DRAFT FEASIBILITY STUDY

Mile 24 Landfill Audit Report

DATA SHEET

Project Name: **Consultancy Services to Prepare a Solid Waste Master Plan for Emerging Tourism Areas**
Project ID: **TC # BL-T1067**
Form of Contract: **Lump-Sum**

Consultant

Name:	HYDEA SpA
Address:	Via del Rosso Fiorentino 2G, 50142 Florence, Italy
Tel:	+39 055 719491
Fax:	+39 055 7135233
Email:	mail@hydea.it
Website:	www.hydea.it
Managing Director:	Paolo Giustiniani, tel. +39 055719491, mail@hydea.it
Contact Person:	Dimitri Abbado, tel. +39 0557194929, d.abbado@hydea.it

Work Team

	Key Experts	
A	Project Manager/SWM Engineering Specialist	Michele Lambertini
B	Procurement Specialist	Fabio Berardi
C	Financial and Institutional Specialist	Jeroen Ijgosse
D	Social Specialist	Jeroen Ijgosse
EI	International Environmental (EIA) Specialist	Sara Monti
EN	National Environmental (EIA) Specialist	Evaristo Avella
F	Landfill and Transfer Station Design Specialist	Stan Ebelewicz
G	Waste Characterization Specialist/HQ PM	Dimitri Abbado
H	Hydrogeologist	Michele Lambertini
	Non Key Expert	
I	Constructed Wetland Specialist	Riccardo Bresciani
J	Hydraulic Engineer	Simone Carotti
K	Civil Engineer	Federico Raspanti
L	Landscape Expert	Luciano Luciani
M	Civil/Structural Engineer	Omar Mitchell
N	Local supports	To be nominated

Contracting Authority:

Name:	Solid Waste Management Authority, Ministry of Natural Resources and Agriculture
Address:	Market Square, Belmopan, Belize, C.A.
Director:	Mr. Gilroy Lewis
Fax:	+501 8021527
E-mail:	sw.director@mnra.gov.bz

LIST OF ACRONYMS AND ABBREVIATIONS

BATNEEC	Best Available Techniques Not Entailing Excessive Costs
BoQ	Bill of quantities
CO	Construction and Operation
CQA	Construction Quality Assurance
DBE	Design, Build Engineer
DBO	Design, Build, and Operate
DOC	Drop Off Centre
DoE	Department of Environment
ECP	Environmental Compliance Plan
ESIA	Environmental & Social Impact Assessment
ESMP	Environmental and Social Management Plan
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EU	European Union
FS	Feasibility Study
H&S	Health and Safety
HDPE	High-density polyethylene
IDB	Inter-American Development Bank
LFG	Landfill Gas
LEL	Lower Explosive Limit
MASW	Multi-channels Analysis Surface Waves
MRF	Materials Recycling Facility
MSW	Municipal Solid Waste
MNRA	Ministry of Natural Resources and Agriculture
MSWM	Municipal Solid Waste Management
NSR	Noise Sensitive Receivers
PIU	Project Implementation Unit
PM	Project Manager
RCV	Refuse Collection Vehicle
RFP	Request for Proposals
RORO	Roll-On-Roll Off
SW	Solid Waste
SWM	Solid Waste Management
SWaMA	Solid Waste Management Authority
SWMP	Solid Waste Management Project
QA/QC	Quality Assurance and Quality Control
ToR	Terms of Reference
UEL	Upper Explosive limit
WASA	Water and Sewerage Authority
WB	World Bank
WTE	Waste-to-Energy

TABLE OF CONTENTS

ANNEXES

1 INTRODUCTION

The audit at Mile 24 Landfill was carried out in order to assess the adequacy of the operation and infrastructure to cater for the waste disposal needs of the Northern and Southern Corridors as per the outcomes of the present Master Plan.

