



***GOVERNMENT OF BELIZE
CONSULTANCY TO PREPARE A
NATIONAL SOLID WASTE MANAGEMENT
POLICY AND STRATEGY AND UPDATE
THE NATIONAL SOLID WASTE
MANAGEMENT PLAN***

INCEPTION REPORT

presented by





Integrated Skills

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Project Summary Data

Client	Government of Belize, Ministry of Natural Resources & Agriculture Solid Waste Management Authority (BSWaMA) Market Square, Belmopan Tel/Fax: (501) 802 - 1527
Client Representatives	Mr Gilroy Lewis, Director, BSWaMA Ms Lumen Cayetano, Senior Solid Waste Technician, BSWaMA
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	Prepared by	Reviewed by	Reviewed by
ORIGINAL	NAME M P Betts	NAME N Crick	NAME
DATE 26 th November 2013	SIGNATURE 	SIGNATURE 	



Glossary of Acronyms

APAMO	Association of Protected Areas Management Organizations
BACONGO	Belize Alliance of Conservation NGOs
BAHA	Belize Agricultural Health Authority
BAS	Belize Audubon Society
BELIPO	Belize Institute of Environmental Law and Policy
BSWaMA	Belize Solid Waste Management Authority
BPEO	Best Practicable Environmental Option
BTIA	Belize Tourism Industry Association
BZD	Belize Dollars
CIF	Cost, Insurance & Freight
DOE	Department of Environment
ELV	End-of-Life Vehicle
EU	European Union
GoB	Government of Belize
IDB	Inter-American Development Bank
ISL	Integrated Skills Limited (the Consultant)
JSC	Joint Services Council
kWh	Kilowatt Hours
lb	Pound
Ltd.	Limited
MoH	Ministry of Health
MNRA	Ministry of Natural Resources and Agriculture
MSW	Municipal Solid Waste
MWh	Megawatt Hours
NEMO	National Emergency Management Organization
NGO	Non-Governmental Organisation
PACT	Protected Areas Conservation Trust
PFB	Program for Belize
PSP	Private Service Provider
SWM	Solid Waste Management
ToR	Terms of Reference
TS	Transfer Station
USD	United States Dollars
WEEE	Waste Electrical and Electronic Equipment
WM	Waste Management

CONTENTS

EXECUTIVE SUMMARY	I
1. INTRODUCTION	1
1.1 Overview and Objectives of Assignment	1
1.1.1 Overview	1
1.1.2 Objectives	1
1.2 Progress to Date	2
2. PROJECT BACKGROUND AND CONTEXT	3
2.1 Project Background	3
2.2 Project Context	6
2.3 Institutions and Stakeholders	7
3. ACTIVITIES, RESULTS & RECOMMENDATIONS OF THE INCEPTION PHASE	11
3.1 Activities	11
3.2 Results of the Baseline Review & Analysis	11
3.3 Foreseen Difficulties and Constraints	13
3.4 Preliminary Conclusions & Recommendations	13
3.4.1 Policy and Legislative Framework	13
3.4.2 Institutional / Organisational Arrangements	14
3.4.3 Human Resources and Capacity	16
3.4.4 Data Availability, Monitoring and Reporting	17
3.4.5 Stakeholder Awareness and Communication	17
3.4.6 Financing and Cost Recovery	18
3.4.7 Waste Prevention	21
3.4.8 Waste Recovery and Recycling	24
3.4.9 Waste Segregation, Storage, Collection and Transport	25
3.4.10 Waste Treatment / Processing	28
3.4.11 Final Disposal	30
4. COMMENTS ON THE TERMS OF REFERENCE	32
4.1 General Observations	32
4.2 Comments on Task 1 – National Solid Waste Management Policy	32
4.3 Comments on Task 2 – National Solid Waste Management Strategy	34
4.4 Comments on Task 3 – National Solid Waste Management Plan	35
4.5 Comments on Task 4 – Stakeholder Consultations	36
5. RECOMMENDATIONS FOR CHANGE	37
5.1 Scope of Work / Deliverables	37
5.2 Work Programme	37
ANNEX A – List of Site Visits / Interviews	
ANNEX B – Agenda for the First Stakeholder Workshop	
ANNEX C – List of Workshop Attendees	
ANNEX D – Draft Problem Analysis Matrix	

EXECUTIVE SUMMARY

Overview

This *Inception Report* has been prepared by Integrated Skills Limited (ISL) within the framework of the Belize Solid Waste Management Project (“the Project”) being implemented by the Government of Belize (GoB) in cooperation with the Inter-American Development Bank (IDB). It relates to the Inception Phase of a consulting services assignment (“the Services”) being executed under a contract between GoB and ISL (No. 001-2013/2014) dated September 30th 2013.

In accordance with the agreed work programme, the Consultant’s key experts (Michael Betts and Nick Crick) made an initial visit to Belize between 7th and 25th October 2013. During this period, a number of meetings were held with various stakeholders, including governmental institutions, local governments and with the private sector. Also during this period, site visits to Belize City and other key towns / districts took place to observe solid waste management (SWM) practices and to discuss existing problems and potential measures for improvement with local stakeholders. A list of site visits / interviews conducted during the initial visit is presented in **Annex A**.

Assignment Objectives

According to the ToR, the **main objective** of this consultancy assignment is to:

1. *Design a National Solid Waste Management Policy* that is consistent with the waste management hierarchy, resource recovery and conservation and integrated sustainable solid waste management.
2. *Design a Solid Waste Management Strategy* as part of (1) above in order to deploy the Policy over a twenty year time horizon.
3. *Update the National Solid Waste Management Plan*.

Progress to Date

The contract for this assignment commenced on 1st October 2013. The Consultants have since spent almost three weeks in Belize carrying out a baseline review and analysis of the current situation, and met with a number of key stakeholders including representatives of:

- BSWaMA;
- Various ministries and government agencies (notably the Ministries of Natural Resources & Agriculture; Energy, Science and Technology; Finance; Forestry, Fisheries and Sustainable Development; Health; Local Government; and the Department of Environment);
- Local governments in Belize City, Belmopan, Dangriga, Orange Walk, Punta Gorda, Santa Elena / San Ignacio and San Pedro;
- The private sector (notably Belize Recycling Company Inc.; Belize Waste Control Ltd.; Resource Recovery Belize).

These meetings, together with visits to various localities and existing waste management facilities, have enabled the Consultants to gather further detailed information and conduct a review and assessment of existing waste management conditions and practices in almost all of the main population centres of Belize (the exception being Placencia, which will be visited during the next mission in January 2014).

With the support and assistance of BSWaMA, an initial *Stakeholder Workshop* was also organised and held on 23rd October in Belize City. A copy of the Agenda for the Workshop and a list of Workshop Attendees are presented respectively in **Annex B** and **Annex C**.

Activities

The activities foreseen for the Inception Phase of this assignment were as follows:

- Gather and review all available data, mapping and other relevant information.
- Review existing legislation, institutions, policies and plans.
- Carry out initial stakeholder interviews and field visits.
- Review existing markets for recyclable materials.
- Review and assess existing / planned waste management methods, systems and facilities.
- Prepare an analysis of existing waste sources, types, quantities and flows.
- Prepare an analysis of current financial costs and revenues for SWM facilities / services.
- Organise and conduct a "problem analysis" workshop with key stakeholders.
- Develop preliminary recommendations and a rationale for the National SWM Policy and Strategy.
- Prepare and submit an Inception Report.

Upon submission of this Inception Report, all of the above activities will have been completed except for the analysis of current financial costs and revenues. We propose that this particular analysis is undertaken once a "Waste Flows and Costs Model for Belize" has been developed and populated with the latest available data. Such a model will enable the current and future waste flows, required infrastructure, physical capacities and costs to be estimated and analysed in much more detail. The model will be constructed and progressively developed during Tasks 1 and 2.

Results of the Baseline Review & Analysis

A baseline review and analysis has been undertaken by the Consultants using data and information gathered from:

- Existing reports, legislation, mapping and other relevant documentation;
- One-to-one interviews with selected stakeholders;
- Site visits to various localities and facilities (including the new SWM facilities serving the Western Corridor);
- A first Stakeholder Workshop held on 23rd October.

The primary output from the baseline review and analysis is the draft "Problem Analysis Matrix" presented in **Annex D**. This aims to identify and define clearly all of the significant problems, constraints and deficiencies associated with the existing arrangements for managing solid waste in Belize, and their principal causes and effects.

Main Conclusions & Preliminary Recommendations

Our main conclusions and preliminary recommendations reached during the Inception Phase are summarised in the following table. We emphasise that the conclusions and recommendations set out in the table below are very preliminary in nature, and may be expected to change and evolve as the assignment progresses.

Belize - National SWM Policy, Strategy & Plan – Summary of the Consultants’ Main Conclusions & Preliminary Recommendations		
Area/Activity	Main Conclusions	Preliminary Recommendations
1. Policy & Legislative Framework	<ul style="list-style-type: none"> The existing legislative framework is rather fragmented, ineffective and in need of substantial reform. 	<ul style="list-style-type: none"> Develop a new framework law that is either focussed solely on solid waste management (e.g. a Solid Waste Management Act), or a law that is much broader in scope and which addresses all aspects of environmental protection in a comprehensive manner. Progressively introduce secondary legislation (regulations / by-laws, including legally-binding technical standards and codes of practice) for regulating specific waste-generating products, waste management activities and waste streams.
2. Institutional / Organisational Arrangements	<ul style="list-style-type: none"> Existing institutional and organisational arrangements for SWM at the national level are rather confused / fragmented, with responsibilities not always clearly defined and in some cases overlapping. Existing national institutions are also, for the most part, severely under-resourced. Existing institutional arrangements for municipal SWM collection and street cleaning services at local level are also fragmented, under-resourced and chaotic. With the exception of Belize City, all local authorities are too small to be able to exploit economies of scale in service provision or deliver these services reliably and cost-effectively. 	<ul style="list-style-type: none"> Reform the existing institutional and organisational arrangements at the national level so that: <ul style="list-style-type: none"> One Ministry has overall responsibility for policy formulation / strategic planning and legislation in relation to SWM; An Inter-ministerial Steering Group is established, Chaired by the Lead Ministry, to supervise / co-ordinate / monitor SWM policy and strategy implementation; BSWaMA becomes an autonomous implementing body responsible for organising, procuring and supervising the provision of SWM facilities and services throughout Belize (including hazardous WM facilities and services); A new, autonomous national agency is created (with regional branches) to be responsible for all environmental permitting, monitoring and enforcement throughout Belize (i.e. not just solid waste management). Clarify and rationalise (upscale) the institutional / organisational arrangements for planning, managing and delivering municipal SWM collection and street cleaning services.
3. Human Resources / Capacity	<ul style="list-style-type: none"> The numbers and capacities of human resources currently engaged in SWM activities (in both the public and private sectors) are generally inadequate. 	<ul style="list-style-type: none"> Once agreement in principle has been reached on the future institutional and organisational arrangements for SWM, carry out a detailed human resource and training needs assessment for public sector waste management functions at national, regional and local levels. Establish national vocational qualifications and professional standards, and promote the establishment of an independent professional body for people engaged in SWM activities.
4. Data Availability, Monitoring & Reporting	<ul style="list-style-type: none"> There is a dearth of reliable data and information on waste types and flows, and their fate and impact on public health and the environment. The lack of reliable data and information significant constraint on the long-term planning and development of a more sustainable SWM system. 	<ul style="list-style-type: none"> Develop a national system for classifying and regularly collecting, processing, analysing and disseminating data and information on wastes and their fate. Ensure that in future, all public SWM facilities are equipped with electronic weighbridges and databases that can be accessed and interrogated remotely.

Belize - National SWM Policy, Strategy & Plan – Summary of the Consultants’ Main Conclusions & Preliminary Recommendations		
Area/Activity	Main Conclusions	Preliminary Recommendations
5. Stakeholder Awareness & Communication	<ul style="list-style-type: none"> The current level of stakeholder communication and engagement in relation to SWM leaves quite a lot to be desired. 	<ul style="list-style-type: none"> Develop and implement a stakeholder communications strategy and programme (we understand this is already planned by BSWaMA).
6. Financing / Cost Recovery	<ul style="list-style-type: none"> The costs of constructing and operating SWM infrastructure are met almost entirely by GoB through the MNRA budget. Capital expenditure is heavily reliant on donor financing, in particular from the IDB, and has been focused hitherto on the development of SWM infrastructure in the Western Corridor. Revenues generated by the environmental tax far exceed GoB budgeted expenditures on SWM infrastructure and services. Waste collection and similar environmental services represent a significant expense and financial burden for local authorities. Revenues from existing fees / taxes are not equitably and appropriately distributed amongst local authorities. Apart from Belize City, none of the authorities visited by the Consultants has invested in vehicles and equipment in recent years. The present arrangements for financing and recovering the costs of SWM infrastructure and services are neither desirable from a policy perspective, nor financially sustainable in the long term, and are therefore in urgent need of reform. 	<ul style="list-style-type: none"> The ultimate objective should be to set user fees at levels which recover the full costs of providing and maintaining public SWM facilities and services that meet the required environmental and other performance standards. However, given the history and current situation regarding cost recovery, it is likely that such an objective will take considerable time to achieve, and that a “hybrid solution” will need to be adopted for a transitional period. Such a “hybrid solution” should include: <ul style="list-style-type: none"> A surcharge on power or water utility bills sufficient to recover the full operating costs of managing household and commercial wastes (collection, transport, treatment and final disposal); A reformed environmental tax regime, a part of the revenues from which is earmarked to finance the capital costs of the infrastructure, vehicles and equipment required to manage wastes in a sustainable manner. Changes to the existing environmental tax regime should include: <ul style="list-style-type: none"> Differential tax rates applied to certain goods (both imported and domestically-produced) which, when discarded, create a substantial burden on the environment and / or result in significant public expenditure for their environmentally-sound collection, treatment and disposal; Hypothecation (earmarking) of the resulting revenues so that these are used exclusively for the purpose of financing capital investments in SWM infrastructure, vehicles and equipment. Gradually extend and increase charges and user fees for environmental services to a level where their costs (including capital costs) are fully covered and they become financially sustainable without subvention.
7. Waste Prevention	<ul style="list-style-type: none"> Most waste producers in Belize neither perceive nor bear the true costs of managing their wastes in an environmentally-sound manner, and so they have little reason or incentive to try and avoid or reduce the amount of waste they generate. Moreover, product importers and suppliers, consumers and other waste generators are often not aware of the potential opportunities for, and benefits of, avoiding and / or reducing wastes. However, an area where GoB intervention has no doubt led to a 	<ul style="list-style-type: none"> A combination of informational, promotional and regulatory policies and measures should be introduced in order to incentivise and / or enforce behavioural changes aimed at avoiding and reducing the amounts of waste generated. In the Consultants’ view, the policies and measures which are of particular relevance and offer practical scope for application in Belize are: <ul style="list-style-type: none"> Product taxes and incentives;

Belize - National SWM Policy, Strategy & Plan – Summary of the Consultants’ Main Conclusions & Preliminary Recommendations		
Area/Activity	Main Conclusions	Preliminary Recommendations
	worthwhile reduction in the amount of waste produced is in the area of legislation to control beverage packaging (Returnable Containers Act 2009).	<ul style="list-style-type: none"> - Extended producer responsibility policies; - Green public procurement policies.
8. Waste Recovery & Recycling	<ul style="list-style-type: none"> • As with waste prevention, because most waste producers in Belize pay little or nothing towards the costs of managing their wastes in an environmentally-sound manner, they and other economic actors have little incentive to recover / recycle materials from waste themselves, or to facilitate recovery and recycling of their wastes by others. • Consequently, <i>recovery and recycling of MSW</i> currently occurs only on a very limited scale, and is focused on materials which are easy to sort manually and for which there is a ready market – mainly paper and board from commercial sources, plastics and metals (but not glass). • <i>Other solid waste categories / streams</i> which are currently recovered / recycled on a notable scale are bagasse, citrus processing residues, ELVs, E-waste and batteries (both lead-acid and dry cell). • Increases in the recovery and recycling rate for MSW are likely to be achievable only through the widespread introduction of source segregation and separate collection of recyclable materials. • Expansion of recovery and recycling activities appears to be constrained by a number of factors. These are described in section 3.4.8 and Annex D below. 	<ul style="list-style-type: none"> ➢ Introduce source segregation and separate collection of recyclable materials from MSW in towns and cities. ➢ Assess the scope and potential viability of energy recovery from MSW and other suitable waste streams. ➢ Implement a mix of regulatory and non-regulatory measures in order to promote investment in new recycling facilities and technologies, underpinned by a sustained stakeholder awareness and communication campaign.
9. Waste Segregation, Storage, Collection & Transport	<ul style="list-style-type: none"> • Waste collection and street cleaning services are the aspects of SWM which are of greatest visibility and importance to the general public and, at the moment, these create a rather poor impression in many areas of Belize, especially in suburban and rural areas. • Existing MSW collection services suffer from a number of problems and deficiencies. These are listed in section 3.4.9 below. • The two new transfer stations opened in September this year to receive MSW collected in Belize City and San Ignacio / Santa Elena suffer from some design flaws which impede the efficient operation of the stations and increase the health and safety risks for site staff and visitors. • Similarly, in the Consultants’ opinion, the type of bulk transfer vehicles used to transport MSW from Belize City and San Ignacio / Santa Elena (articulated tractor / top loading semi-trailer rigs with “walking floor” discharge from the semi-trailer) is less than ideal. 	<ul style="list-style-type: none"> ➢ Rationalise and upscale the existing arrangements for organising and managing MSW collection and street cleaning services. ➢ Change the basic method used to store and collect MSW from kerbside collection of small, individual waste containers to a communal waste storage and collection system (thereby substantially increasing the performance and cost-effectiveness of the collection vehicles). ➢ Introduce standardised, large-volume, colour-coded communal waste storage containers for segregated dry recyclable materials and other residual wastes. ➢ Install proper container stances located within a convenient walking distance from householders and other waste producers, and which can be accessed quickly and easily for mechanical emptying by collection vehicles. ➢ Wherever access conditions allow (which means throughout most of Belize except for the Cayes), introduce large-capacity, 3-axle waste collection vehicles equipped with container lifting/emptying mechanisms. ➢ Introduce narrow / compact chassis compaction collection vehicles where access conditions are restricted.

