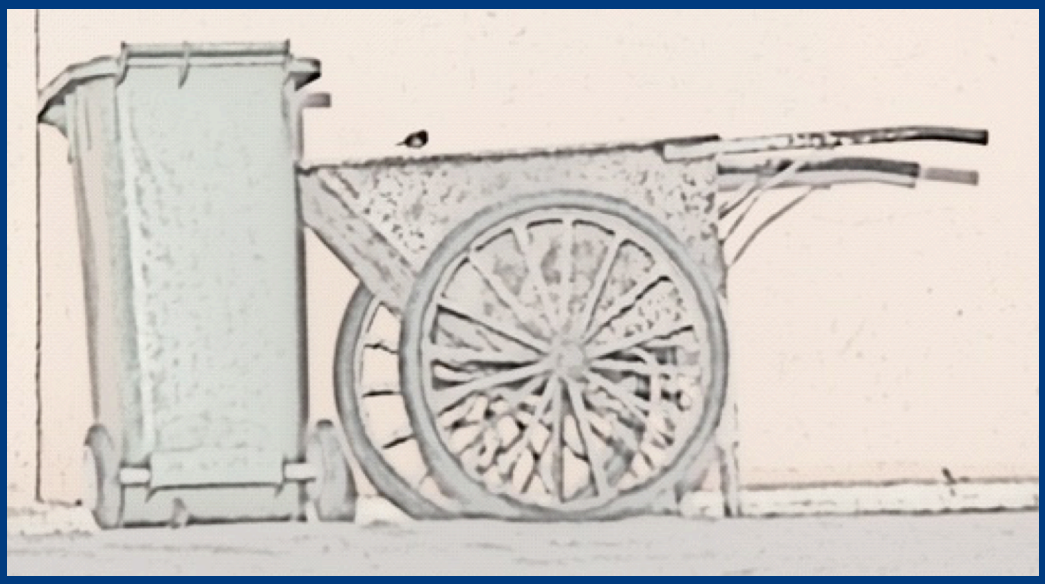
**TA-8566 REG: Mainstreaming Integrated Solid Waste Management in Asia - Solid Waste Management Team (46248-001)**

# Prefeasibility Study – New Buenavista Landfill Design Build Operate Contract

## Sorsogon, Philippines



**December 2016**

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# Contents

# List of Abbreviations

| | |
|---|---|
| **ADB.** | Asian Development Bank |
| **BLGF.** | Bureau of Local Government Finance |
| **CAPEX.** | Capital Expenditure |
| **DBO.** | Design, Build, Operate |
| **DENR.** | Dept. of Environment and Natural Resources |
| **DF.** | Development Fund |
| **DSC.** | Debt Service Capacity |
| **DSCR.** | Debt Service Coverage Ratio |
| **GFI** | Government development bank |
| **IPM.** | Industrial Property Maintenance |
| **IRA.** | Internal Revenue Allotment |
| **LGU** | Local Government Units |
| **MDFO.** | Municipal Development fund Office |
| **MDFP.** | Municipal Development Fund Project |
| **OPEX.** | Operational Expenditure |
| **Php.** | Philippines Peso |
| **PPP.** | Public Private Partnership |
| **RETA.** | Regional Technical Assistance |
| **RoE.** | Return on Equity |
| **SWM.** | Solid Waste Management |
| **VfM.** | Value for Money |

# Executive Summary

Sorsogon's identification of a new landfill site and commencement of the project planning dovetailed with the development of this prefeasibility study which proposes outsourcing of the design, building and long-term operation of this new landfill.

In addition to designing, building and the long term operation of the new landfill, the private contract would encompass the remediation of the closed Buenavista dumping site and the currently operating Bato site. It is proposed that outside professional management will bring multi-project experience of successful landfill project implementation and operation from elsewhere in the Philippines, and that financial contractual incentives tied to detailed objective performance standards will properly motivate their consistent achievement.