In such aim three different levels of adequacy have been considered:

- Adequacy of existing infrastructures
- Adequacy of operation organisation
- Respect of Environmental Compliance Plan requirements

The audit was carried out by Hydea's Team Leader, Michele Lambertini (CV attached in Annex 1), through the following activities:

- Interview on site (26th October 2015) with:
    - Mr. Alex Carrillo (SWAMA) and
    - Mr. Reynaldo Hernandes (PASA) –
- Site visit – 27th October 2015
- Document review – 28th and 29th October 2015
- Debriefing with Mr.Alex Carrillo – 29th October 2015

The following documents were reviewed:

- Environmental Compliance Plan (ECP)
- PASA Contract
- Fire Evacuation Plan
- 3rd Quarterly Operation Report (Feb-Apr 2015)
- Sanitary Landfill Sampling and Monitoring Plan (Nov 2013)
- Leachate Contingency Plan (Nov 2013)
- Groundwater wells logs
- Site Map
- Scale house tickets and daily records
- Landfill gas monitoring plan

EIA document prepared by BET in 2008 was also reviewed and, specifically, chapter 6.0 – "Environmental mitigation plan" where, in section 6.3 – "Regional Sanitary Landfill, Mile 22", provisions are given for the mitigation of the impacts of the Landfill. Since all the therein reported provisions have been considered by the subsequent Environmental Compliance Plan with only minor changes and corrections, the latter document only has been used as reference for the present Audit. Exceptions are specifically mentioned in the following where necessary.

1.1 Limits of the Audit

The Audit is limited to assess the characteristics of the Mile 24 Landfill in regard with the possible use of the same as disposal site also for the waste generated by the Northern and Southern Corridors. No other components of the Western Corridor system (e.g. Transfer Station, transport) have been assessed since out of the scope of the Audit.

The quality of the construction and its compliance with the specific standards and requirements haven't been directly assessed since they were objects of a specific Quality Assurance and Quality Control Plan approved by the relevant authorities and carried out by an international Design Build Engineer (DBE) and all the related activities have been completed by February 2015.

2 INFORMATION SECTION

Subject	Description	Representative for the Audit
Owner	Government of Belize – Solid Waste Management Authority	Mr. Alex Christopher Carrillo Technical Environmental Specialist
Operator	PASA Belize Ltd (branch of PASA S.A. Mexico) Contract signature date 27th January, 2012. Operations start date 5th August, 2013. The DBO is for 8 years. The operation certificate is dated the 26th August, 2013 so the operation part of the contract expires on the 25th August 2021	Mr. Reynaldo Hernandez CEO
Auditor	HYDEA spa (Italy)	Mr. Michele Lambertini Team Leader
Construction supervision	AECOM Ltd. (UK) Appointed DBE Mr. James Walton	No

3 EXISTING INFRASTRUCTURES

3.1 Mile 24 general information

The landfill site is located along the Western Highway midway between Belize City and Belmopan. The site is also 6 miles south the junction with the coastal road and 8 miles north to the Burrell Boom road that connects the Western Highway with the Northern Highway.
An asphalt paved access road, 3.5 km long, lead to the site not visible from the highway.
The site is about 150 hectares wide and includes:

- Compound area with ancillary facilities
- Two (#2) MSW cells, 2.5 hectares each, already active
- One (#1) Hazardous Waste cell, 0.27 hectares, not yet operational
- One (#1) Stormwater pond
- Three (#3) leachate treatment lagoons
- Soil borrow pit area
- 25 hectares buffer zone along the perimeter of the site

Both the MSW and the Hazardous Waste cells are fully fenced.

The landfill has been built by the Contractor PASA s.a. awarded by BSWAMA of the Design-Build-Operate contract also including the construction and operation of #4 Waste Transfer Stations in the Western Corridor.
The Design-Build phase of the landfill has been completed in February 2015 but a first cell was active since the beginning of August 2013 when the MSW was firstly delivered. The whole Design-Build phase has been supervised by a Design Build Engineer appointed by SWAMA to carry out the Quality Assurance and Quality Control plan.

