be used in aggregate manufacture and may also contain metals that can be recycled. Air pollution control residues are also produced and these are sent to a hazardous landfill and/ or treatment.

The footprint of a WtE facility can be relatively small when compared to other residual waste treatment facilities and the recovery of energy significantly improves the carbon impact of the waste management solution. The architectural design of WtE facilities is very varied and can range from iconic buildings, industrial buildings or designs that blend with the local landscape and environment.

Disposal

Although the CIG will use landfill as the last option for the management of solid waste, it is acknowledged that there will continue to be a reduced landfill requirement in future for the following reasons:

- ▶ Not all waste can be economically recycled;
- ▶ Not all waste is suitable for recovery;
- ▶ Residual waste treatment facilities produce residues that need to be disposed of; and
- ▶ There will be a need for disposal capacity should facilities be closed for maintenance.

The CIG will therefore consider the feasibility of landfill mining at George Town landfill as a means of extending the life of this facility whilst it is also remediated. Any new landfill facilities will be engineered to modern standards and include containment measures and environmental control facilities for both non-hazardous and hazardous wastes.

Institutional and Regulatory Recommendations

To enable the effective regulation of future waste management services and facilities Amec Foster Wheeler recommends:

- ▶ That the proposed development of major new waste management facilities are subject to a planning process that includes the production of an Environmental Impact Assessment (this is currently consistent with practice on the Cayman Islands);
- ▶ A Government regulatory function is established that is independent of waste management operations;
- ▶ That waste management facilities can operate only with a specific permit/licence issued by the regulator;
- ▶ The permits should establish the operational conditions and environmental standards that each waste management facility must operate in accordance with. The approach to the application of the environmental standards should as far as possible be consistent with those applied to determination of a planning application;
- ▶ Waste facility operators are required to monitor their activities in accordance with the requirements of the permit/licence and report the results of this process to the regulator; and
- ▶ The regulator would scrutinise permits and licence compliance, undertake periodic permit/license reviews, carry out periodic facility assessments and inspections and implement enforcement action in the event of non-compliance. Such enforcement actions could include corrective notices, activity cessation notices, financial deductions and criminal prosecution; and
- ▶ Primary regulation is introduced to bring in to effect the new regulatory regime.

The Caymanian legislative framework for the management of solid waste will require amendment and augmentation to enable the effective regulation of new and alternative waste management facilities that are considered in this National Solid Waste Management Strategy (NSWMS). In particular aspects of the Public Health (Garbage and Refuse Disposal) Regulations 2011 will require revision to enable the delivery of solid waste to non-landfill waste treatment plant. New regulations will be needed to ensure that any waste management facilities are operated and managed to an appropriate standard. Amec Foster Wheeler recommend that this is accomplished through a licensing/ permit system that is overseen by an independent Government regulatory body. Primary legislation would be needed to both introduce the permit and licensing system and empower the regulatory body.