Belize - National SWM Policy, Strategy & Plan – Summary of the Consultants’ Main Conclusions & Preliminary Recommendations		
Area/Activity	Main Conclusions	Preliminary Recommendations
		<ul style="list-style-type: none"> ➤ Extend regular MSW collection service coverage to include all villages / communities located on or close to an all-weather road or highway; ➤ Install transfer-loading systems only where necessary and economically justifiable. ➤ Ensure that future transfer stations are located as close as possible to the centroid of the collection areas which they serve in order to minimise the travel time required for collection vehicles to unload. ➤ Establishing a national system for collecting (and treating – see section 3.4.10 below) healthcare risk waste and other hazardous wastes. ➤ Investigate options for remedying design flaws in existing transfer stations. ➤ Ensure that designs for all future SWM facilities are reviewed independently by someone who has extensive experience of operating such facilities before they are approved. ➤ In future, consider alternative types of bulk waste transfer vehicle which can potentially offer greater operational flexibility / interchangeability, and stability when traversing and discharging on landfill sites.
10. Waste Treatment / Processing	<ul style="list-style-type: none"> • With certain notable exceptions (see section 3.4.10 below), most solid wastes generated in Belize are currently disposed of without any form of processing or pre-treatment. • Medical waste incinerators are installed at eight hospitals but, as far as we have been able to determine, none of them are currently functioning. • The provisions of the Environmental Protection Act and the Hazardous Waste Regulations relating to waste treatment and disposal are not being enforced effectively (presumably because, until very recently, there were no facilities located within Belize capable of receiving and disposing of hazardous wastes in a legal and environmentally-secure manner). • Although the quantities of hazardous and difficult wastes generated in Belize are relatively small, the current situation is unsustainable, especially for a country which aspires to be a major destination for eco-tourism. • Many of the technologies / systems available for treating such wastes are expensive to procure and operate, especially at small scale, and therefore costs and cost-effectiveness should be a prime consideration in planning a national system for their management. 	<ul style="list-style-type: none"> ➤ Introduce and enforce a prohibition on the landfill disposal of all untreated hazardous and difficult wastes unless it can be proven (by the landfill operator), to the satisfaction of the independent regulator, that such untreated wastes are stable and can be landfilled without risk of causing harm to human health or the environment. ➤ The suitability and affordability of different options for handling, treating and disposing of such wastes should be assessed taking into account the prevailing conditions and context of Belize. ➤ Based on the findings of this assessment, establish an integrated national system for collecting, transporting, storing, treating and safely disposing of all hazardous and difficult wastes.

Belize - National SWM Policy, Strategy & Plan – Summary of the Consultants’ Main Conclusions & Preliminary Recommendations		
Area/Activity	Main Conclusions	Preliminary Recommendations
11. Final Disposal	<ul style="list-style-type: none"> • Despite the existence of legislation prohibiting the dumping of wastes, most of the solid wastes generated in Belize have hitherto been disposed of in an uncontrolled manner, resulting in serious adverse impacts on the environment. • Since BSWaMA took over the responsibility for waste transport and disposal, various measures have been taken to improve the situation and this process is still on-going. • Once the remaining facilities foreseen for the Western Corridor have been completed, more than 50% of the solid waste generated in Belize will be disposed of safely at the Mile 24 regional sanitary landfill. • Similar facilities and systems need to be developed to serve the remaining areas of the country. 	<ul style="list-style-type: none"> ➤ Carry out an assessment to determine the optimum type, number, location and size of facilities required to serve the rest of the country. ➤ Based on the results of the assessment, develop additional regional sanitary landfills and / or transfer-loading facilities to serve the northern and southern areas of Belize.

1. INTRODUCTION

1.1 Overview and Objectives of Assignment

1.1.1 Overview

This *Inception Report* has been prepared by Integrated Skills Limited (ISL) within the framework of the Belize Solid Waste Management Project ("the Project") being implemented by the Government of Belize (GoB) in cooperation with the Inter-American Development Bank (IDB). It relates to the Inception Phase of a consulting services assignment ("the Services") being executed under a contract between GoB and ISL (No. 001-2013/2014) dated September 30th 2013.

In accordance with the agreed work programme, the Consultant's key experts (Michael Betts and Nick Crick) made an initial visit to Belize between 7th and 25th October 2013. During this period, a number of meetings were held with various stakeholders, including governmental institutions, local governments and with the private sector. Also during this period, site visits to Belize City and other key towns / districts took place to observe solid waste management (SWM) practices and to discuss existing problems and potential measures for improvement with local stakeholders. A list of site visits / interviews conducted during the initial visit is presented in **Annex A**.

The findings of the Inception Phase are presented in this report, together with an updated programme for the further work on the assignment.

1.1.2 Objectives

According to the ToR, the **main objective** of the consultancy assignment is to:

4. *Design a National Solid Waste Management Policy* that is consistent with the waste management hierarchy, resource recovery and conservation and integrated sustainable solid waste management.
5. *Design a Solid Waste Management Strategy* as part of (1) above in order to deploy the Policy over a twenty year time horizon.
6. *Update the National Solid Waste Management Plan*.

In our Combined Technical & Financial Proposal dated 29th July 2013, we further interpreted the **subsidiary objectives** of the Services as being *inter alia* to:

- Review international, national and local policies and legislation relating to solid waste management and analyse their potential relevance and future implications for Belize.
- Review and assess existing waste arisings and waste management practices, processes, facilities and costs in Belize.
- Develop projections of waste arisings for the various waste streams indicated in the ToR.
- Review the conclusions and recommendations made in previous studies on solid waste and environmental management, and consider / recommend possible modifications.
- Identify and review / evaluate feasible options / measures for managing wastes over the short, intermediate and long term drawing upon experience from elsewhere, in particular other smaller countries.
- Define / elaborate possible waste management scenarios for Belize, and appraise and compare their technical, economic and environmental performance under various sets of conditions and assumptions.



- Recommend a preferred waste management scenario.
- Identify, evaluate and compare options for financing and procuring any additional infrastructure and services that would be needed to implement a preferred waste management system, and recommend a policy and approach in this respect.
- Provide advice on appropriate institutional and organisational structures for the future provision and operation of waste management infrastructure and services.
- Based on the results / conclusions of the above, and in close consultation with BSWaMA and other key stakeholders, develop a National Solid Waste Management Policy and Integrated Strategy, and update the National Waste Management Plan.

1.2 Progress to Date

The contract for this assignment commenced on 1st October 2013. The Consultants have since spent almost three weeks in Belize carrying out a baseline review and analysis of the current situation, and met with a number of key stakeholders including representatives of:

- BSWaMA;
- Various ministries and government agencies (notably the Ministries of Natural Resources & Agriculture; Energy, Science and Technology; Finance; Forestry, Fisheries and Sustainable Development; Health; Local Government; and the Department of Environment);
- Local governments in Belize City, Belmopan, Dangriga, Orange Walk, Punta Gorda, Santa Elena / San Ignacio and San Pedro;
- The private sector (notably Belize Recycling Company Inc.; Belize Waste Control Ltd.; Resource Recovery Belize).

These meetings, together with visits to various localities and existing waste management facilities, have enabled the Consultants to gather further detailed information and conduct a review and assessment of existing waste management conditions and practices in almost all of the main population centres of Belize (the exception being Placencia, which will be visited during the next mission in January 2014).

With the support and assistance of BSWaMA, an initial *Stakeholder Workshop* was also organised and held on 23rd October in Belize City. A copy of the Agenda for the Workshop and a list of Workshop Attendees are presented respectively in **Annex B** and **Annex C**.

The main aims of the workshop were to:

- Introduce the Consultants, and present a brief overview of the approach which is being adopted for undertaking this assignment;
- Provide an introduction to the concept and methodology of "integrated waste management planning"; and
- Identify and define clearly the problems / deficiencies associated with the existing arrangements for managing waste which the National SWM Policy and Strategy will need to address, and to establish a hierarchy of cause and effect relationships for the negative features of the existing arrangements.

The workshop was lively and well attended and, besides establishing a working relationship and on-going dialogue between the Consultants and representatives of a wide range of stakeholders, the workshop also provided vital input to the development of a "Problem Analysis Matrix" (see section 3.2 below and **Annex D**).

2. PROJECT BACKGROUND AND CONTEXT

2.1 Project Background

As already noted, this assignment is being conducted within the framework of the Belize Solid Waste Management Project and is taking place against a background of considerable on-going changes in the way wastes are managed in Belize. The Project is aimed at improving solid waste management practices, reducing environmental pollution and enhancing the image of Belize in the eco-tourism market through better management of its Municipal Solid Wastes.

The current Project phase commenced in 2008 and is scheduled to be completed in 2014. It addresses solid waste management needs along the so-called Western Corridor (Belize City, San Ignacio and Santa Elena), and the islands of Ambergris Caye and Caye Caulker. With financing from the IDB and the OPEC Fund for International Development, the Project is financing infrastructure investments *to improve solid waste disposal* in the aforementioned cities and localities, and services to strengthen BSWaMA as the entity responsible for improving solid waste management across the country.

Major tangible results achieved to date include:

- Closure of a large open dump site close to Belize City (Mile 3);
- Closure of an open dump site close to San Ignacio;
- Design, construction and bringing into operation of a new regional sanitary landfill facility, including access road, to serve the Western Corridor (Mile 24);
- Design, construction and bringing into operation of two new transfer-loading stations to serve Belize City and San Ignacio / Santa Elena.

Further Project components yet to be completed are:

- Closure of open dump sites in San Pedro and Caye Caulker;
- Design, construction and bringing into operation of two new transfer-loading stations to serve San Pedro and Caye Caulker;
- Closure of dumpsites in Belmopan and Burrell Boom and construction of transfer stations.

Some photographs of recently-commissioned Project facilities are shown in **Figure 1 through Figure 4** below. These facilities are already having a profound positive impact on the way in which wastes from Belize City and San Ignacio/Santa Elena are managed, with commensurate benefits in terms of reduced pollution and risks to public health.

The Project scope does not currently include any of the townships and communities located outside the Western Corridor. However, we understand that BSWaMA plans to address the waste disposal needs of remaining areas of the country in due course.

Nor does the Project scope currently address the *containment and collection of MSW*, or the *temporary storage, collection and safe treatment of hazardous and obnoxious wastes*. These are aspects of the existing arrangements for managing solid wastes in Belize which are in need of substantial improvement (see section 3.2 below).

Other *consulting assignments* carried out in recent years under the auspices of the Project, and which are of particular relevance to this assignment, include:

- Strategic Plan for the Solid Waste Management Authority (August 2011);
- Design of Cost Recovery Mechanism for the SWM Project (May 2011);
- Waste Generation and Composition Study for the Western Corridor (May 2011);
- Review of the Existing Legal/Regulatory and Institutional Framework (Feb 2011).

Figure 1: New Regional Landfill Facility for Non-Hazardous Wastes at Mile 24



Figure 2: New Landfill Cell for Stabilised Hazardous Wastes at Mile 24



Figure 3: New Transfer Station Serving San Ignacio / Santa Elena



Figure 4: New Transfer Station Serving Belize City



2.2 Project Context

The project context is the environment in which a project is being undertaken and includes many external influences (political, economic, sociological / demographic, technological, legislative, environmental, etc.). Every project has a unique context. In relation to this particular Project, some of the more important *adverse* contextual influences are:

- A relatively small domestic population of ca. 340,000 residing within a land area of ca. 8,900 square miles, of which roughly 45% live on or near the coast, and along an East-West belt running across the middle of the country (known as the Western Corridor).
- Consequently, the scope for exploiting economies of scale in the provision of infrastructure and services for managing wastes is limited;
- In areas where tourism plays a significant role, large seasonal fluctuations in population levels and therefore the quantities of waste generated;
- For islands located some distance from the mainland, the constraints imposed by the weather and tides on extra-island movement of wastes and recyclable materials;
- A complex and somewhat dysfunctional legal / institutional framework for managing wastes (and for protecting the environment generally);
- High dependence on imported technology and the equipment required to manage wastes in a cost-effective and environmentally-sound manner;
- Lack of local markets for recyclable materials, and high transport costs to reach export markets;
- Long and porous land borders making it difficult to prevent or control the import / export of illegal and / or dangerous goods;
- Limited market size and constraints to creating effective competition in the provision of infrastructure and services for managing wastes by the private sector;
- Limited national pool of human resources trained and experienced in the development and operation of modern waste management facilities and systems;
- An historical resistance by waste producers to paying for essential services such as solid waste management;
- A spectacular but fragile natural environment, with sensitive terrestrial, aquatic and marine ecosystems located in many areas of the country.

On the other hand, some important *positive* influences are:

- With an economy based primarily on agriculture, tourism and services, the quantities of hazardous and difficult wastes generated are relatively small;
- In most cases, the conditions prevailing in the urban areas visited by the Consultants are amenable to the introduction of standardised and more efficient methods of MSW containment and collection, and the segregation and separate collection of recyclable materials at source;
- A paved / all-weather highway network which is, for the most part, of good quality and lightly trafficked, thereby enabling wastes to be transported economically in large-capacity waste collection vehicles over longer distances than would be the case in countries with generally poor road conditions and high traffic densities;



- A high proportion of the population lives in close proximity to a highway (see map below) which will help to facilitate future expansion of waste management service coverage;
- A generally well-educated and literate populace¹ which, on the available evidence, would appear to be broadly receptive to the notion of paying a reasonable fee for better quality waste management services.

Figure 5: Population Distribution



2.3 Institutions and Stakeholders

An overview of the institutions and stakeholders involved (directly or indirectly) in solid waste management related activities, and their respective roles / mission, is presented in **Table 1**. There are various other organisations with an actual or potential interest in solid waste management but, as far as the Consultants have been able to determine, those listed in Table 1 are the principal ones.