Extensive market sounding meetings with prospective private contractors were conducted jointly with city officials on November 15, 2016. There are clearly a growing pool of experienced landfill contractor – operators in the Philippines and from contractor – operators interviewed, there was considerable interest indicated in the Sorsogon landfill contract. The potential for an operating contract to be long term (10 years or more) did not deter such private interest even when taking into account that in the Philippines market, usual terms are 1-2 years post completion.

The PFS highlights some key technical objectives of the DBO contract with particular highlighting on the need to correctly shape and compact the landfill for leachate and stormwater management and to construct and maintain a relative impermeable basal liner of compacted clay.

While Sorsogon officials would optimally seek to raise project funding for all or most of the project through grants, it is possible to borrow funds on a long term basis for at least a major portion of the capital cost. Contractors expressed interest in funding project costs but their options would typically carry a much higher borrowing cost than the City itself. The city recognizes that it would have to repay either bank loans or contractor investment tariffs from general fund revenues (not from solid waste net revenues). This leads to important conclusions that solid waste revenues should be significantly increased and annual debt payment amounts kept within limits so as not to compete with other urgent city needs.

# 1. Introduction

The purpose of this pre-feasibility report under Asian Development Bank RETA 8566 is to summarize and preliminarily assess key commercial and technical issues for the proposed private sector Design Build Operate model for a new Buenavista landfill to be constructed in the City of Sorsogon. This report should be read together with the Solid Waste Action Plan which features a proposed terms sheet and bid parameters for this concession. This study acts as a pre-cursor to a Final Full Feasibility Study along with fully developed Prequalification and Bidding Documents inclusive of a Draft Detailed Contract which could follow on from this RETA.

# 2. Project Description

## 2.1 Project Rationale

The City of Sorsogon has decided to construct a new controlled landfill facility. However, experience from other Local Government Units in the Philippines suggests that best practices for designing, constructing and operating new landfill infrastructure often are not implemented when left to local government management only. Instead, it is better to enlist outside assistance at least during the construction and early to mid-stage operations.

## 2.2 Project Objective

The Project Technical Objectives are described at length in the "New Controlled Landfill Development" Section 15 of the Integrated Solid Waste Management Plan. Specific objectives include designing and maintaining landfill configuration, surface water management, leachate management and maximizing landfill capacity.

These technical objectives of private sector are best addressed by a Private contractor taking full control of landfill operations and being compensated (i) for construction and remediation on a milestone basis and (ii) for operations on the basis of fee per ton of new waste fee for services with deduction for failure to achieve specified performance targets. This ensures a fixed price for construction and remediation and stability in the year to year solid waste disposal operating budget.

## 2.3 Scope of Work Required by RETA 8566

RETA 8566 requires that this Prefeasibility Study covers both technical and commercial aspects for this Public-Private-Partnership project which has been identified in the Integrated Solid Waste Management Strategy. This must include a financial analysis of investment costs, revenue streams and gap in funding (if any). As the initial assessment is on the viability of a private operation, financial analysis is undertaken from the private operator's perspective.

Although not technically required, the report will incorporate a municipal finance section to discuss several grant cum long term debt options that can be considered by the City in raising finance to pay for its new landfill. It is anticipated that the introduction of a private operator will attract more sources of finance and/or debt on better terms than if the City were operating the landfill by itself.

# 3. Context

## 3.1 Policy Context (objectives of PPP structure)

Construction, Operations and Management arrangements range from a small service consulting contract involving no performance risk to a landfill operator taking full control of the City's solid waste disposal function – both employees and finances and responsibility for performance.

The objective of this study is to analyse the full-scale management responsibility option for construction and management but in which the City remains owner.

## 3.2 Technical Context – Performance Targets

There are three sites associated with the contract for solid waste disposal.