3.2 Waste cells

Two (#2) Municipal Solid Waste (MSW) cells have been constructed so far extended on a 5 hectares area. A first layer of waste has already been deposited on cell 1 and the waste disposal is now moving on cell 2.
The cells have been constructed under a Design-Build and Operate (DBO) contract and the construction has been subject to the supervision of a Design-Build Engineer (DBE) in accordance to an established Quality Assurance and Quality Control program.

The waste deposit, as foreseen by the closure plan, will be developed from the minimum elevation of approximately 13 m a.s.l. to a maximum height of 27 m a.s.l. in a pyramidal shape. The total available volume of the two constructed cells is estimated to be around 660,000 m^3 corresponding to a minimum of about 462,000 tonne (0.7 tonne/m^3 density).
The use of the volume can be estimated to be around 100,000 m^3 at the end of year 2015 according to the total waste tonnage delivered so far and using the same density value as above.

At the present pace of the waste input the remaining lifespan of the present cells can then be estimated to be between 5 and 6 more years. Only very recently the San Pedro Transfer Station became operative, soon also the Burrel Boom and Caye Caulker ones will be active and the waste transferred to Mile 24 Landfill through container trucks.
A residual active lifespan of 5 years can then conservatively be assumed.

An additional 0.68–acre-wide cell (0.27 Ha), presently inactive, has also been built to host Hazardous Waste (HW). The Hazardous Waste cell is presently inactive, a preconditioning treatment system prior disposal for different types of waste is being evaluated and need to be implemented to make the cell fully operational. The matter is under exam by the SWAMA.
Both the MSW and the HW cells are fully fenced.

The whole site area is about 150 hectares 110 hectares of which are still available for future expansions. Considering a conservative 60% of the whole area as available for the waste disposal and taking into account an occupancy rate of 132,000 m^3/hectare as per the already constructed cells (660,000 m^3 / 5 hectares) the total residual availability of volume can be estimated as:

$$132{,}000 \text{ m3/ha} \times (110 \text{ ha} \times 60\%) = 8{,}712{,}000 \text{ m}^3$$

In other words, considering a 10 years available volume provided by the already constructed 5 ha cells and the doubling of the waste input due to the joint disposal of the waste generated by the Northern and Southern Corridors, the total active lifespan of the landfill at the present waste input can be estimated in 66 years.
The site therefore allows space for sufficient expansions.