A list of attendees at the first stakeholder workshop held on 23rd October is presented in **Annex C**.

¹ Source: UNDP - <http://www.undp.org/content/belize/en/home/countryinfo/#>

Table 1: Overview of Institutions and Stakeholders Involved in SWM

Stakeholder Type / Name	Roles / Mission
<p>Central Government (Ministries):</p> <p>Ministry of Natural Resources and Agriculture</p> <p>Ministry of Forestry, Fisheries and Sustainable Development</p> <p>Ministry of Health</p> <p>Ministry of Energy, Science & Technology and Public Utilities</p> <p>Ministry of Finance and Economic Development</p> <p>Ministry of Labour, Local Government, Rural Development, NEMO and Immigration</p> <p>Ministry of Education, Youth & Sports</p>	<p>→ Formulation of policies & enactment / enforcement of legislation.</p> <p>→ Management of natural resources; Responsible for BSWaMA and BAHA.</p> <p>Enforcement of the Environmental Protection Act, Returnable Containers Act & Hazardous Waste Regulations (through the DOE); Protected areas management; responsible for DOE.</p> <p>→ Enforcement of the Public Health Act; Control of infectious diseases and contamination arising from SWM activities; Management of healthcare & other hazardous wastes.</p> <p>→ National Policy on Energy; Enforcement of the Public Utilities Commission Act (through the Public Utilities Commission); Promotion of energy recovery from waste (biomass).</p> <p>→ Generation and allocation of financial resources for public SWM infrastructure and services; Enforcement of the Environmental Tax Act (through the Comptroller of Customs); Servicing of the IDB loan for the Belize SWM Project.</p> <p>→ National Policy on Local Governance; Enforcement & oversight of the system of local government; Responsible for NEMO.</p> <p>→ Inclusion of SWM & environmental protection in educational curricula.</p>
<p>Central Government (Subordinated Agencies):</p> <p>Belize Solid Waste Management Authority (BSWaMA)</p> <p>Belize Agricultural Health Authority (BAHA)</p> <p>Department of the Environment (DOE)</p> <p>Comptroller of Customs</p> <p>Public Utilities Commission</p> <p>National Emergency Management Organization (NEMO)</p> <p>Statistical Institute of Belize</p>	<p>→ Implementation of policies / legislation enacted by Central Government.</p> <p>→ Overall responsibility for SWM in Belize; Planning, provision & operation of infrastructure for MSW transport & disposal.</p> <p>→ Enforcement of legislation related to food safety, quarantine, plant and animal health; Control of disposal of condemned food, infected animals, international garbage, quarantine waste & similar wastes.</p> <p>→ Control of environmental pollution; Enforcement of legislation related to SWM; Preservation, protection and improvement of the environment.</p> <p>→ Administration of the Environmental Tax Act.</p> <p>→ Economic regulation of the electricity, water, and telecommunications sectors.</p> <p>→ Management and coordination of preparation for, and responses to, national emergencies such as floods and hurricanes. Organising clearance and removal of debris in the event of natural disasters.</p> <p>→ Statistics on population, trade & economy; Statistics on solid waste.</p>



Stakeholder Type / Name	Roles / Mission
<p>Local Government:</p> <p>City Councils (2) & Town Councils (7)</p> <p>Community Councils (12) & Village Councils (180)</p> <p>National Association of Village Councils</p>	<p>→ Local governance in cities, towns & villages</p> <p>→ Coordination, control, management & regulation of the collection and removal of all garbage material from all residential or commercial areas.</p> <p>→ Enactment & enforcement of By-Laws for the cleanliness of streets and other public places; Maintenance of streets, drains and sanitation in general.</p> <p>→ Representation of Village Councils at national level.</p>
<p>Private Sector – WM Companies:</p> <p>PASA Belize Ltd.</p> <p>Belize Waste Control Ltd.</p> <p>Belize Maintenance Limited</p> <p>Belize Recycling Company Inc.</p> <p>Placencia Sanitation Co. Ltd.</p> <p>Resource Recovery Recycling Belize Ltd.</p>	<p>→ Provision of SWM infrastructure, know-how & services.</p> <p>→ Design, construction & operation of waste management infrastructure on behalf of, and under contract to, BSWaMA.</p> <p>→ Collection of MSW in Belize City; Recovery & recycling of materials from waste.</p> <p>→ Street & drain cleaning in Belize City.</p> <p>→ Recovery & recycling of materials from waste.</p> <p>→ Collection & disposal of MSW in Placencia.</p> <p>→ Recovery & recycling of materials from waste.</p>
<p>Private Sector – Industrial & Commercial Waste Producers:</p>	<p>→ Minimisation and recycling of waste; Duty to ensure proper handling, recovery and disposal of waste; Monitoring and reporting on waste production, recovery and disposal.</p>
<p>The Public:</p>	<p>→ Placement of MSW for collection; Minimisation & segregation of MSW at source; Payment of fees / taxes for SWM services; An interested and affected party within the proximity of existing / proposed SWM facilities.</p>
<p>Non-Governmental Organisations (NGOs):</p> <p>Association of Protected Areas Management Organizations (APAMO)</p> <p>Belize Tourism Industry Association (BTIA)</p> <p>The Recycling Network of Belize</p> <p>Programme for Belize (PFB)</p> <p>Protected Areas Conservation Trust (PACT)</p>	<p>→ Representing & promoting specific public & sectoral interests. Lobbying on development, planning and environmental issues.</p> <p>→ Umbrella organisation for protected areas management organisations; protection of the integrity and diversity of Belize’s protected areas system.</p> <p>→ Umbrella organisation for the tourism sector promoting sustainable development of the tourism industry.</p> <p>→ A project run by the BTIA and Resource Recovery Recycling Belize Ltd., which is developing a network of collection centres for paper & cardboard, plastics (except for Styrofoam), dry cell batteries and E-Waste.</p> <p>→ Promotion of the conservation of the natural heritage and wise use of the natural resources of Belize.</p> <p>→ Promotion of the protection, conservation and enhancement of the natural and cultural resources of Belize.</p>



Stakeholder Type / Name	Roles / Mission
Belize Alliance of Conservation NGOs (BACONGO)	→ Umbrella organisation of nine separate environmental & similar bodies based in Belize.
Belize Audubon Society (BAS)	→ Promotion of sustainable management of Belize's natural resources through leadership and strategic partnerships with stakeholders in order to achieve and maintain a balance between the needs of both people and the environment.
Belize Institute of Environmental Law and Policy (BELIPO)	→ Promotion of the development, improvement and enforcement of Belize's environmental laws & policies in a manner that is consistent with international conventions for the conservation and sustainable use of natural resources.
Toledo Institute for Development & Environment (TIDE)	→ Promotion of sustainable use and management of ecosystems within the Maya Mountain Marine Corridor of Southern Belize.

3. ACTIVITIES, RESULTS & RECOMMENDATIONS OF THE INCEPTION PHASE

3.1 Activities

The activities foreseen for the Inception Phase of this assignment were as follows:

- Gather and review all available data, mapping and other relevant information.
- Review existing legislation, institutions, policies and plans.
- Carry out initial stakeholder interviews and field visits.
- Review existing markets for recyclable materials.
- Review and assess existing / planned waste management methods, systems and facilities.
- Prepare an analysis of existing waste sources, types, quantities and flows.
- Prepare an analysis of current financial costs and revenues for SWM facilities / services.
- Organise and conduct a "problem analysis" workshop with key stakeholders.
- Develop preliminary recommendations and a rationale for the National SWM Policy and Strategy.
- Prepare and submit an Inception Report.

Upon submission of this Inception Report, all of the above activities will have been completed except for the analysis of current financial costs and revenues. We propose that this particular analysis is undertaken once a "Waste Flows and Costs Model for Belize" has been developed and populated with the latest available data. Such a model will enable the current and future waste flows, required infrastructure, physical capacities and costs to be estimated and analysed in much more detail. The model will be constructed and progressively developed during Tasks 1 and 2.

3.2 Results of the Baseline Review & Analysis

A baseline review and analysis has been undertaken by the Consultants using data and information gathered from:

- Existing reports, legislation, mapping and other relevant documentation;
- One-to-one interviews with selected stakeholders;
- Site visits to various localities and facilities (including the new SWM facilities mentioned in section 2.1 above);
- The first Stakeholder Workshop held on 23rd October.

The data gathering was undertaken using the basic information check-list presented in **Table 2** overleaf. The Consultants were able to gather information on, and gain a reasonably accurate understanding of, most of the issues listed in this table. However, one important area where further work is needed concerns the current arrangements for financing and recovering the costs of SWM services and facilities. This will be addressed in conjunction with development of the "Waste Flows and Costs Model for Belize" referred to in section 3.1 above.

The primary output from the baseline review and analysis is the draft "Problem Analysis Matrix" presented in **Annex D**. This aims to identify and define clearly all of the significant problems, constraints and deficiencies associated with the existing arrangements for managing solid waste in Belize, and their principal causes and effects.



Table 2: Check-List Used for the Baseline Review & Assessment of the Existing SWM Situation

Regional / Local Characteristics:

- Demographic and socio-economic characteristics
- Land use and water resources
- Environmental characteristics, quality and sensitivity
- Existing transportation networks
- Nature, distribution and stage of development of commerce and industry

Nature and Scale of Waste-Related Issues:

- Sources, types and quantities of wastes
- Current health risks / impacts from waste-related pollution
- Current impacts of wastes on air and water quality
- Extent of land contamination related to existing / past waste management practices
- Occurrence of major incidents involving wastes
- Efficacy of the existing institutional and organisational arrangements for managing wastes
- Current level of activity directed towards resource efficiency, waste minimisation and recycling
- Standard / quality of existing waste storage and collection arrangements
- Standard / quality of waste transport systems
- Quality and adequacy of existing waste processing / treatment facilities
- Standard / quality of existing landfill sites
- Extent of uncontrolled dumping of wastes
- Extent and nature of stockpiling of wastes

Legislation and Enforcement:

- Requirements of existing waste management policies and legislation
- Status and anticipated requirements of impending policies and legislation
- Adequacy of the existing regulatory regime
- Adequacy of existing monitoring arrangements
- Efficacy of the existing arrangements and procedures for enforcement
- Current and proposed environmental quality objectives and emission standards

Public Perceptions and Attitudes:

- Public perceptions and attitudes towards wastes management generally e.g. existing public concerns and expectations
- Is the community willing and able to accept higher financial costs of improved waste management standards?
- Public attitudes to the selection and siting of new waste management facilities
- Attitudes of business to the goals of improved waste management performance and standards

Economic / Financial Issues and Constraints:

- Current arrangements for financing and recovering the costs of wastes management services and facilities
- Scope for private sector involvement in the provision of waste management services and facilities
- Nature and efficacy of any existing economic policy measures / instruments
- Are waste producers willing / able to afford the short-run financial costs of moving to higher standards?
- Is local government able to finance the transition to higher standards and, if so, to what extent?
- Are external sources of finance available in the form of loans and grants?
- Potential for creating competition for the provision of wastes management services and facilities.

3.3 Foreseen Difficulties and Constraints

The support provided to the Consultants by BSWaMA during the Inception Phase has been exceptional. We have also been impressed by the helpfulness and enthusiasm of the various stakeholder representatives met by the Consultants. These experiences bode well for the future progress of the assignment.

In our experience, the greatest challenge will be to try and win consensus and support from representatives of all sectors of Belizean society for the forthcoming National SWM Policy and Strategy, thereby establishing a firm foundation for the subsequent implementation of a range of measures aimed at putting solid waste management in Belize onto a more sustainable footing. However, at this stage, we do not foresee any major difficulties or constraints which might prevent or impede the successful completion of this assignment.

3.4 Preliminary Conclusions & Recommendations

Based on the results of the baseline review and problem analysis, we present in the remainder of this section our preliminary conclusions and recommendations under the following sub-headings:

- Policy and legislative framework
- Institutional / organisational arrangements
- Human resources and capacity
- Data availability, monitoring and reporting
- Stakeholder awareness and communication
- Financing and cost recovery
- Waste prevention
- Waste recovery and recycling
- Waste segregation, storage, collection and transport
- Waste treatment / processing
- Final disposal

For ease of reference, the above sub-headings adopt the same sequence as those contained in the Problem Analysis Matrix presented in **Annex D**.

We emphasise that the conclusions and recommendations set out below are very preliminary in nature, and may be expected to change and evolve as the assignment progresses. They also reflect and take into account the Project background and context described in section 2 above.

3.4.1 Policy and Legislative Framework

In the context of this assignment, a policy is typically understood to mean a “vision” and set of *broad goals and basic principles, instruments and guidelines for managing wastes* which government intends to pursue and implement through a series of actions set forth in a *strategy and implementation plan*. Belize does not yet have such a policy but this deficiency is currently being addressed as a component of this assignment. Once the policy and related strategy and implementation plan have been finalised and adopted, it is inevitable that new and / or revised legislation will be required to give these legal force and provide the necessary powers to implement the actions foreseen in the plan.

However, it is also clear from the baseline review and problem analysis that the existing legislative framework is rather fragmented, ineffective and in need of substantial reform.



The Consultant's preliminary view is that this might best be achieved through the development of a *new framework law* which *inter alia*:

- Provides comprehensive legal definitions for key words and terms relating to SWM which are harmonised with internationally-used definitions;
- Embeds in law the long-term national goals and standards for SWM;
- Embodies and gives legal force to the government's policies and principles relating to waste management (e.g. "the polluter pays principle");
- Provides for the eventual introduction of extended producer responsibility for specified types or categories of products²;
- Provides for the eventual introduction of hypothecated taxes / levies on waste-generating products that have a demonstrable and specific negative impact on the environment and / or the systems required to manage the ensuing wastes in an environmentally-sound manner;
- Sets up a mechanism for monitoring implementation of the national strategy, and determining further actions which may be necessary for achieving national policy objectives and targets;
- Incorporates provisions for progressively introducing secondary legislation (regulations / by-laws, including legally-binding technical standards and codes of practice) for regulating specific waste-generating products, waste management activities and waste streams;
- Defines and assigns institutional competence and responsibilities for policy formulation / strategic planning, implementation and permitting / enforcement at national, regional and local levels;
- Establishes an independent and unified system for controlling / permitting all waste management facilities and activities (including waste collection and transport), and for monitoring and enforcement (including minimum requirements and criteria for inspections);
- Provides for much higher penalties (including fixed penalties) for offences;
- Repeals all existing legislative acts or instruments which are conflicting, irrelevant or obsolete.

Such a framework law might be a law focussed solely on solid waste management (e.g. a Solid Waste Management Act), or a law that is much broader in scope and which addresses all aspects of environmental protection in a comprehensive manner (e.g. an Environmental Protection Act incorporating several chapters or parts with related schedules). The major advantage of the latter approach is that such a broad spectrum framework law would provide the basis for a more integrated and streamlined approach to environmental management and protection in Belize which avoids conflicts and overlap, and which would be much easier to monitor and enforce. But a comprehensive Environmental Protection Act of this kind would of course involve considerably more time and effort to prepare and enact.

3.4.2 Institutional / Organisational Arrangements

As may be seen from **Table 1** and **Annex 4**, the existing institutional and organisational arrangements for SWM are rather confused / fragmented, with responsibilities not always clearly defined and in some cases overlapping. Existing institutions are also, for the most part, severely under-resourced.

² Extended producer responsibility aims to decrease the total environmental impact of a product by making the manufacturer of the product responsible for the entire life-cycle of the product and especially for the take-back, recycling and final disposal.



At the national level, it is vital that legal competence and institutional responsibilities for a) policy formulation / strategic planning and legislation, b) strategy implementation and c) permitting / enforcement are **clearly defined and assigned to separate public entities**. In the Consultant's view (based on experience in more than 70 countries), it is unlikely that implementation and enforcement can ever function effectively if the responsible entities are embedded within a Ministry. Therefore, if SWM infrastructure and services are to be further improved and legislation is to be enforced effectively, it is essential that legal responsibility / competence for implementation on the one hand, and permitting / enforcement on the other, are assigned to institutionally-separate and operationally-autonomous agencies with clear legal mandates, delegated powers and adequate resources.