The first site is the old Buenavista dumping site which was closed in 2014, but has not been fully remediated. Works required at this site include extinguishing the fires on site as the highest priority and then covering the exposed waste at the toe of the batter on the main cell. The amount of work required is minimal and could be easily integrated into the development of the new landfill on the adjacent property, particularly in terms of hauling soil to be used as cover material in the remediation process.

The current dumpsite at Bato requires significant remediation before closure, in terms of reducing the slope of the external batters which range from 45° up to the angle of repose for the waste deposited. Once the external batter slopes have been reduced to the required 1 vertical to 2.5 horizontal and compacted, then final soil cover to a thickness of 600 mm needs to be applied. The city will need to determine whether the existing footprint of the waste mound extends beyond the actual property boundaries, and if so, must determine the allowable limit of the remediated site's footprint.

Cover soil required for the remediation of the site could possibly be won on site. However, this needs to be determined by the city when reviewing the foot print of the cell compared with the property boundary. If there is little virgin land available within the defined property area, soil will have to be imported to the site.

In terms of the approach to remediation, it would be appropriate to keep operating the site in parallel as the new landfill is being developed. However, the contractor will be obliged to operate the old Bato dumpsite such that the new waste is placed to provide the required final batter slopes. This placement of new waste would be sensibly integrated with the flattening of the external batter slopes to provide the overall required final configuration and slopes.

Given the small size of the site and the increasingly higher clay content within the soil profile at increasing depth, it is considered that it would be unnecessary to remove all waste and place a basal low permeability liner under the mound area. Similarly, given the small size of the site and its remoteness, it is considered unnecessary to install a perimeter leachate interception drainage system leading to a pump station for leachate irrigation or reinjection during wet weather. The site is simply too small to warrant these extensive engineering interventions and are considered unnecessary with the remediation approach described above.

A controlled landfill will be developed at the new Buenavista site. The site has good topography in terms of the main valley feature with reasonable slopes and with the head of the valley being within the property boundary.

The first performance target will be to ensure that all external stormwater runoff is directed away from the landfill cell where small valley features may bring rainwater runoff into the cell location. No runoff should be allowed to enter the cell site.

The second component of landfill development will be the excavation of the base of the landfill to satisfy engineering requirements in terms of slope for requisite lateral drainage and also the longitudinal slope for pipe flow velocity requirements. Given the observed clay content of the soils on site, a relatively impermeable basal liner will then be constructed on the prepared and sloped base by placing 3 to 4 layers of 200 millimetres thick compacted clay. The final design requirements will be agreed with the DENR during detailed design.

A network of leachate drains will then be installed on top of this liner with slotted pipes installed within a gravel surround to maximize leachate interception efficiency.

The leachate pipes will direct leachate into a leachate pumping station located at the downstream end of the first cell. Suitable pumping equipment will be installed within the station to facilitate the irrigation of collected leachate during dry weather over previously worked areas or access roads. In wet weather, a reinjection pit will be constructed at the top of the waste mound to allow leachate to be directed into the top of the mound for absorption within the upper drier waste lifts within the cell.

Other engineering activities will be required, such as a provision of suitable water supplies and wastewater management from the ablution facilities and truck cleaning activities, as well as the installation and maintenance of access roads and landfill equipment and the posting of appropriate signage.

The operation of the site will then be in accordance with the accepted Operations Manual and Environmental Management and Monitoring Plan requirements. One of the key aspects will be to ensure regular cover of the exposed waste with appropriate soil to a minimum thickness of 150 mm. Intermediate areas must be covered to a depth of at least 300 mm with final cover being 600 mm thick.

The other key operational strategy will be to maximize the slope of waste batters within the site leading to minimization of rain water infiltration, and therefore, minimizing leachate volumes. External batters should be compacted and trimmed at the standard site of 1 vertical to 2½ horizontal and with daily working areas and dumping tables having a slope of no less than 5% at any time. A subset of these activities would include having defined allowable tipping areas rather than allowing waste to be deposited anywhere on site, and the establishment of an appropriately sized tipping face to minimize the amount of exposed waste at any time.