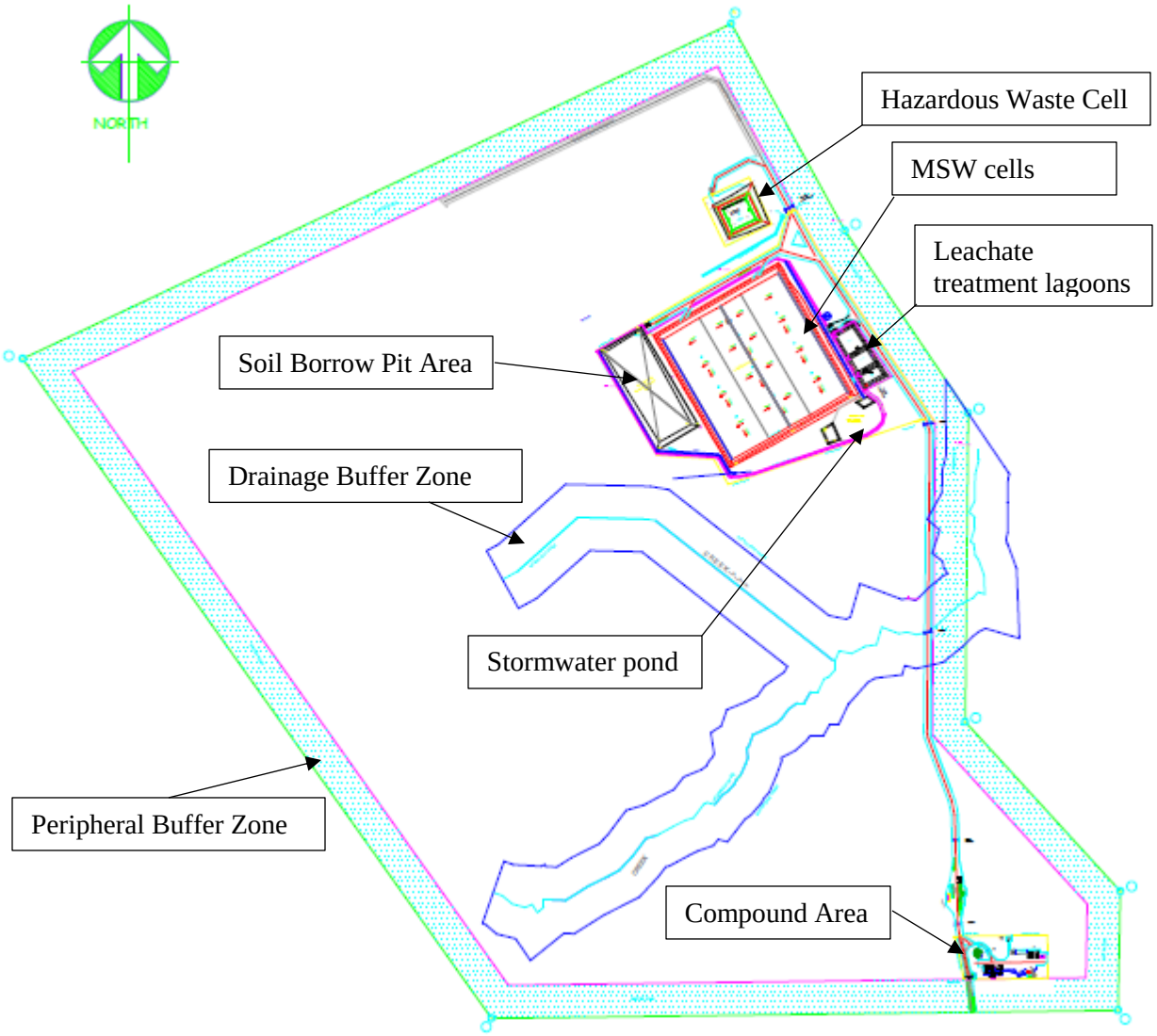
3.3 Ancillary infrastructures

The landfill site is equipped with all the necessary ancillary infrastructures of adequate standard:

- Entrance gate and Guard Hut
- Administrative Building
- Workshop for machine maintenance
- Hazardous Waste enclosed and sheltered deposit
- Wheel wash facility
- Weighbridge and scale house
- Access road paved with asphalt
- Backup generator
- Leachate extraction system
- Leachate treatment system (3 lagoons)
- Stormwater sedimentation pond (#1)
- Fuel deposit
- Groundwater monitoring wells (#5)

With the exception of the leachate treatment ponds, the stormwater pond and the groundwater monitoring wells, all the ancillary infrastructures are adequate to cater for future expansions of the landfill and increased waste inputs.

Figure 1 – General layout of Mile 24 Landfill Site. Note that the drawing is not the "as Built" one, minor differences with respect to the real situation of the site are present.



3.4 Availability of materials

A clay soil crest is present at the western margin of the cells and it is presently excavated to provide soil for the intermediate and final cover (daily cover is done through plastic sheets). At a visual estimate the available soil doesn't appear to be sufficient for the needs of the existing cells (moreover if considering that part of the material is white clay, not ideal for the purpose since highly plastic).
It is in any case unreasonable to imagine that the site can provide sufficient material for both the final and intermediate cover of future expansions of the extent allowed by the whole site.
The cover material needed for a 5 hectares cell can be approximately estimated in not less than 35,000 m^3 (0.5 m thick cover as per the requirements). The material needed for the intermediate cover of the same cells can instead be (very conservatively) estimated in 66,000 m^3 (10% of the total available volume). A

one meter (on average) scraping depth of the excavations to prepare the same 5 hectares cells can provide 50,000 m^3 of material, insufficient for both the final and intermediate cover of one such cell.
Besides, it has to be considered that not all the excavated material can be suitable for the final cover and that, on the other hand, some area of the site will need clay fill to cater for an insufficient natural clay bottom layer.