With this in mind, our preliminary view regarding reform of existing institutional and organisational arrangements *at the national level* is that:

- One Ministry should have overall responsibility for policy formulation / strategic planning and legislation in relation to SWM (the MNRA would seem the obvious choice);
- An Inter-ministerial Steering Group should be established, Chaired by MNRA, to supervise / co-ordinate / monitor SWM policy and strategy implementation;
- BSWaMA should be re-constituted as an autonomous implementing body responsible for organising, procuring and supervising the provision of SWM facilities and services throughout Belize (including hazardous WM facilities and services);
- A new, autonomous national agency should be created (with regional branches) to be responsible for all environmental permitting, monitoring and enforcement throughout Belize (i.e. not just solid waste management).

Under the above institutional structure, BSWaMA would become a wholly-owned, public not-for-profit environmental services utility (akin to Belize Water Services Limited or Belize Electricity Limited), managed and operated along commercial lines and subject to external oversight and regulation. Consideration should also be given to expanding the remit of the new agency responsible for environmental regulation to include land use planning and permitting, because land use and environmental sustainability are closely linked. Such an approach has proved highly effective and successful in other countries.

For example, in Malta (a small country with a population slightly larger than Belize, but with much greater environmental problems and pressures), legal competences and institutional responsibilities for SWM at national level have been clearly defined and separated between:

- The Ministry for Sustainable Development, the Environment and Climate Change, which is responsible *inter alia* for WM policy formulation / strategic planning and legislation (see <http://msdec.gov.mt>);
- The Malta Environment and Planning Authority (MEPA), which is responsible for land use planning and environmental regulation (see www.mepa.org.mt); and
- WasteServ Malta Ltd. (WSML), which is responsible for organising, managing and operating integrated systems for waste management including integrated systems for minimisation, collection, transport, sorting, reuse, utilisation, recycling, treatment and disposal of solid and hazardous waste (see www.wasteservmalta.com).

The legislative and institutional reforms in Malta took place around a decade ago, and have since resulted in a quantum improvement in the financial and environmental sustainability of solid waste management on these small, environmentally fragile islands.

At the local level, the existing institutional arrangements for municipal SWM collection and street cleaning services are also fragmented, under-resourced and chaotic, and this



is clearly having a negative impact on service coverage and quality, resulting in significant environmental problems and public dissatisfaction throughout much of Belize. In particular, it is evident that, with the exception of Belize City, all local authorities are *too small to be able to exploit economies of scale in service provision or deliver these services reliably and cost-effectively*. In the Consultants' opinion, there is no realistic prospect that this situation will improve significantly unless the existing institutional / organisational arrangements for planning, managing and delivering these services are clarified and rationalised.

There are a number of ways in which this might be achieved:

- Transfer the responsibility for planning and managing all MSW collection and related services (including street cleaning) to a newly re-constituted successor organisation to BSWaMA (see above), and out-source service delivery on a regional scale to the private sector through competitive tendering;
- Require / encourage (either by law and / or by means of financial incentives) contiguous local authorities to form regional associations with legal personality, and with delegated responsibilities and powers to plan and manage MSW collection and similar services on behalf of member authorities. Service delivery could be undertaken either directly by the associations using their own equipment and workforces, and / or by out-sourcing to the private sector;
- Establish by statute regional "Joint Services Councils" (JSC) as public entities to take-over legal responsibility for the provision of MSW collection and similar services organised at a regional level. As with municipal associations, service delivery could be undertaken either directly by the JSCs using their own equipment and workforces, and / or by out-sourcing to the private sector.

The above options each have potential advantages and disadvantages. Their suitability / practicability in the context of Belize will be explored during the next phase of the assignment. However, whichever option is eventually selected, it would be essential in the Consultant's view to preserve local involvement and ensure that local stakeholders' interests are formally recognised and represented within any new institutional structure.

The issue of financing and recovering the costs incurred by public institutions engaged in WM activities is discussed in section 3.4.6 below.

3.4.3 Human Resources and Capacity

Our initial baseline review of the existing situation suggests that the numbers and capacities of human resources currently engaged in SWM activities (in both the public and private sectors) are generally inadequate, a conclusion which was also confirmed by the feedback received during the first stakeholder workshop. However, as far as we have been able to determine, a systematic and in-depth assessment of the numbers and capacities of human resources required to perform various public SWM functions satisfactorily has not yet been carried out.

To some extent, the numbers and types of human resources required to operate SWM facilities and deliver SWM services will be estimated by the Consultants using the "Waste Flows and Costs Model for Belize" referred to in section 3.2 above. However, the model will not assess the qualifications and skills that will be required to develop a more sustainable SWM system in Belize. Accordingly, once agreement in principle has been reached on the future institutional and organisational arrangements for SWM, we would recommend that a detailed *human resource and training needs assessment for public sector waste management functions* is conducted at national, regional and local levels.

Likewise we consider that, in order to build a professional cadre specialising in waste management, it will be necessary to establish national vocational qualifications and professional standards, and promote the establishment of an independent professional body for people engaged in WM activities (e.g. Belizean Institute of Waste Management).



3.4.4 Data Availability, Monitoring and Reporting

An oft-quoted adage is "If you can't measure something, you can't manage it."³, and this is certainly true of solid waste management.

Currently, there is a dearth of reliable data and information on waste types and flows, and their fate and impact on public health and the environment. Although various consulting assignments carried out under the auspices of the Project have from time-to-time generated valuable data and information on different aspects of SWM (most recently, in relation to waste generation and cost recovery in the Western Corridor), there is no national system for classifying and regularly collecting, processing, analysing and disseminating data and information on wastes and their fate. This is quite a serious shortcoming and significant constraint on the long-term planning and development of a more sustainable SWM system. Accordingly, this issue will need to be addressed in the forthcoming National SWM Strategy.

To some extent, the dearth of reliable data has no doubt been exacerbated by the lack of any equipment for weighing and recording the types and quantities of solid wastes delivered to SWM facilities, i.e. weighbridges. A weighbridge is now available at the recently-opened regional landfill facility at Mile 24 but, unfortunately, weighbridges are not installed at the two new transfer-loading stations serving Belize City and San Ignacio / Santa Elena. Modern electronic weighbridges and the related computer control systems are relatively inexpensive to purchase and install, but they provide invaluable information not only about day-to-day WM activities but also about long-term trends. We therefore recommend that in future *all public WM facilities are equipped with electronic weighbridges and databases* that can be accessed and interrogated remotely.

3.4.5 Stakeholder Awareness and Communication

Implementing a SWM strategy and plan obviously involves various changes and the achievement of stated policy objectives. In any society or community, the interests and aims of different organisations and individuals do not always coincide. As a consequence, it is usually necessary to overcome a variety of institutional and social barriers if the policy objectives are to be reached. The main purpose of stakeholder communications is to inform stakeholders and respond to their concerns, try and reconcile any conflicting or competing interests, and build consensus for implementing the actions foreseen in the strategy and plan.

In the context of SWM strategy development and implementation, effective stakeholder communications will be required in a variety of ways, for example in order to:

- Facilitate the process of consulting on, reviewing and subsequently updating the Strategy and Plan;
- Obtain information and feedback on key issues from stakeholders during Policy and Strategy development;
- Address concerns and objections, and hopefully win local acceptance and co-operation, with regard to the development of new landfill sites and other necessary WM facilities;
- Facilitate the process of formulating, approving, communicating and implementing the measures relating to cost recovery for waste management services;
- Develop an appreciation and understanding of some of the economic realities and practical constraints of waste management amongst key target groups.

³ Attributed to Peter Drucker, management consultant, educator and author, who invented the concept known as *management by objectives*.

It will be important to distinguish between the needs for *environmental education / awareness-raising* on the one hand, and the needs for *stakeholder relations and communications* on the other. The former mainly involves a constant *one-way process* (i.e. selected concepts, ideas and information are continually presented and transferred to particular target groups such as schoolchildren) aimed at bringing about fundamental long-term changes in social attitudes and behaviour, whereas the latter usually entails a *two-way process* of limited duration intended to generate a specific reaction or response on the part of a target audience or group within a comparatively short time frame, e.g. to identify and address the concerns of the local community in connection with the development of a new waste management facility. Although to some extent inter-dependent, each element requires a different approach and different skills / resources.

Judging solely by the comments and statements made during the first stakeholder workshop, the current level of stakeholder communication and engagement in relation to SWM leaves quite a lot to be desired. We were therefore pleased to learn that BSWaMA has recognised the importance of this issue and has already taken action by appointing a consultant to assist in developing a stakeholder communications strategy and programme. We therefore propose to defer drawing any conclusions or making any recommendations on this particular issue until we have had an opportunity to review the forthcoming stakeholder communications strategy.

3.4.6 Financing and Cost Recovery

Currently, the *costs of constructing and operating SWM infrastructure* are met almost entirely by GoB through the MNRA budget. The actual and estimated expenditures for SWM services within the MNRA budget are summarised in **Table 3**.

Table 3: GoB Expenditure on SWM Services – Actual & Forward Estimates, BZD

Expenditure Type	Actual	Estimated			
	2011/12	2012/13	2013/14	2014/15	2015/16
Capital II Expenditure (budget financed)	132,403	424,982	1,000,000	1,000,000	1,000,000
Capital III Expenditure (donor financed)	4,541,910	8,295,834	7,585,593	7,585,593	7,585,593
Recurrent expenditure	267,395	252,392	275,434	275,434	275,434
Totals	4,941,709	8,973,207	8,861,027	8,861,027	8,861,027

Source: Ministry of Finance – MNRA Program Budget and Forward Estimates, 2013/14 Budget Cycle

As may be seen, capital expenditure is heavily reliant on donor financing, in particular from the IDB, and has been focused hitherto on the development of SWM infrastructure in the Western Corridor.

In terms of *revenue*, the Environmental Tax Act 2001 (as subsequently amended) was originally enacted to generate revenues for the specific purposes of:

- Developing a national solid waste management program;
- Defraying the cost of the disposal of refuse generated by the use of goods referred to in section 3 of the Act (basically all imported goods with the exceptions of certain medical supplies and basic foodstuffs);
- Assisting in the collection and disposal of garbage throughout Belize;
- Cleaning up rivers and canals and other internal waterways;
- Preserving and enhancing the environment; and



- Strengthening the institutional capacity of the Department of the Environment.

Under the Act, an *ad valorem* tax (currently 2%) is applied to the CIF value of all imported goods, with certain exemptions. In 2011/12, the revenue raised by this tax amounted to approximately BZD 21.6 million and, according to GoB estimates, is projected to increase to around BZD 24.5 million in 2013/14. Clearly, revenues generated by the tax far exceed GoB budgeted expenditures on SWM infrastructure and services.

Section 7 of the Act states that the proceeds of the tax shall be placed into a special fund. However, our understanding is that revenues from this tax are simply absorbed into the GoB general revenue budget and are not earmarked or allocated for the purposes stated in the Act. We also understand that the World Trade Organisation (WTO) has raised concerns that the tax is discriminatory by assuming that all imports have adverse environmental effects while all domestic products have no adverse environmental effects, and that therefore the administration of this tax is inconsistent with GATT Article III⁴.

Waste collection and similar environmental services represent a significant expense for local authorities, and all of the local authorities we interviewed reported that they are struggling to find and allocate sufficient funds just to cover the day-to-day costs of operating these services. The main funding sources for local SWM services are municipal revenues generated primarily from local fees and property taxes, and subventions from central government. In towns and cities, residential waste collection and disposal services are provided mainly free of charge to household users. Commercial waste collection services are normally paid for directly by waste producers based on the quantities of waste produced.

Apart from Belize City, none of the authorities visited has invested in vehicles and equipment in recent years and, in most cases, the existing vehicles / equipment are old and in poor condition (it is testimony to the skills of local mechanics that they have been able to keep them running!). Even in Belize City, which has the greatest concentration of wealth and commercial activity in the country, the two Private Service Providers (PSPs) providing waste collection and sanitation services are currently owed large sums of money by Belize City Council.

If Belize is to achieve an integrated and environmentally sustainable national SWM system, it is vital that the revenues generated and allocated for this purpose are sufficient to be able to meet the full costs (including capital depreciation / debt servicing) of developing and operating such a system. Clearly, the present arrangements for financing and recovering the costs of SWM infrastructure and services are neither desirable from a policy perspective, nor financially sustainable in the long term, and are therefore in urgent need of reform.

Charging for the provision / use of SWM facilities and services is important not only in order to generate revenues to cover their costs, but also because this helps to instil a sense of value amongst service users and consumers, and to create an incentive to reduce the amount and / or the polluting characteristics of the wastes generated. Experience elsewhere suggests that progressively raising fees / tariffs for the use of waste management facilities / services to levels which reflect their true long-term cost to society is one of the most effective ways of encouraging environmentally-desirable behaviour, and ensuring that the necessary infrastructure and services can be financed. This is the philosophy underlying the "polluter pays principle".

The ultimate objective should therefore be to set user fees at levels which recover the full costs of providing and maintaining public SWM facilities and services that meet the

⁴ GATT Article III states that Members may not use internal measures to discriminate between domestic goods and those imported from Members. The WTO replaced GATT, as the organisation overseeing the multilateral trading system, on 1 January 1995.

required environmental and other performance standards. However, given the history and current situation regarding cost recovery, it is likely that such an objective will take considerable time to achieve, and that a “hybrid solution” will need to be adopted for a transitional period.

Ideally, a charging policy and revenue collection mechanism for SWM services should be:

- *Proportionate* in relation to the amount of waste requiring public management;
- *Equitable* in terms of the ability-to-pay;
- *Efficient* in terms of the net revenues raised (i.e. after deduction of administrative costs); and
- *Difficult to evade* in the sense that an effective sanction is readily available in the event of non-payment.

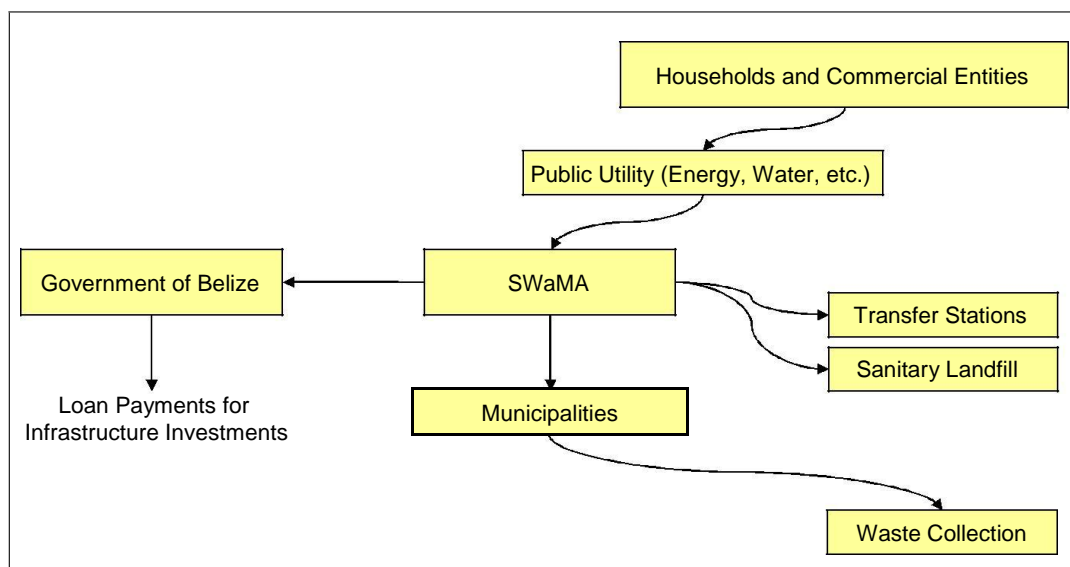
Unfortunately, such an ideal mechanism does not exist and all methods of charging for SWM services represent a compromise.