Other operational requirements such as collecting any litter on site due to truck spillage or wind will be included. General operational requirements will also need to address flies, rodents and odour issues as appropriate, however these should be readily manageable if the site is operated as described above.

## 3.3 Institutional Context

The outsourcing of landfill management under a private design-build-operate contract would be the first major Private-Public-Partnership of the Sorsogon City government. It would be particularly important to establish effective interface between the waste collection division and the landfill operator. Recycling operations consisting of scavenging rights of City collection employees and existing scavenger on site rights at the landfill should also be maintained.

A contract between the city and a private company for landfill construction and operation would hinge on achievement of performance targets and the City's capacity to fairly assess penalties against a private operator for objective non-performance. This would be best executed by a city official with an inspection / regulatory function. As the contract would be subject to independent arbitration, the subject official would need to have requisite training to avoid repeated appeals to the arbitrator based on professionally faulty judgements.

## 3.4 Results of Market Sounding Exercise

The market sounding with four potential DBO contractors, each with relevant DBO and/or private landfill credentials in the Philippines.

There was strong interest in the DBO concept presented. The proposed DBO for the Sorsogon Buenavista landfill was seen to be a pioneer project due to its long operating period phase. Despite this, operators were open to going well beyond the 10 year operating period indicated in the Solid Waste Action Plan.

There was little objection to the performance targets covered. However, assurance was requested that if the Operator was responsible for cleaning the contiguous section of the access road, that Sorsogon would agree not to allow solid waste related and other commercial business to be located along the road.

There was general concern about the City of Sorsogon's position on movement of existing and new scavengers for the new landfill.

If requested, DBO contractors would be willing to follow a Build-Own-Operate or Build–Operate-Transfer model in which the contract financed the landfill itself and was reimbursed with an additional investment tariff.

## 3.5 Proposed Categories for Performance Targets

The proposed categories for contractual performance targets are presented in detailed in **Annex 4 – Performance Criteria for Landfill Contract.** These would be finalised and agreed during contract negotiations.

However, the performance measures may be summarized as follows:

- Quantity of waste received for landfill
- Construction of landfill base according to design
- Construction of landfill cell according to design
- Remediation of open dump areas
- Adequacy of internal access roads
- Cleanliness of access routes to landfill
- Residents' and private haulers' satisfaction with landfill
- Residents' dissatisfaction with landfill
- Private haulers' dissatisfaction with landfill
- Worker productivity
- Equipment productivity
- Recycling achievements
- Environmental controls
- Hazardous waste segregation
- Fair labour practices
- Occupational health and safety controls
- Fuel consumption
- Reliability
- Communication
- Finance

# 4. Viability

## 4.1 Revenue Potential

A Design-Build-Operate Contract would not by itself generate any revenue. However, the need to pay for such service does focus on city's policies to make solid waste mostly or partially self-sustaining in the long run.

Before initiating any negotiation or discussion for possible financing with any potential funder, it is prudent to evaluate the city's financial capacity to generate internal funds and its respective public financial management system. These two basic features are reflections of the quality of any city's governance and administration. Weak governance or poor public financial management does not generally attract new or external sources of funding.

### 4.1.1 Revenues from Garbage Fee

Business establishments are charged with garbage collection fees as they secure business permits. The fees are based on the nature and size of business and accrue to the General Fund. For the past two years, the city has collected an average of Php856,000, representing a very low 10% of the city's revenues from services (Table 4.1). It is an important policy object for the city to pass appropriate legislation that will support changes in solid waste service fee structure and generate additional revenues to finance the operations of the landfill. The neighbouring municipalities may also be encouraged to dump in the landfill, subject to an appropriate tipping fee.