It can then be preliminarily recommended that the soil excavated for the preparation of the future cells would be stockpiled and used for the final cover of the same cells. At the same time the selection and use of alternative intermediate cover is highly recommended.

4 PRESENT MANAGEMENT SYSTEM

4.1 Working and opening time

The landfill working time in week days is from 7 am to 5 pm. The waste is received until 3:45 pm to allow the necessary activities of waste compaction and daily cover at the end of each day.
On Saturdays the working time is from 7 am to 1 pm and the opening time is limited to 11:45 am.
No works on Sundays and holidays.
The site is guarded 24/7.

4.2 Personnel

The permanent personnel employed at the landfill is currently:

- #1 Landfill Manager, part time
- #1 Safety and Environmental Coordinator, part time
- #1 Scale House Attendant, full time
- #1 Foreman, full time
- #1 Dozer Operator, full time
- #3 general maintenance and waste disposal labourers, full time
- #2 Guards, full time

Soil excavation for waste cover are carried out on demand by a sub-contractor.

4.3 Machines

A Caterpillar D6 type bulldozer is used for the waste disposal operations.
An excavator and dump truck are present when necessary for the soil excavations.
Other ancillary machines, such a tractor with slasher are present.
4" and 6" pumps are also present on site for dewatering and leachate recirculation.

The operating machine (bulldozer) and the offloading procedures are today sufficient to properly deal with the presently limited waste inputs.
An increase number of daily loads (especially in peak times and wet weather conditions) and an increase amount of waste input will nevertheless need a revision of both aspects.
The use of a light landfill compactor (28 tonne) would be recommended together with the adoption of offloading procedures that allows a quicker offloading of an increased number or trucks simultaneously.
The use of two machines could probably provide, under such conditions, the necessary and adequate performances:

- the present bulldozer or a quicker machine for the movement of the waste
- a light landfill compactor for spreading and compaction of the waste.

4.4 Operating instructions, procedures, programs and plans

While some major Plan (H&S, Fire Evacuation) have been established and implemented a more structured, comprehensive and formally established management system is missing.
The operational plans not explicitly requested by the EPC are reportedly adopted by the Operator but not shared with SWAMA. Specifically, no access was granted during the audit nor after to any H&S, Training and Maintenance Plans even if the Operator refers that they have been established.
Evidences and interviews nevertheless confirmed that the respective aspects are managed and no accidents nor formal non compliances have been reported so far. Similarly the site, the facilities and the equipment appears to be well kept and in good conditions.

Although the present slow pace of the operation (due to the low amount of waste input) is well managed and controlled by the present organisation, some grey area is already evident that suggest the aspect should be considered and improved.
The record keeping and, in particular, the reporting activities appear to be ameliorable to ensure a better control of and a more prompt intervention on the different aspects (both operational and environmental). In this regard refer to the following check list for details.

The implementation of a comprehensive management and control system appears to be necessary in specific looking forward to an increased tonnage of waste input.

4.4.1 Health and safety plan

A Health and Safety (H&S) Plan has been established and the aspect is managed. No accidents have been reported so far with regard to the landfill operation.

4.4.2 Training

Periodical training is provided to the personnel on landfill operations and health and safety. In some cases the personnel have been reportedly sent to Mexico for training on already active facilities operated by PASA.

4.4.3 Grievance mechanism

The EPC don’t explicitly ask for a formal grievance mechanism and communication plan. The aspect is informally managed as witnessed by the quarterly reports and no complaints have been reportedly received so far with regard to the landfill. Only one complaint has been reportedly received so far with regard to the transport of the waste and solved (covering of transport trucks to avoid littering).
In this regard has to be noted the only relevant difference of the EPC with respect to the EIA recommendations. The Environmental Mitigation Plan included in the EIA, in fact, recommends (section 6.3.11) the establishment of a “Community Advisory Committee …, to facilitate involvement of neighbouring communities in the operations and monitoring of the Regional Mile 22 disposal facility”. Such recommendations has not been included in the EPC.