In a recent study conducted for BSWaMA⁵, the following options for recovering the costs of SWM services were evaluated and compared:

1. A dedicated portion of the property tax for private persons and of the trade license fees for businesses;
2. Direct solid waste service fees;
3. Tipping fees;
4. A surcharge on power or water utility bills;
5. Direct billing of users by a private sector operator;
6. Prepaid bags;
7. Direct quantity-based billing at the point of collection.

The consultant recommended adopting options 1 and 4 above, and also using option 3 as the payment procedure for commercial entities arriving at the landfill gate. The payment scheme envisaged by the consultant for option 4 is illustrated in **Figure 6**.

Figure 6: Payment Scheme Envisaged for the Utility Bills Option



⁵ Design of Cost Recovery Mechanism for the Solid Waste Management Project for the Western Corridor, Belize, C.A. 2056/OC-BL, Final Report prepared by Hydroplan GmbH, May 2011.



We generally concur with the above recommendation. However, as mentioned earlier, our preliminary thinking is that a “hybrid solution” should be adopted for a transitional period comprising:

- A *surcharge on power or water utility bills* sufficient to recover the *full operating costs* of managing household and commercial wastes (collection, transport, treatment and final disposal);
- A *reformed environmental tax regime*, a part of the revenues from which is earmarked to finance the *capital costs of the infrastructure, vehicles and equipment* required to manage wastes in a sustainable manner.

Changes to the existing environmental tax regime would include:

- *Differential tax rates* applied to certain goods (both imported and domestically-produced) which, when discarded, create a substantial burden on the environment and / or result in significant public expenditure for their environmentally-sound collection, treatment and disposal;
- *Hypothecating (earmarking) the resulting revenues* to be used exclusively for the purpose of financing investments in SWM infrastructure, vehicles and equipment.

Consideration might also be given to broadening the environmental tax base and channelling the resulting revenues to an extra-budgetary *state environmental fund*. Such funds have been applied very successfully in some countries as a transitional means of financing capital investments (but not operating expenditures) for environmental protection in both the public and private sectors, whilst charges and user fees for environmental services are gradually extended and increased to a level where their costs (including capital) are fully covered and they become financially sustainable without subvention.

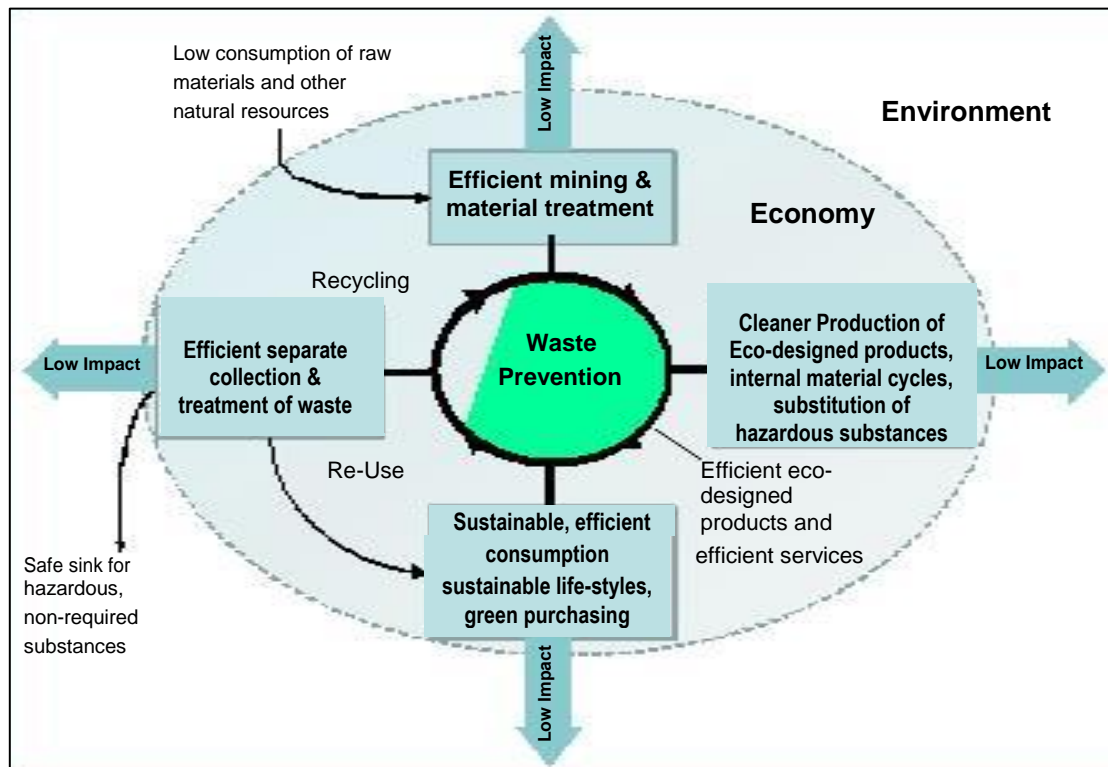
3.4.7 Waste Prevention

Waste prevention encompasses a range of policy options and measures, and has a broad range of benefits. Targeting waste production at source reduces the amount and / or toxicity of waste before recycling, composting, energy recovery and landfilling become options. Waste prevention also includes measures to reduce the adverse characteristics and impacts of the generated waste on the environment and human health.

Waste prevention can be achieved by reducing the quantity of material used in the creation of products and increasing the efficiency with which products, once created, are used. Preventing waste by limiting unnecessary consumption and by designing and consuming products that generate less waste are strict forms of waste avoidance. Waste prevention also encompasses actions that can be undertaken once a product reaches its end-of-life: rather than discarding the product, the final user should consider re-use, repair or refurbishment as options. Extending a product’s lifetime or considering options like re-use are also forms of prevention through diversion of waste flows.

A comprehensive waste prevention policy and programme not only concerns the waste management sector but also the mining sector and productive industries, manufacturers, importers, designers and service providers, and public and private consumers (see **Figure 7**). Consequently, all economic sectors and actors may be considered as stakeholders in the preparation and implementation of a waste prevention programme.

Waste prevention is positioned at the top of the Waste Management Hierarchy, and is therefore considered as preferable to all other methods of managing waste. Currently, because most waste producers in Belize neither perceive nor bear the true costs of managing their wastes in an environmentally-sound manner, they have little reason or incentive to try and avoid or reduce the amount of waste they generate. Moreover, product importers and suppliers, consumers and other waste generators are often not aware of the potential opportunities for, and benefits of, avoiding and / or reducing wastes.

Figure 7: Scope of Waste Prevention (adapted from EEA 2007⁶)


However, one area where government intervention has no doubt led to a worthwhile reduction in the amount of waste produced is in relation to beverage packaging. The Returnable Containers Act 2009 states that a deposit on beverage containers (a separate, sealed glass, metal or steel bottle or can used for containing one US gallon or 3.8 litres or less at the time of sale of a beverage intended for use or consumption in Belize) shall be collected by all distributors and dealers at the time of sale or distribution. "Beverage" is defined in the Act as carbonated soft drinks, beer and other malt products. Importantly, the scope of the Act does not include non-beverage or plastic containers.

We have not been able to obtain detailed data on the quantities and types of packaging materials produced, imported or consumed in Belize but, according to "Resource Recovery Recycling Belize Ltd", there are approximately 1 million beverage containers discarded every month⁷. There would therefore appear *prima facie* to be considerable potential for further reducing the amount of packaging material arising as waste, as well as increasing the amount captured for subsequent recycling.

Policies and measures for waste prevention and reduction fall into three broad categories:

Informational policies and measures aimed at changing behaviour and making informed decisions, including:

- **Awareness campaigns**
- **Information on waste prevention techniques**
- **Training programmes for key stakeholders**
- Eco-labelling

⁶ EEA - European Environment Agency: Belgrade Report 2007

⁷ <http://www.resourcerecoverybelize.com/about-us/recycling-in-belize/>



Promotional policies and measures, which incentivise behavioural change and providing financial and logistical support for beneficial initiatives, including:

- **Support for voluntary agreements**
- **Promotion of reuse and repair**
- **Promotion of environmental management systems**
- Clean consumption incentives
- Promotion of research and development

Regulatory policies and measures, which enforce limits on waste generation, expand environmental obligations and impose environmental criteria on public contracts, including:

- Planning measures
- **Taxes and incentives**
- **Extended producer responsibility policies**
- **Green public procurement policies**
- Eco-design requirements

In principle, all of the above could be considered for introduction and application in Belize. However, taking into account the context and prevailing conditions in Belize, we have highlighted those policies and measures which we believe offer practical potential for application and which might therefore form components of a National SWM Policy and Strategy. Of particular relevance in our view are the three regulatory areas highlighted above. With respect to extended producer responsibility, the following product-related waste categories / streams should be considered as potential candidates for inclusion within the scope of a nationwide producer responsibility scheme:

- Used packaging materials (including plastic shopping bags)
- Used batteries and accumulators
- Used mineral and cooking oils
- End-of-life consumer durable and electrical / electronic goods (E-Waste)
- Used tyres
- End-of-life vehicles
- Pesticides and herbicides

The details of such a scheme would need to be negotiated and agreed between the Government, and industry / producer groups or trade associations representing the producers, importers and distributors of the products giving rise to the above-listed waste categories / streams.

In the Consultants' opinion, the key considerations for selecting and applying strategic measures to encourage waste prevention and reduction should be to:

- Focus on those stages in the product life cycle over which the GoB could reasonably expect to be able to exert some practical influence, namely local manufacture, import, local distribution, consumption, discard, collection, treatment and final disposal;
- Concentrate on those sources and types of waste which, by virtue of their volume and/or polluting potential, constitute a significant environmental, social or economic burden on the community;
- Allocate, as far as practicable, the full long run costs of managing particular waste streams directly onto the waste producer;



- Shift, as far as practicable, the primary responsibility for managing certain problematic waste streams onto those who, directly or indirectly, contribute to the production of those wastes;
- Retain market flexibility and consumer choice;
- Avoid measures with the potential to disrupt or distort severely the existing patterns of distribution and consumption, or to erode significantly the competitive standing of the Belizean economy;
- Minimise the overall administrative burden and financial costs to the GoB;
- Exploit the position of the GoB as a major purchaser of goods and services, owner and operator of waste management facilities and services, and promoter of standards and values;
- Only consider introducing measures which have been applied with some demonstrable degree of success under comparable circumstances elsewhere;
- In the case of economic measures, maintain fiscal neutrality⁸;
- Intervene only where there is clear evidence to indicate that wastes are being produced and disposed of excessively due to a failure or distortion in the relevant market(s);
- Utilise direct regulation only as a last resort (although the threat of regulation can be a remarkably persuasive tool).

3.4.8 Waste Recovery and Recycling

As in the case of waste prevention, because most waste producers in Belize pay little or nothing towards the costs of managing their wastes in an environmentally-sound manner, they and other economic actors have little incentive to recover / recycle materials from waste themselves, or to facilitate recovery and recycling of their wastes by others.

Recovery and recycling of MSW currently occurs only on a limited scale, and is focused on materials which are easy to sort manually and for which there is a ready market – mainly paper and board from commercial sources, plastics and metals (but not glass). These activities are undertaken by scavengers, a small number of private scrap dealers, and by operatives using manual picking and sorting methods undertaken in designated areas at the two new transfer-loading stations serving Belize City and San Ignacio / Santa Elena. Collectively, these activities probably account for no more than a few per cent of the total quantity of MSW generated in Belize.

Other solid waste categories / streams which are currently recovered / recycled on a notable scale include:

- Most of the waste remaining from sugar cane processing (bagasse) of which just over 400,000 tonnes was produced in 2010. Of this, approximately 75% was used to power steam turbines to generate 97,961 MWh of electricity and 456,270 tonnes of low pressure steam (used in boilers);⁹
- Part of the waste remaining from citrus fruit processing which is used to generate power in a 2MW cogeneration facility;
- End-of-life vehicles (ELVs);
- E-Waste;

⁸ Fiscal neutrality describes the notion that a tax should not distort economic behaviour, and is generally achieved when a combined set of government spending and taxing measures produces no net impact on aggregate demand.

⁹ Source: National Energy Policy Framework 2011.



- Batteries (lead-acid and dry cell).

Based on statements made to the Consultants during one-to-one interviews and the results of the first stakeholder workshop, the expansion of recovery and recycling activities appears to be constrained by a number of factors including:

- Domestic market outlets for most types / grades of recyclable material either do not exist or are very weak;
- A lack of stable, long-term export markets for some types / grades of recyclable materials;
- High costs for collection, segregation and shipment of some recyclable materials to export markets;
- Apart from the Returnable Containers Act (which is primarily a waste prevention measure), legislative support and economic incentives to encourage greater recovery and recycling do not exist;
- Manufacturers, importers and distributors of products giving rise to specific product-related waste streams are not obliged to take-back the wastes resulting from their products for subsequent re-use / recycling;
- Apart from one or two areas such as San Pedro, Ambergris Caye, convenient and easily-accessible facilities for dropping off recyclable materials separated from household waste do not exist.

Further substantial increases in the recovery and recycling rate for MSW are achievable only through the widespread introduction of source segregation and separate collection of recyclable materials in towns and cities (see section 3.4.9 below)¹⁰. Further substantial increases in the recovery and recycling of other types of solid waste are likely to require the introduction of a mix of regulatory and non-regulatory measures in order to promote investment in new recycling facilities and technologies, underpinned by a sustained stakeholder awareness and communication campaign.

3.4.9 Waste Segregation, Storage, Collection and Transport

Waste collection and street cleaning services are the aspects of SWM which are of greatest visibility and importance to the general public and, at the moment, these create a rather poor impression in many areas of Belize, especially in suburban and rural areas.

Common problems and deficiencies with the existing *MSW collection services* include:

- Inadequate service coverage and quality;
- A lack of standardised waste storage containers of an appropriate size, type and quality which are capable of being mechanically emptied;
- Inappropriate and insufficient vehicles and equipment;
- Poor organisation and inefficient working methods;
- Inadequate maintenance of vehicles, equipment and containers;
- Poor condition of vehicles, equipment and containers (see **Figure 8** and **Figure 9**);
- Except in a few areas, no systems for source-segregation, separate storage and collection of recyclable materials and hazardous wastes (including healthcare risk wastes).

¹⁰ We also note that the "National Energy Policy Framework 2011" envisages that 50% of the waste generated in Belize City and surrounding areas could be collected for electricity generation. In our view, the calculations on which this vision is based are flawed, and recovery of energy from MSW on this scale is unlikely to be economically viable at current energy prices. However, the technical feasibility and economic viability of recovering energy from MSW and other wastes will be investigated during the next phase of this assignment.

Figure 8: Large Capacity 3-axle Collection Vehicle Used in Punta Gorda



Figure 9: Small Capacity 2-axe Collection Vehicle Used in Punta Gorda





As already stated in section 3.4.2 above, the Consultant believes that the only way in which these services could be substantially and cost-effectively improved in the near future is by changing and up-scaling the existing arrangements for organising and managing these services, and involving the private sector to a greater extent than at present.

Other possible measures for upgrading and improving the performance and cost-effectiveness of *MSW waste collection services* include:

- Changing the basic method used to store and collect MSW from kerbside collection of small, individual waste containers to a communal waste storage and collection system (thereby substantially increasing the operational performance and cost-effectiveness of the collection vehicles);
- Introducing standardised, large-volume, colour-coded communal waste storage containers for segregated dry recyclable materials and other residual wastes;
- Installing proper container stances located within a convenient walking distance from householders and other waste producers, and which can be accessed quickly and easily for mechanical emptying by collection vehicles;
- Wherever access conditions allow (which means throughout most of Belize except for the Cayes), introducing large-capacity, 3-axle waste collection vehicles equipped with container lifting / emptying mechanisms;
- Using narrow / compact chassis compaction collection vehicles where access conditions are restricted;
- Extending regular MSW collection service coverage to include all villages / communities located on or close to an all-weather road or highway;
- Installing transfer-loading systems only where necessary and economically justifiable, and ensuring that transfer stations are located as close as possible to the centroid of the collection areas which they serve in order to minimise the travel time required for collection vehicles to unload;
- Establishing a national system for collecting (and treating – see section 3.4.10 below) healthcare risk waste and other hazardous wastes.