5 ENVIRONMENTAL COMPLIANCE PLAN

An Environmental Compliance Plan (ECP) both for the construction and the operation phases of the whole waste management system of the Western Corridor (Transfer Stations and Landfill) was issued by the DoE to BSWAMA on the 21st February 2012.
Section 5.0 (Environmental Compliance Plan for Landfilling Operations) of such ECP has been considered to verify the status of compliance of the landfill operation.
In the following table the level of compliance to each requirement in Section 5, as ascertained during the auditing activities, is reported and commented.
The level of compliance on each of the requirements is then represented in the last column of the same table accordingly to the following rating:

1. The requirement is fully and regularly accomplished both formally and substantially
2. The requirement is substantially accomplished, minor formal inaccuracies to be corrected
3. The requirement is substantially accomplished, formal inaccuracies to be corrected and/or operational measures to be implemented to better control and manage the aspect in order to avoid possible future non-compliances
4. The requirement is not fully or only formally accomplished
5. The requirement is not accomplished

5.1 Inspections by third parties

The operation of Mile 24 Landfill and its compliance with the ECP is subject to periodic inspections by SWAMA and the DoE.
SWAMA carries out weekly inspections to the site. A constant correspondence with the Operator is kept by SWAMA to deal with the contractual aspects including the submittal and approval of the required deliverables.

DoE personnel is inspecting the site on a bimonthly base to ascertain the compliance of the operation with the ECP. No reports of these inspections have been released to SWAMA so far nor have non-compliances been reportedly highlighted by the DoE.

In this regard it can be recommended that an Inspection Register is kept at the landfill. Inspections should be recorded, by the inspection personnel, including at least the following information:

- Date and time
- Agency and Name of the inspectors
- Operators personnel participating to the inspection
- Inspected items and major outcomes of the inspection
- Recommendations, if any, with deadline for accomplishment and instruction for requested formal communications (if any)
- Date of accomplishment with the recommendation (to be noted by the operator)

Environmental Compliance Plan – Landfilling Operation Check list

Ref.	Requirement	Evidences	Compl.	Recommendations
5.1	**Site preparation and record keeping**			
5.1.1	Site Preparation Report	The requirement has been substantially accomplished even if a formal and specific Site Preparation Report hasn't been prepared. The documentation of the quality assurance and quality control activities produced by the Design-Build Engineer nevertheless substantially replace the Report.	1	None
5.1.2	Daily records	Daily records of almost all the required data are regularly kept. Indirect information on the remaining can be inferred from different available information source or documentation.	2	A more regular and formally established record keeping procedure is recommended (e.g. daily register including all the aspects as per section 5.1.2.2 of the ECP to be kept by the foreman)
5.1.3	Annual Report	Formally an annual report is not prepared. Quarterly reports including the necessary information are provided by PASA but not transmitted to DOE. The requested information as per the requirement is reported but not commented and in some case there is some uncertainty on the unit measures used and on how some data has been determined.	2	The preparation of an annual report and its submission to the DOE is recommended. Comments on the ongoing of the different parameters and the acceptability of the detected/measured parameters should be included.
5.2	**Clearing of land**			
5.2.1	Buffer zone	All the requirements of the present section are fully satisfied.	1	none
5.3	**Pollution control**			
5.3.1	Landfill Gas (LFG)	Landfill gas is presently measured by SWAMA. PASA has recently (Oct 2015) submitted a plan for the monitoring of the compliance with clauses from 5.3.1.1 to 5.3.1.4. Approval is pending.	2	The Plan doesn't include contingency plans or procedures. While the proposed monitoring wells to be specifically drilled appears to be adequate, it is strongly recommended the measurement of LFG levels at the outlet of the HDPE pipe located on the southern border of the cell underneath