All of the above measures would of course require substantial new investment.

With regard to the *transport of MSW*, until recently, the universal practice has been to transport all MSW collected to the final disposal point directly in the collection vehicle. However, since the opening of two new transfer stations in September this year (see **Figure 3** and **Figure 4** above), all of the MSW collected in Belize City and San Ignacio / Santa Elena has been transported to the new regional sanitary landfill at Mile 24 in bulk transfer vehicles.

While the transfer stations are essential components of the new regional SWM system for the Western Corridor, in our opinion, they both suffer from some fundamental design flaws which impede the efficient operation of the stations and increase the health and safety risks for site staff and visitors alike. Accordingly, we recommend that:

- Options for remedying the aforementioned design flaws are investigated as a matter of urgency; and
- The proposed designs for all future SWM facilities are reviewed independently by someone who has extensive experience of operating such facilities before they are approved.

Similarly, in our opinion, the type of bulk transfer vehicles used to transport MSW from Belize City and San Ignacio / Santa Elena (articulated tractor / top loading semi-trailer rigs with “walking floor” discharge from the semi-trailer) is less than ideal. On a landfill site, unless ground conditions are close to perfect, this type of vehicle can be unstable

and, unless a small loading shovel is provided to remove the waste as it is discharged, the walking floor has insufficient purchase on the waste to push it clear of the semi-trailer or to move the vehicle forward (see **Figure 10**). We therefore recommend that, in future, *alternative types of bulk waste transfer vehicle are considered* which can potentially offer greater operational flexibility / interchangeability, and stability when traversing and discharging on landfill sites.

Figure 10: Bulk Transfer Vehicle Discharging MSW at Mile 24 Sanitary Landfill



3.4.10 Waste Treatment / Processing

Currently, most solid wastes generated in Belize are disposed of without any form of processing or pre-treatment¹¹. Notable exceptions are:

- Small-scale / home composting of organic household wastes in some rural communities;
- Aerobic treatment (composting) of solid residues resulting from the processing of citrus fruit (peels, pulp and seeds) to produce soil conditioner, which is given to farmers free-of-charge;
- Processing (sorting, cleaning, baling, etc) of recyclable materials (paper and board, plastics, metals) recovered from household and commercial wastes prior to shipment;
- Processing of ELVs prior to shipment;
- Incineration (as necessary) of infected animals, condemned food, confiscated products and similar wastes in a facility owned by the Belize Agricultural Health Authority (BAHA).

There are also waste incinerators installed at a number of hospitals but, as far as we have been able to determine, none of them are currently functioning.

According to an assessment undertaken in 2008¹², the following hospitals have incinerators installed:

¹¹ By treatment, we mean a controlled physical, thermal, chemical or biological process that changes the characteristics of the waste in a beneficial way.

¹² Belize National Medical Waste Management Assessment, Pan American Health Organisation, 2008 – <http://www.bvsde.paho.org/bvsacd/infviaje/residuos/041923/041923-114/hospitalesBelize.pdf>



- Karl Heusner Memorial Hospital;
- Universal Health Services Hospital;
- Northern Regional Hospital;
- Corozal Community Hospital;
- Western Regional Hospital;
- San Ignacio Hospital;
- Southern Regional Hospital;
- Punta Gorda Hospital.

Collectively, the above-listed facilities represent a substantial capital investment which has, in effect, been wasted.

In some countries, notably in all EU countries, all wastes must be pre-treated before final disposal to landfill. Under EU legislation, any process used to pre-treat waste must:

- (a) Reduce the wastes volume; or
- (b) Reduce its hazardous nature; or
- (c) Facilitate its handling; or
- (d) Enhance its recovery.

Treatment processes range between the simple and inexpensive (for example, baling of waste paper to reduce its volume / increase its density prior to shipment to an end user), through to the complicated and expensive (for example, Mechanical Biological Treatment, Thermal Treatment, Anaerobic Digestion or Physico-Chemical Treatment).

There are some types / categories of waste which, in order to protect public health and / or the natural environment, really should be treated prior to final disposal. These include:

- All hazardous wastes (sometimes referred to as 'special' wastes);
- Difficult wastes.

Definitions and classifications of waste vary from country-to-country. In Belize, under the Hazardous Waste Regulations 2009, "hazardous wastes" are defined as meaning any material or substance characterized as being toxic, corrosive, flammable, reactive, explosive, infectious or pathogenic that may pose a threat to the environment and human health, and includes wastes that are:

- (a) Listed in Table 1 of the Schedule [to the Regulations]; or
- (b) Defined by the criteria specified in Table 2 of the Schedule [to the Regulations];
or
- (c) Listed in Annex 1 of the Basel Convention on the Transboundary Movement of Hazardous Waste.

Part VI of the aforementioned Regulations prohibits the disposal of liquid hazardous waste in a landfill, and also prescribes certain technical requirements for landfills in which any solid hazardous wastes are deposited. Rather curiously, the legal responsibility for determining whether or not a hazardous waste is restricted from landfill disposal pursuant to the Regulations rests with the waste generator, not with the landfill operator.

In addition, Part IV of the Environmental Protection Act (as amended) prohibits the dumping, disposal or deposit of any garbage, refuse, toxic substances or hazardous wastes in any place that may directly or indirectly damage or destroy flora or fauna, or pollute water resources or the environment.



In any event, the relevant provisions of the Environmental Protection Act and the Hazardous Waste Regulations are clearly not being enforced effectively (presumably because, until very recently, there were no facilities located within Belize capable of receiving and disposing of hazardous wastes in a legal and environmentally-secure manner).

The term “difficult waste” has no statutory definition but is generally understood to mean a non-hazardous waste that is obnoxious, can cause a nuisance or has properties which cause it to require extra care in handling and disposal (for example, condemned foodstuff, slaughterhouse wastes, quarantine wastes, dead domestic animals, end-of-life tyres). Although not classified as hazardous, such wastes are usually best treated in an appropriate way in order to reduce or eliminate their objectionable characteristics.

The quantities of hazardous and difficult wastes generated in Belize are relatively small. In one sense, this is a distinct advantage because the risks of serious damage to human health or the environment through illegal or inappropriate handling and disposal are also correspondingly small. Nevertheless, the current situation is unsustainable, especially for a country which aspires to be a major destination for eco-tourism. We have therefore concluded that *Belize needs to establish an integrated national system for collecting, transporting, storing, treating and safely disposing of all hazardous and difficult wastes.*

Many of the technologies / systems available for treating such wastes are expensive to procure and operate, especially at small scale, and therefore costs and cost-effectiveness should be a prime consideration in planning a national system for their management. During the next phase of this assignment, the Consultants will identify different options for handling, treating and disposing of such wastes, and assess their suitability and affordability taking into account the prevailing conditions and context of Belize.

3.4.11 Final Disposal

Despite the existence of legislation prohibiting the dumping of wastes, most of the solid wastes generated in Belize have hitherto been disposed of in an uncontrolled manner, resulting in serious adverse impacts on the environment (for example, see **Figure 11** below). Open dumping and burning of waste has been the standard approach to solid waste disposal throughout the country. The burning of waste is typically done in open low-temperature fires thereby polluting ground water, soil and air, and is also sometimes responsible for uncontrolled fires.

However, since BSWaMA took over the responsibility for waste transport and disposal, various measures have been taken to improve the situation and this process is still ongoing. The regional sanitary landfill opened recently at Mile 24 (described in section 2.1 above) constitutes a major step forward in the development of a more sustainable system for managing solid wastes. Once the remaining transfer facilities foreseen for the Western Corridor have been completed, more than 50% of the solid waste generated in Belize will be disposed of safely at the Mile 24 sanitary landfill, enabling numerous uncontrolled dumpsites to be closed and remediated.

The challenge for the future will be to develop similar facilities to serve the remaining areas of the country. In the Consultants’ opinion, and subject to reforming the system for collecting MSW as outlined in section 3.4.9 above, this will require the development of one or possibly two additional regional sanitary landfills and / or transfer-loading facilities to serve the northern and southern areas. The optimum type, number, location and size of facilities required to serve the rest of the country is an issue which the Consultants will address in the next phase of this assignment, using the “Waste Flows and Costs Model for Belize” referred to in section 3.1 above.

Figure 11: Uncontrolled Dumpsite Serving Dangriga and Surrounding Area¹³



¹³ Located Near the Junction of the Hummingbird and Southern Highways

4. COMMENTS ON THE TERMS OF REFERENCE

4.1 General Observations

The outputs / deliverables specified in the ToR for this assignment comprise a series of reports, including this Inception Report. As specified, the remaining reports are required to consist of successive versions (preliminary, draft and final) of the National SWM Policy, Strategy and Plan.

Reports prepared by a consultant on behalf of a client are normally structured and written in a way that presents the consultant's expert knowledge, analysis, findings and recommendations concerning a particular problem or issue, which the client must consider and then decide upon a course of action. The outputs and findings of the consultant are not necessarily conclusive or final, but tend to be open ended and more complex (for example, a range of possible options or recommendations for action which the client must consider and eventually act upon). Ultimately, such reports are the means by which the consultant communicates to the client the actions he or she believes could or might be taken in order to achieve a desired outcome or goal.

However, in our opinion, a national policy, strategy and plan of any kind is the means by which the government communicates to the public and other stakeholders the principles and actions that it intends to apply and implement in order to achieve an explicitly stated outcome or goal. This requires a completely different style of writing and presentation, as illustrated by the following two statements:

1. "The consultant recommends that a new framework law for the environment is enacted that is broader in scope than existing legislation, and which addresses all aspects of environmental protection in a comprehensive and integrated manner".
2. "The Government intends to enact a new framework law for the environment that will be broader in scope than existing legislation, and which will address all aspects of environmental protection in a comprehensive and integrated manner".

The former statement is simply a consultant's recommendation, whereas the latter is a clear statement of intent by the Government to implement a particular course of action. Although it is not uncommon for national SWM policies and strategies to take the form of (and be published as) a consultant's report¹⁴, we believe this is the wrong approach which might be interpreted by some stakeholders as indicating a lack of ownership or commitment on the part of the GoB.

We therefore recommend that the National SWM Policy, Strategy and Plan for Belize are written and presented in a way that conveys to the reader the impression that *these have been developed by the GoB*, and constitute the *GOB's commitment to implementing a clearly stated policy and course of action aimed at putting solid waste management in Belize onto a more sustainable footing*. This means *inter alia* that the Consultants' name and role in their preparation should not be mentioned in the Policy, Strategy and Plan (at least, not in the final approved and published versions).

4.2 Comments on Task 1 – National Solid Waste Management Policy

The scope of this Task specified in the ToR includes:

1. Background and Situation analysis;
2. Rationale;
3. Policy Goals, Purpose and Framework;

¹⁴ For example, the "National Waste Management Strategy for Grenada", published in April 2003, and downloadable from <http://www.gswma.com/strategy.htm>



4. Guiding Principles;
5. Policy Context and linkages to other National Policies on Sustainable Development and Environment, Tourism, Healthcare, Agriculture, Land Use Policy, Energy, among others; establish policies for local government bodies within the National Solid Waste Management Policy framework;
6. Policy Instruments/Tools: public education and awareness; enabling legal, regulatory and institutional framework for sound waste management; economic incentives and instruments; sustainable financing mechanisms; private sector participation and partnerships.

We have reviewed various GoB policies published in recent years (specifically policies relating to energy, food and agriculture, gender, land use, local governance, tourism and water resources management), and there is a wide disparity between them in terms of purpose, scope, contents, style and length. Some go far beyond a simple statement of government policy on a particular issue, and include detailed analyses, proposals for change, strategies, actions, recommendations etc. What is noticeable is that each of the existing policies published by GoB appears to have been developed in isolation, without any consideration of, linkages to, or integration with other relevant policies.

In our view, a National SWM Policy should be a concise document which presents the government's "vision" and set of overarching principles, strategic goal / objectives and policy guidelines for the future management of wastes throughout the country. Accordingly, we propose to adopt the following scope and structure for the National SWM Policy:

- Background and Existing Situation (short overview)
- Policy Purpose, Goal and Objectives (with links to other relevant national policies)
- Overarching Principles to be Applied for the Future Management of Solid Wastes
- Policy Guidance (including qualitative and quantitative targets) for:
 - Legislative reform
 - Institutional reform and strengthening
 - Human resources development and capacity building
 - Improving data availability, monitoring and reporting
 - Stakeholder awareness and communication
 - Financing and cost recovery
 - Waste prevention
 - Waste recovery and recycling
 - Waste segregation, storage, collection and transport
 - Waste treatment / processing
 - Final disposal of wastes
- Policy Implementation, Monitoring and Review

We also propose that:

- Point 6 of the specified scope for this Task (Policy Instruments/Tools) is dealt with as a component of the National SWM Strategy rather than in the Policy because the application of such instruments / tools would in practice constitute measures for achieving the Policy goals;
- The final version of the National SWM Policy (or at least an advanced draft) is completed and approved by key stakeholders before the Consultants commence work on developing the National SWM Strategy.

4.3 Comments on Task 2 – National Solid Waste Management Strategy

The scope of this Task specified in the ToR includes strategies and targets for:

1. Waste avoidance and minimization;
2. Reduction, reuse and recycling of waste;
3. Source separation of waste;
4. Promotion of resource recovery activities, such as composting and energy from waste;
5. Reduction in overall waste bulk generation;
6. Diversion of waste from landfills;
7. Management of international waste;
8. Management of disaster debris;
9. Management of biomedical waste;
10. Management of waste water treatment sludges and septage (septic tank pumpings);
11. Promotion of environmentally sound, economically feasible, appropriate waste treatment and disposal technologies – integrated waste management facilities;
12. Promotion of extended producer responsibility for specific waste streams such as: e-waste, tires, plastic shopping bags;
13. Development of integrated waste management plans at the local government level;
14. Development of a waste information system strategy;
15. Enabling and sustaining the strategy: technical, institutional, legal, socio-economic;
16. The feasibility and costs of implementing the strategy.

In the context of this assignment, we interpret the term “National SWM Strategy” to mean an overall framework or ‘blueprint’ which stipulates the actions and measures that will be taken by the GoB and others to achieve the goals and outcomes defined in the National WM Policy, and by when.

The final strategy is typically formulated and prepared based upon a *preferred waste management scenario* identified following an analysis of the existing situation, and an assessment of different options and alternative scenarios for managing various waste streams in a more sustainable manner. Following finalisation and approval of the National SWM Policy, the Consultants will carry out an assessment of SWM options and scenarios using the integrated “Wastes Flows and Costs Model” described in section 3.1 above.

This assessment will seek to identify the so-called “Best Practicable Environmental Option” (BPEO) for the future management of solid wastes in Belize. The BPEO is the outcome of a systematic assessment and consultative decision-making process that emphasises the protection and conservation of the environment across land, air and water. The BPEO process establishes, for a given set of objectives and circumstances, the option (or combination of options) that provides the greatest benefits or least damage to the environment as a whole, at acceptable cost, in the long term as well as in the short term. Essentially, the process is about finding the best possible solution for Belize.

We propose that the National SWM Strategy should have the following scope and structure:



- Statement incorporating the overall national policy goals, objectives and related targets
- Statement of the key principles and criteria upon which the strategy is founded
- Summary of the key data and assumptions on which the strategy is based
- Description of the main elements / features of the strategy:
 - Nature of wastes and waste flows, and related forecasts
 - Existing situation and key problems / deficiencies
 - Applicable legislation, standards and regulations
 - Future institutional and organisational arrangements for managing wastes
 - Measures for preventing, reducing, recovering, recycling or reusing wastes
 - Standards, methods and technologies for storage, collection and transportation
 - Technologies / techniques to be applied for treatment and final disposal
 - Measures and procedures for clean-up and restoration of waste sites
 - Methods and procedures for detailed planning, assessment, development and operation of wastes management facilities
 - Methods to be adopted for financing, procuring and recovering the costs of waste management facilities and services
 - Approach and methods for educating, informing, and communicating with the public / key stakeholders
- A programme for implementing the required legislative, institutional and organisational changes
- Description of the main systems and procedures to be developed and applied for implementing the strategy
- A programme for developing the required physical facilities for waste management
- Estimates of the human resources required to implement the strategy
- Estimates of the magnitude and timing of the capital and operating expenditures required in order to provide and operate the physical facilities and systems for waste management
- A programme for funding facilities, infrastructure or other types of project related to waste management, and for introducing or improving systems for cost recovery
- A programme for communicating the strategy to the public and other key stakeholders
- An overall timetable for the achievement of the strategy goal and objectives
- Arrangements for reviewing and updating the strategy at appropriate intervals

4.4 Comments on Task 3 – National Solid Waste Management Plan

The scope of this Task specified in the ToR includes:

1. Translating the proposed waste management policy goals and strategies into action;
2. Defining the baseline regarding current waste management practice in Belize;
3. Current legislative, regulatory and institutional framework for managing waste in the country;
4. Proposed legislative (revamped and updated Solid Waste Management Authority Act), regulatory and institutional framework (recommended organizational structure(s) with institutional relationships and responsibilities clearly defined) for managing waste (municipal, ICI, biomedical, WWT sludges and septic tank pumping);
5. Incorporating current and future cost recovery schemes/mechanisms for financial sustainability.



6. Updating the National Solid Waste Management Plan as informed by the situation analysis, baseline conditions, current legislative, regulatory and institutional framework and the advent of new treatment technologies for waste management.

In the context of this assignment, we propose to interpret the term “National SWM Plan” to mean a document containing the details of how the various actions and measures foreseen in the National SWM Strategy will be undertaken and by whom. This is normally prepared / finalised after the National SWM Policy and Strategy have been approved and adopted.

As may be deduced from sections 4.2 and 4.3 above, the scope specified for this Task in the ToR is somewhat different from our proposed interpretation of what a National SWM Plan should contain. Also, as far as we are aware, the existing National Solid Waste Management Plan mentioned in the ToR comprises just a single short chapter (Chapter 9.0) in Volume 1 of the Phase 2 Report presented by Stantec Consulting International in February 1999.

We therefore propose that the scope originally specified for this Task in the ToR is incorporated as appropriate in the National SWM Policy and Strategy, and that the National SWM Plan has the following revised scope and structure:

- Identification of the authorities / agencies responsible for strategy implementation
- Identification and definition of all key tasks and activities required in order to implement the adopted strategy
- The sequence, timing and linkages of key tasks and activities
- Key implementation decision points and milestones
- Detailed timetables for implementation
- Detailed estimates of the resources required and related costs
- Cash flow projections for the overall plan and for all plan sub-components
- A detailed financing plan
- Supporting data and explanatory text, as required e.g. identifying and detailing the allocation of responsibilities for key implementation tasks; the indicators of achievement to be used.

4.5 Comments on Task 4 – Stakeholder Consultations

The scope of this Task specified in the ToR requires the Consultants to plan and conduct stakeholder consultations for the National SWM Policy, Strategy and Plan and obtain consensus.

A first stakeholder workshop has already been conducted and two more such workshops are planned during early 2014 (one more than specified in the original ToR). Further one-to-one meetings and discussions with key stakeholders will be undertaken during the Consultants’ next mission to Belize in January. If it was felt necessary or beneficial (and after consultation with BSWaMA), a fourth stakeholder workshop could be arranged in order to obtain consensus amongst as wide a spectrum of stakeholders as possible.

We intend that the next stakeholder workshop (which is tentatively planned to take place on Wednesday January 15th 2014) will present the final results of the problem analysis, and discuss the national policy goals, objectives and related targets for the various components of an integrated SWM system for Belize.

5. RECOMMENDATIONS FOR CHANGE

5.1 Scope of Work / Deliverables

Our only recommendation for changing the Scope of Work relates to the specification for Task 2 (National SWM Strategy), which currently includes the management of septage (septic tank pumpings).

Septage (both sludge and supernatant) is almost entirely liquid in nature and accordingly, in our opinion, this issue should be dealt with as part of a policy and strategy for managing sewage and other predominantly liquid waste streams. Indeed, this issue is already addressed to a certain extent in the “National Integrated Water Resources Management Policy for Belize” (Policy No. E.6.2).

We therefore recommend that management of this particular waste is removed from the scope of work for this assignment.

5.2 Work Programme

An updated work programme for this assignment is presented in **Figure 12**.

Despite a slight delay in completing and submitting this Inception Report, we still anticipate completing this assignment within the agreed timeframe.



**ANNEX A
LIST OF SITE VISITS / INTERVIEWS**

Date	Location	Person(s) Interviewed	Position
09/10/2013	BSWaMA Offices, Belmopan	Mr Gilroy Lewis Ms Lumen Cayetano	Director Senior SW Technician
09/10/2013	Santa Elena / San Ignacio (incl. visit to TS)	Javier Gonzalez	Supervisor, Santa Elena / San Ignacio Town Council
10/10/2013	Belize City Council Belize City Hall	Mr Dion Leslie Mr Percival Munillo	Councillor Sanitation Manager
10/10/2013	Visits to Belize City TS & Mile 24 Landfill Facility	-	-
11/10/2013	Department of Environment, Belmopan	Ms Maxine Monsanto Ms Celi Cho Mr Jorge Franco	Acting Senior Env. Officer PR Officer Environmental Officer
13/10/2013	San Pedro, Ambergris (incl. visit to site of new TS)	Mr Samuel Gonzalez	Foreman, San Pedro Town Council
14/10/2013	Department of Local Government, Belmopan	Mr Eugene Palacio	Director
15/10/2013	Punta Gorda Town Council	Mr Anthony Fuentes Mr Ludwig V Palacio	Mayor Administrator
15/10/2013	Dangriga Town Council (incl. visit to dumpsite)	Mr Ryan Rodriguez	Works Manager
16/10/2013	Western Regional Hospital, Belmopan	Mr Mark Bernard	Senior Public Health Inspector, MoH
17/10/2013	Ministry of Finance, Belmopan	Ms Yvette Alvarez Ms Maria Cooper	Senior Advisor Economist
18/10/2013	Belize International Airport	Mr Enrique Hoare	Manager of Operations
18/10/2013	Orange Walk Town Council	??	Sanitation Department
18/10/2013	Visit to Corozal	-	-
21/10/2013	Belize Water Services Ltd. Belize City	Mr Alvan Haynes Mr Keith Hardwick Mr Dave Pascascio	Chief Executive Officer Tech. Services Manager Operations Manager
21/10/2013	Belize Recycling Company	Mr Juan Carlos Dussan	Director
21/10/2013	Belize Waste Control Ltd. Belize City	Mr George Lamb	General Manager
24/10/2013	MNRA, Belmopan	Dr Paul Flowers Ms Randene Twist	Director, Policy Coordination & Planning Legal Counsel
24/10/2013	BSWaMA Offices, Belmopan	Mr Gilroy Lewis	Director



**ANNEX B
AGENDA FOR THE FIRST STAKEHOLDER WORKSHOP**



Belize Solid Waste Management Project (BL- L1006)
- National Solid Waste Management Policy, Strategy & Plan

-

First Stakeholder Workshop

Radisson Fort George Hotel, Belize City, 23 October 2013

BACKGROUND

The Consultancy to prepare a National Solid Waste Management Policy and Strategy and update the National Solid Waste Management Plan for Belize commenced on 1st October 2013 and is being implemented over an eight-month period. Primary objectives of the project are to support the Government of Belize, Solid Waste Management Authority (SWaMA) in:

1. *Designing a National Solid Waste Management Policy* that is consistent with the waste management hierarchy, resource recovery and conservation and integrated sustainable solid waste management.
2. *Designing a Solid Waste Management Strategy* as part of (1) above in order to deploy the Policy over a twenty year time horizon.
3. *Updating the National Solid Waste Management Plan.*

This first stakeholder workshop is being convened in order to provide input to the process of developing the Policy and Strategy referred to above.

WORKSHOP AIMS

The main aims of the workshop will be to:

- Introduce the Consultants appointed to assist SWaMA, and present a brief ***overview of the approach*** which is being adopted.
- Provide an introduction to the concept and methodology of ***"integrated waste management planning"***.
- Identify and define clearly the ***problems / deficiencies*** associated with the existing arrangements for managing waste which the Policy and Strategy will need to address, and to establish a hierarchy of ***cause and effect relationships*** for the negative features of the existing arrangements.
- Transpose the problems identified into a set of ***strategic objectives***, linked within a hierarchy of ***means-ends relationships***.



The basic purpose of **problem analysis** is to identify and define clearly all of the **significant** problems, constraints and deficiencies associated with the existing waste management arrangements.

A problem is not the absence of a solution, but an **existing negative state or condition**. Often, a negative feature or effect of existing wastes management arrangements is perceived to be a problem but, on closer examination, may in fact only be a symptom of the true or "core" problem which ultimately gives rise to the negative effect. For this reason, it will be important for workshop participants to consider and analyse carefully the nature of the "cause-and-effect" relationships for what are generally perceived to be the problems associated with the existing wastes management arrangements, in order to identify a set of well-defined and interrelated "core" problems. The identification and **definition of existing problems** will therefore be the **main focus of discussion and debate** during the workshop. This will require the interactive involvement and contributions from all workshop participants.

Once the core problems have been identified and clearly defined, the process of defining and linking a set of **strategic objectives** should be comparatively straightforward, as the objectives normally constitute the inverse or "mirror image" of the problems.

The workshop will be led by an experienced workshop moderator (Michael Betts). The outputs of the workshop will also be documented and **distributed to participants for further comment and feedback**.



WORKSHOP AGENDA

Wednesday, 23rd October

08.30 – Registration and coffee

09.00

09.00 – Welcome & Introduction – SWaMA Representative

09.15

**09.15 – Introduction to Integrated Waste Management Planning –
10.00 Michael Betts**

**10.00 – Techniques for Problem Identification, Definition &
10.45 Analysis – Michael Betts**

10.45 – Coffee break

11.00

**11.00 – Organisation of working groups to identify / define
11.15 existing problems and constraints**

**11.15 – Structured working group discussions to identify / define
12.00 existing problems and constraints**

12.00 – Lunch

13.30

**13.30 – Continuation of structured working group discussions to
15.00 identify / define existing problems and constraints**

15.00 – Coffee break

15.15

15.15 – Presentations by working groups

16.00

16.00 – Workshop summary and conclusion

16.30



**ANNEX C
LIST OF WORKSHOP ATTENDEES**

Name	Organisation	Email Address	Contact No.
George Lamb	Belize Waste Control Ltd	Lamb-george2012@hotmail.com	610 4141
Percival Moutto	Belize City Council, Belize City	percivalmoutto@Belizecitycouncil.org	600 3519
Winston Taylor	Member, BSWAMA Board		667 4277 / 522 0229
Mitchell Danderson	Belize Maintenance Ltd.		223 1118 / 664 1564
Sheldon Lopez	Placencia Sanitation Co. Ltd	sheldonlopez@hotmail.com	601 5408
Shirley Humes	Min. of Natural Resources & Agriculture	planningtechnician@gmail.com	622 9291
Coney Contantino	Galen University	CConstantino@galen.edu.bz	631 2104
Ludwig V Palacio	Punta Gorda Town Council	ludwigpalacio@yahoo.com	667 6275
Anthony Fuentes	Punta Gorda Town Council	anthonyfuentes@gmail.com	629 2440
Maria Cooper	Ministry of Finance	maria.cooper@mof.gov.bz	636 0030
Clifford King	Ministry of Local Government	Clifford.king@labour.gov.org	670 2643
Victoria Cawich	Forestry Department	wildlifefd@ffsd.gov.bz	629 4455
Philip Timmons	Belmopan City Council	Philip_timmons@hotmail.com	600 3947 / 8222271
Armando Aban	Cooperative Department	mandyaban@yahoo.com	632 2032
Efrain Gomez	CSFI (Shipstern)	fraingomez@gmail.com	605 9023
Heron Moreno	CSFI (Shipstern)	shipstenbase@gmail.com	620 8771
Estela Reyes	BTIA (Tourism Industry Association)	execdirector@btia.org	227 1144
Joel Rancharan	Bowen and Bowen (Crystal Bottling Co.)	JRancharan@bowen.bz	225 2154
Eduardo Eddie Cano	San Ignacio/Santa Elena Town Council		621 8081
Javier Gonzalez	San Ignacio/Santa Elena Town Council		605 5678
Ruth Staine -Dawson	National Association of Village Council	rsdear@yahoo.com	610 1719
Justin Hulse	Bowen and Bowen (Brewery)	JHulse@bowen.bz	623 2158
Joel Rancharan	Bowen and Bowen (Crystal Bottling Co)	JRancharan@bowen.bz	225 2154
Michael Kelly	Resource Recovery Recycling Ltd.	MichaelKellybz@yahoo.com	610 1142
Robert Hazel	Resource Recovery Recycling Ltd.		633 8055
Kadie Usher	Belize Electricity Ltd.	Kadie.usher@bel.com.bz	227 0954 ext. 2602
Albert Roches	Belize Natural Energy	aroches@belizeenergy.bz	665 4253 823 0393 ext. 161
Margarita Garcia	Belize Agriculture Health Authority	margargarciabzkind@gmail.com	610 2939

Name	Organisation	Email Address	Contact No.
Samuel Gonzalez	San Pedro Town Council		627 9412
Kenrick Brackett	San Pedro Town Council	kennybjosh@yahoo.com	635 3844
Isabel Enfinger	Travellers Liquor	bztraliqltd@gmail.com	822 2182 / 636 0831
Areini Palacio Morgan	Belize Audubon Society	advocacy@belizeaudubon.org	223 5004
Claire Bright	Ministry of Energy, Science, Tech& Public Utilities	Energy2@estpu.gov.bz	607 8133
Yoshini Matsubara	Ministry of Energy, Science, Tech& Public Utilities		634 7341
Jorge Aldana	Ministry of Energy, Science, Tech& Public Utilities	eemanager@estpu.gov.bz	632 3461
Edgar Ek	Department of Environment		802 2816
Andrew Harrison	Ministry of Natural Resources & Agriculture	andrew.harrison@agriculture.gov.bz	822 2241 ext. 135
Celi Cho	Department of Environment	doe.publicawarenessunit@ffsd.gov.bz	802 2542 / 2816
Liberato Teul	Dangriga Town Council		522 3213 / 663 4534
Ryan Rodriquez	Dangriga Town Council		522 0039 / 631 9407
Rondene Twist	Ministry of Natural Resources	legal@mnra.gov.bz	802 3661
Nonato Canto	PCB	pcbinfo@btl.net	824 2640
Tiffany Smith Diaz	Belize City Council	tiffanydiaz@belizecitycouncil.org	663 6287
Mark E Bernard	Ministry of Health (Public Health)	MARK.BERNARD@CHR.health.gov.BZ	660 4490 / 629 8736
Horris Patten Jr.	Ministry of Health (Public Health Bureau Central Health)	horrispattenjr@yahoo.com	622 6548
Ebilberto Romero	Programme for Belize	execdirector@pfbelize.org	227 5616