				the cell itself.
5.3.2	Burning	The requirement appears to be fully satisfied.	1	None
5.3.3	Control of odour	Clauses from 5.3.3.1 to 5.3.3.5 (waste cover) appear to be fully satisfied and so far adequate to provide the necessary odour control. Clause 5.3.3.6 (waste compaction) appears also to be substantially satisfied accordingly to quarterly reports. It wasn't possible to fully ascertain the measurement method for the parameter. Clauses from 5.3.3.7 to the end appear to be fully and adequately satisfied.	2	With respect to the waste cover it must be noticed that the requirement 5.3.3.4 should be urgently reconsidered with regard to the cover on internal slopes (directly in contact with the leachate drainage layer). The soil erosion on such slopes, in fact, is such to convey fine particles into the drainage system potentially causing its partial clogging. It is strongly recommended the use of plastic sheets (or other alternative cover) only for the intermediate cover of such slopes. The requirement should be than reconsidered in agreement with the DOE and amended accordingly. The establishment of an adequate procedure for waste compaction including the definition of what is intended for "compaction density" is recommended. The waste disposal and compaction is carried on through the use of a dozer while formally the mentioned clause requires the use of a landfill compactor. A revision of the clause including a wider range of possibilities (e.g. depending on a range of waste inputs) to achieve the desired result is suggested to avoid possible contractual issues and environmental liabilities. The lack of established procedures and documentation of the different aspects should be better considered and addressed.
5.3.4	Smoke and dust	All the requirements appear to be fully and adequately satisfied.	2	It is nevertheless recommended the establishment of a specific and detailed Maintenance Plan and Program to better control the aspect and document the compliance.
5.3.5	Water pollution	All the requirements are satisfied with the partial exception of the maximum grade of the slopes. PASA has requested the change of such requirement (from 25% to 33%) proposing alternative mitigation measures and received approval on that by the Design-Build Engineer.	2	The relevant clause of the EPC should be changed accordingly with approval of the DOE to avoid possible contractual issues and environmental liabilities.

5.3.6	Sanitary landfill and leachate management	Most of the clauses of this section refer to the construction rather than to the operation of the landfill. Some of the aspects as per the requirements appear to have been modified and replaced with alternative equivalent solutions (raising wells instead of leachate trenches). With respect to the clauses pertinent to the landfill operation (from 5.3.6.17 onward) they appear to be substantially and adequately satisfied by the Operator.	3	While the adopted solutions appears to be technically adequate and in accordance with accepted standards, it is recommended the amendment of the ECP accordingly to avoid contractual issues and environmental liabilities. The lack of established procedures to govern the aspect and, likewise, of regular records of the activities carried out doesn't allow a punctual and certain control on the compliance to the aspect. The establishment of approved procedures and records appears in this case more relevant than in any other. (see also next section)
5.3.7	Leachate contingency plan	The required plan was submitted but not approved (Nov 2013). It hasn't been resubmitted so far.	4	This seems to be a high priority for the substantial compliance of the landfill operation. When drafting the Plan it is recommended to also consider operational and record keeping procedures in normal conditions.
5.3.8	Surface water drainage and erosion control	The constructed drainage system appears to be conform to the requirements (once more here related to the Design-Build phase rather than to the landfilling operation). Some erosion forms are nevertheless evident at a visual inspection.	2	The establishment of a programmed maintenance plan of the drainage system and the construction of rip-raps or silt traps together with other erosion control measures on slopes should be considered. Clause 5.3.8.6 (slope steepness) should be reconsidered in accordance with what already mentioned with regard to section 5.3.5.
5.3.9	Sewage disposal	The requirement appears to be fully satisfied.	1	None
5.3.10	Litter prevention	The requirement appears to be fully satisfied.	1	None
5.3.11	Scavenging	The requirement appears to be fully satisfied.	1	None
5.3.12	Noise pollution	The requirement appears to be fully satisfied.	1	None
5.3.13	Hazardous waste	The requirement appears to be substantially satisfied. No sorting of waste is nevertheless done at the landfill.	2	It is recommended the establishment of waste acceptance and control (visual inspection) procedures at least for the loads directly delivered by privates to better accomplish with the specific requirement.
5.4	**Operation, Maintenance and Monitoring**			
5.4.1	Surface water monitoring	A monitoring plan has been submitted by PASA to SWAMA (Nov 2013) but not yet approved. Monitoring activities are nevertheless carried out regularly. The annual report is not submitted (see also	2	The compliance with the requirement is a priority.

		comments on section 5.1.3 above).		
5.4.2	Ground-water monitoring	A monitoring plan has been submitted by PASA to SWAMA (Nov 2013) but not yet approved. Monitoring activities are nevertheless carried out regularly. The annual report is not submitted (see also comments on section 5.1.3 above).	2	The compliance with the requirement is a priority. The sampling and monitoring of the seeping water collected by the HDPE pipe underneath the cells which outlet is located in the southern side of the cells is highly recommended since can provide an early control of the aspect in case of anomalies.
5.4.3	Leachate monitoring	A monitoring plan has been submitted by PASA to SWAMA but not yet approved. Monitoring activities are nevertheless carried out regularly with the exception of what highlighted above with regard to section 5.3.6. The annual report is not submitted (see also comments on section 5.1.3 above).	2	The compliance with the requirement is a priority.
5.4.4	Daily cover	The requirement appears to be fully satisfied.	1	See also comments on section 5.3.3 on this aspect.
5.5	**Disaster and emergency preparedness**			
5.5.1	Wet weather	The aspect is not taken into account.	2	The requirement appears to be redundant with respect to a well built and operated landfill. The aspect can be, and in fact is, resolved through operational measures. The amendment of the clause is then recommended, replacing the requirement (pertinent to the construction phase) with the need of adequate alternative operational measures.
5.5.2	Fire prevention	The requirements are substantially accomplished. A fire prevention plan is present and the relevant permit released.	2	With specific regard to clause 5.5.2.1 it is once more recommended the establishment of a waste acceptance and control procedure as per comment on section 5.3.13 above.
5.5.3	Storms and floods	The requirement pertains the Design-Build phase and has been accomplished.	1	None
5.5.4	Contingency plans	No Contingency Plan has been reportedly drafted and submitted to the DOE.	5	The compliance with the requirement is a priority.
5.6	**Pest control**			
		All the requirements are accomplished and the aspect appears to be under control.	1	None

5.7	**Road, traffic and safety**			
		The requirement pertains the Design-Build phase and has been accomplished.	1	None

6 CONCLUSIONS AND RECOMMENDATIONS

According to the outcomes of the auditing activities carried out at the Mile 24 Landfill the following conclusions can be summarized:

- The landfill is constructed and operated in accordance to high quality standards
- No environmental or social issues has been reported and are noticeable so far
- The operation of the landfill is substantially compliant with the ECP
- Major non compliances are related to the delay in the submission of contingency plans
- A general lack of established operational and control procedures is nevertheless noticeable. This aspect can, if not adequately considered, lead to future possible non-compliances (especially with regard to the leachate management).

General recommendations:

- Establishment and implementation of an adequate management and control system based on recognised quality standards (ISO 14001 is recommended)
- In specific a more accurate record keeping and reporting of the activities is needed to fully comply with the ECP requirements
- Keep an inspection register on site
- review of some of the ECP requirements that appears to be obsolete, redundant or replaced in fact by alternative and equivalent solutions
- include the effluents (gas and water) from the HDPE pipe laid underneath the cells in the monitoring plan.

Further recommendations related to the adequacy of Mile 24 Landfill for the disposal of the waste from the Northern and Southern Corridors:

- an additional cell of at least 5 hectares extension should be built not later than 4 years from now
- the operational permanent equipment and disposal procedures shall be reviewed to cater for a doubled waste input.
- The use of a light landfill compactor (28 tonne) would be recommended together with the adoption of offloading procedures that allows a quicker offloading of an increased number or trucks simultaneously.
- It is recommended that the soil excavated for the preparation of the future cells would be stockpiled and used for the final cover of the same cells. At the same time the selection and use of alternative intermediate cover is highly recommended