**ANNEX D
DRAFT PROBLEM ANALYSIS MATRIX**

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
1. Policy & Legislative Framework	<p>1.1 Existing national policy / strategy on SWM is not yet sufficiently developed to facilitate preparation and implementation of an integrated and cost-effective national SWM system.</p> <p>1.2 Existing national legislation relating to SWM is not effective.</p> <p>1.3 Enforcement of legislation relating to SWM is not effective.</p>	<p>1.1.1 A comprehensive policy and strategy, addressing all key areas of performance for SWM, does not exist.</p> <p>1.1.2 Programmes / targets for achieving an integrated SWM system are not yet sufficiently developed / elaborated.</p> <p>1.1.3 Policies for the management of specific / difficult waste streams do not exist.</p> <p>1.2.1 Processes and procedures for formulating, implementing and monitoring the impact of legislation are not efficient or transparent.</p> <p>1.2.2 Current arrangements and procedures for stakeholder consultations and participation in the process of drafting policies & legislation are not effective.</p> <p>1.2.3 Legislation & standards relating to SWM are not sufficiently developed to facilitate a comprehensive & integrated approach to SWM.</p> <p>1.2.4 Key words & terms used in SWM legislation are not adequately defined & / or applied consistently.</p> <p>1.2.5 The interface between national SWM legislation and local regulations is not clear / fully articulated.</p> <ul style="list-style-type: none"> • Enforcement is not considered to be a priority. • Penalties for non-compliance are not appropriate and / or not applied as a deterrent. • Resources and procedures for monitoring and enforcement are insufficient and ineffective. • The various regulatory agencies do not collaborate. 	<ul style="list-style-type: none"> ➤ No comprehensive sectoral basis is available for determining SWM priorities, performance requirements or targets. ➤ Regional / local strategies & plans for SWM have not been prepared. ➤ Local authorities do not have the resources and capacities to implement SWM legislation and standards. ➤ Stakeholder resistance to the introduction of new SWM legislation. ➤ Confusion regarding the meaning and intention of SWM legislation. ➤ Standards relating to SWM are difficult to implement and enforce effectively. ➤ Wastes are not always managed in accordance with best practices / techniques. ➤ Littering & illegal dumping in areas not receiving waste collection service. ➤ Uncontrolled dumping of wastes, including potentially hazardous wastes. ➤ The Department of Environment is not able to monitor and control SWM facilities / processes / activities adequately.
2. Institutional / Organisational Arrangements	<p>2.1 Existing institutional / organisational arrangements are not optimal for an integrated and cost-effective national SWM system.</p>	<p>2.1.1 Existing institutional structures and related information systems & management procedures are fragmented and inefficient / ineffective.</p> <p>2.1.2 Institutional responsibilities are not clearly &</p>	<ul style="list-style-type: none"> ➤ Confusion / overlap of functions & responsibilities. Insufficient co-ordination and cooperation between Government institutions. Lack of continuity in approach. ➤ Failures / deficiencies in decision-making &

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
		<p>comprehensively defined / legally assigned.</p> <p>2.1.3 In some cases, legal competences of Ministries are not clearly defined and / or overlap.</p> <p>2.1.4 The human and financial resources available to existing institutions are not sufficient to deliver an integrated & efficient SWM system.</p> <p>2.1.5 The existing enforcement system is not able to control waste generation and transport / processing / disposal activities effectively.</p> <p>2.1.6 Institutional functions & responsibilities for SWM at the national / local levels are not well coordinated.</p> <p>2.1.7 Resources available at local level are insufficient for effective delivery of SWM services.</p> <p>2.1.8 Institutional arrangements for inter-municipal cooperation with respect to SWM do not exist.</p> <p>2.1.9 Existing legal and organisational arrangements for private sector participation in Municipal Solid Waste management are not effective.</p>	<p>task implementation. Human resources are insufficient and not prepared for such tasks, and are not motivated.</p> <ul style="list-style-type: none"> ➤ SWM activities are not regulated effectively. ➤ Private sector involvement in decision making and performance in SWM is limited. ➤ The scope for economies of scale & other potential efficiencies in service provision are not exploited. ➤ The potential benefits of competition in service provision are not realised in all branches / areas of waste management.
3. Human Resources / Capacity	3.1 Existing numbers & capacities of human resources engaged in SWM (in both the public and private sectors) are inadequate.	<p>3.1.1 The number of staff employed by Government and local authorities in relation to SWM is insufficient.</p> <p>3.1.2 The capabilities of staff engaged in SWM-related activities employed by Government and local authorities are not sufficiently developed.</p> <p>3.1.3 Health & safety of human resources engaged in SWM activities is not a priority.</p> <p>3.1.4 Private sector waste producers and some managers of wastes are not sufficiently trained and / or experienced.</p> <p>3.1.5 The contributions of staff and workers engaged in SWM activities are not recognised / viewed positively by Belizean society (low status).</p> <p>3.1.6 Compensation paid to staff and workers engaged in SWM activities does not reflect adequately their contributions / value to</p>	<ul style="list-style-type: none"> ➤ SWM activities are not planned, managed or regulated effectively. ➤ Inadequate specification and supervision of the provision of SWM infrastructure & services. ➤ Private sector waste producers do not apply best SWM practices and techniques. ➤ SWM service providers do not apply best practices and techniques. ➤ Staff & workers are not motivated to perform efficiently. ➤ Health and safety risks are greater than need be.

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
		Belizean society.	
4. Data Availability, Monitoring & Reporting	4.1 Available data & information on the sources, nature, quantities and fate of wastes, and SWM facilities, is not sufficiently comprehensive and reliable to be able to regulate & manage wastes effectively.	4.1.1 Historical data on wastes & SWM do not exist. 4.1.2 Existing data do not cover all areas / municipalities or all waste streams (focus on western corridor). 4.1.3 A national system for classifying, regularly collecting, processing, analysing & disseminating data & information on the sources, nature, quantities and fate of wastes, and SWM facilities, does not exist. 4.1.4 Waste producers and SWM service providers, are not obliged (by law) to collect, record and report data and information about the wastes they generate / manage.	<ul style="list-style-type: none"> ➤ A comprehensive and reliable statistical basis for planning, management and control of SWM facilities and services does not yet exist. ➤ A comprehensive and consistently reliable basis for monitoring & reporting of all SWM activities and performance does not exist. ➤ Data & information relating to specific / problematic waste streams is inadequate and / or unavailable (e.g. packaging wastes; WEEE; ELVs). ➤ Information available to stakeholders is insufficient.
5. Stakeholder Awareness & Communication	5.1 Stakeholders do not have a sufficient awareness and understanding of their roles & responsibilities in achieving an integrated and cost-effective national SWM system.	5.1.1 Stakeholder awareness and communications are not regarded as a priority / need [by Government]. 5.1.2 A targeted national strategy / programme for on-going communications & consultations with, and participation of, all key stakeholders are not yet in place. 5.1.3 Resources required for effective stakeholder communications are not allocated / sufficient. 5.1.4 SWM issues are not sufficiently addressed within existing educational curricula and programmes. 5.1.5 A focal point for implementation and coordination of a national stakeholder communication programme has not been established / equipped.	<ul style="list-style-type: none"> ➤ Stakeholders are not identified / engaged. ➤ National policy & strategy for SWM are not communicated effectively to all stakeholders. ➤ Government intentions and policy objectives with respect to SWM are not recognised &/or widely understood by all stakeholders. ➤ Responsibilities & duties with respect to SWM are not recognised and / or accepted by all stakeholders. ➤ Communication between different stakeholder groups is not developed. ➤ Waste management is not perceived as an economic as well as an environmental activity. ➤ General awareness and understanding of SWM issues throughout society do not yet exist. ➤ Realisation of necessary SWM facilities and other changes in existing SWM systems / practices may be prevented / delayed due to a lack of stakeholder awareness and understanding.

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
6. Financing / Cost Recovery	6.1 The revenue flows from existing SWM fees and other sources are insufficient to be able to meet the full costs of providing an integrated and environmentally sustainable national SWM system.	6.1.1 Existing fees / taxes for SWM services & facilities are not sufficient to recover the full costs of managing wastes in an environmentally-sound manner. 6.1.2 The full costs of managing wastes in an environmentally sound manner are not known and / or understood by local authorities and waste producers. 6.1.3 Existing regulations / mechanisms for collecting fees / taxes for the provision of SWM services & facilities are not enforced / effective. 6.1.4 Revenues from existing fees / taxes are not equitably and appropriately distributed [to local authorities]. 6.1.5 Elected local government representatives are reluctant to introduce cost-covering charges for SWM services (for political reasons). 6.1.6 The full costs of developing and operating an environmentally sustainable SWM system are not affordable for some members of Belizean society.	<ul style="list-style-type: none"> ➤ A sustainable basis for financing the development and operation of an integrated and cost-effective national SWM system does not yet exist. ➤ Waste producers do not perceive or bear the full costs of managing their wastes in an environmentally-sound manner [polluter pays principle]. ➤ Manufacturers, importers and distributors of products giving rise to specific / problematic wastes / waste streams do not perceive or bear the costs of managing such wastes / waste streams in an environmentally-sound manner [polluter pays principle]. ➤ There is no incentive for the private sector to invest in new SWM infrastructure / systems or services.
7. Waste Prevention	7.1 The potential for waste prevention at source is not being realised.	7.1.1 Existing fees / taxes for SWM services & facilities provide little or no incentive to avoid / reduce waste generation. 7.1.2 Economic incentives to avoid and reduce waste are not available. 7.1.3 Product suppliers, consumers and other waste generators are not aware of the potential opportunities for, and benefits of, avoiding and / or reducing wastes. 7.1.4 Information on the opportunities & techniques for wastes prevention and reduction is not readily available to waste generators.	<ul style="list-style-type: none"> ➤ Clean technologies are not considered or widely applied. ➤ Measures aimed at waste prevention have no basis for effective implementation due to lack of economic incentives and communication between stakeholders. ➤ Resources, including the resources for SWM, are not used efficiently with both actual & potential economic & environmental consequences. ➤ The current / future volumes of waste requiring handling, processing and disposal are / will be greater than need be. ➤ The resource requirements for handling, processing and disposing of wastes are / will be higher than need be.

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
8. Waste Recovery & Recycling	8.1 The potential for greater waste recovery and recycling is not being realised.	8.1.1 Government policy and support for secondary raw material markets do not exist. 8.1.2 Existing fees / taxes for managing and disposing of wastes provide little or no incentive to recover / recycle materials from waste. 8.1.3 Existing legislation to encourage the return of empty beverage containers is not wide enough in scope. 8.1.4 Manufacturers, importers and distributors of products giving rise to specific / problematic wastes / waste streams are not obliged to take-back the wastes resulting from their products for subsequent re-use / recycling. 8.1.5 Stable, long-term markets for some types / grades of recyclable materials do not exist. 8.1.6 Domestic market outlets for most types / grades of recyclable materials do not exist or are very weak. 8.1.7 Costs incurred for collection, segregation and shipment discourage the export of some recyclable materials. 8.1.8 Economic incentives to recover and recycle waste are not available. 8.1.9 Users of raw materials do not consider waste to be part of the material cycle. 8.1.10 Product suppliers, consumers and other waste generators are not aware of the potential opportunities for, and benefits of, recovery and recycling of wastes.	<ul style="list-style-type: none"> ➤ The recovery of some types / grades of potentially recyclable materials is not financially viable under prevailing conditions. ➤ Technologies and techniques for waste recovery and recycling are not widely applied. ➤ Facilities for recovery, re-processing and recycling of some types of recyclable material are limited. ➤ Resources, including the resources for SWM, are not used efficiently with both actual & potential economic & environmental consequences. ➤ The current / future volumes of waste requiring handling, processing and disposal are / will be greater than need be. ➤ The resource requirements for handling, processing and disposing of wastes are / will be higher than need be.
9. Waste Segregation, Storage, Collection & Transport	9.1 Existing methods / systems for the temporary storage, collection and transport of wastes are not efficient / cost-effective.	9.1.1 Existing equipment and other resources for temporary storage, collection and transport of MSW are inadequate. 9.1.2 Existing mechanisms for recovering the costs of providing waste collection services do not encourage waste segregation by waste producers.	<ul style="list-style-type: none"> ➤ Increased health / environmental risks from improper segregation / storage. ➤ Opportunities for economically viable recovery / recycling of some recyclable materials cannot be realised. ➤ The scope for economies of scale in the operation of centralised waste treatment /

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
		9.1.3 Existing arrangements for segregating and separately storing potentially hazardous wastes prior to collection are inadequate. 9.1.4 Systems for segregating & separately storing recyclable materials prior to collection are not sufficiently developed. 9.1.5 Systems for the segregation & separate collection of biodegradable wastes are not sufficiently developed. 9.1.6 Systems for the transfer / bulk transportation of some types of waste to centralised treatment / disposal facilities are not sufficiently developed. 9.1.7 An integrated national system for the segregation, separate storage and collection of hazardous wastes (including healthcare risk waste) does not exist. 9.1.8 Current methods / practices for the collection of MSW inhibit / prevent the efficient use of resources. 9.1.9 A competitive market of service providers for various waste collection services is not fully developed.	processing facilities cannot be exploited. ➤ The costs of MSW collection service provision are / will be higher than need be. ➤ Existing arrangements for the provision of MSW collection services are financially unsustainable in the long run. ➤ Existing providers of waste collection services have little incentive to become more efficient.
10. Waste Treatment / Processing	10.1 Wastes generated are not treated / processed efficiently and in accordance with best practices.	10.1.1 Legislation and standards governing the treatment / combustion of wastes are not sufficiently developed / enforced effectively. 10.1.2 Existing facilities for the treatment / processing of wastes outside the Western Corridor do not comply with modern standards of design and operation. 10.1.3 Staff and operatives engaged in waste treatment and processing activities are not adequately trained. 10.1.4 The low financial cost of landfilling untreated waste, relative to the costs of waste treatment / processing, inhibits investment in new or upgraded treatment / processing facilities. 10.1.5 Facilities for treating / processing hazardous	➤ Enhanced pollution & hazard potential from such facilities. ➤ Some wastes are treated / burnt in inadequate / inappropriate facilities. ➤ Significant risks to the health / safety of operatives handling wastes, and to other people entering waste disposal sites. ➤ Methods higher up the waste management hierarchy are not utilised sufficiently. ➤ Significant pollution / potential health risks from the disposal of some types of untreated waste to landfill.

Belize - Existing Solid Waste Management Arrangements - Problem Analysis

Core Problem = The existing system for managing solid wastes in Belize is financially and environmentally unsustainable.

A. Area/Activity	B. Key Problems	C. Principal Causes	D. Principal Effects
		<p>wastes do not exist / are not functioning.</p> <p>10.1.6 Facilities for treating / processing slaughter and other difficult wastes are insufficient.</p> <p>10.1.7 Facilities for reducing the volume of wastes going to landfill do not exist.</p> <p>10.1.8 Existing systems / facilities for processing of recovered packaging materials are not sufficient.</p> <p>10.1.9 Existing systems / facilities for processing of other product-related wastes streams (e.g. waste oils, ELVs, WEEE, etc) are not sufficient.</p>	
11. Final Disposal	<p>11.1 Wastes requiring final disposal are not always disposed of in accordance with best practices.</p> <p>11.2 Some existing and old (historical & non-operational) waste dump-sites and "hotspots" are not being closed, progressively remediated and restored.</p>	<p>11.1.1 Legislation and standards governing the final disposal of wastes are inadequate / not properly enforced.</p> <p>11.1.2 Existing facilities / practices for the final disposal of wastes outside the Western Corridor do not comply with modern standards / best practices.</p> <p>11.1.3 The number of existing facilities for the environmentally-sound disposal of wastes is not sufficient.</p> <p>11.1.4 Existing tariffs / charges for the final disposal of wastes do not reflect the full costs of landfilling wastes in accordance with modern standards / best practices.</p> <p>11.2.1 Financial resources available for the identification, assessment, closure, remediation and restoration of all old waste dump sites & "hotspots" are not sufficient.</p>	<ul style="list-style-type: none"> ➤ Continuing environmental burdens and risks to health from existing and old waste dump sites and "hotspots". ➤ Continued illegal dumping in some areas. ➤ Significant adverse impacts on the landscape and amenity values. ➤ Adverse impacts on tourism. ➤ The siting, design, operation & after-care of final disposal facilities are not always in accordance with international standards.