- **Table 4-1 Historical Garbage Fee Revenues**

| Year | Amount in '000 | % to General Income |
|---|---|---|
| 2014 | Php820 | 9% |
| 2015 | 891 | 11% |
| Average | Php856 | 10% |

### 4.1.2 Historical Sources of Revenues

The city generated an annual average income of Php473 million over the three-year period 2013 until 2015, and estimates to generate Php684 million in 2016. On the average, 15% of these funds come from local sources while 85% come from national transfers in the form of Internal Revenue Allotment (IRA). Clearly, the city relies heavily on the IRA for most of its operational and capital expenses as only a small portion is provided by the local fund sources. This condition is generally inconsistent with the revenue profile of most cities in the recent years. National data indicate that city governments across the country have been making increased use of the authority to statute additional local charges and fees as allowed in the Local Government Code, and improving local tax collection, resulting in high ratio of local revenues against IRA.

The revenues' correlation between own-source and IRA changed little over time (2013-2015) as shown in Table 4.2. IRA dependency rate remained at the 83%-86% range. This situation demands enforcement of some remedies in tax collection or maybe an update of tax code or more intensive collection strategies, for financial stability. Overall, Revenues decreased at an average of 2% per year.

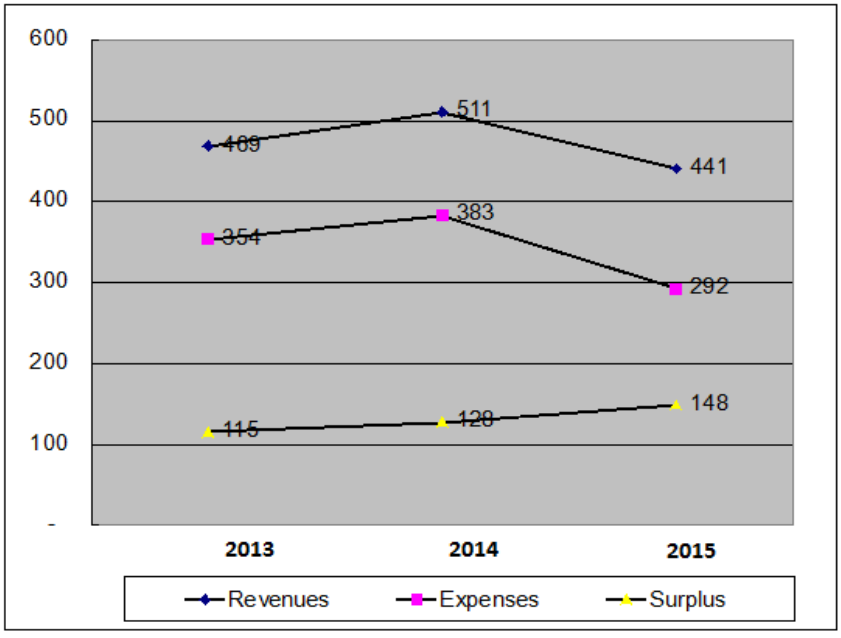
The first six months of 2016, however, showed a significant 48% surge in revenues (annualized), as the city generated total Revenues of Php326 million for that period.

- **Table 4-2 Historical Income Profile 2013-2015 (in million pesos)**

| Income | Actual | | | Average growth rate | Percentage Distribution | | |
|---|---|---|---|---|---|---|---|
| | 2013 | 2014 | 2015 | | 2013 | 2014 | 2015 |
| Real Property Tax | 16 | 15 | 5 | -36% | 3% | 3% | 1% |
| Business tax | 35 | 30 | 37 | 5% | 7% | 6% | 8% |
| Local Taxes (other than RPT and Business) | 16 | 15 | 11 | -16% | 3% | 3% | 2% |
| General Income | 13 | 9 | 8 | -21% | 3% | 2% | 2% |
| IRA | 389 | 437 | 375 | -1% | 83% | 86% | 85% |
| Other General Income (except IRA and Grants) | 0 | 4 | 5 | 13% | 0% | 1% | 1% |
| Total Income | 469 | 510 | 441 | -2% | 100% | 100% | 100% |

### 4.1.3 Net Surplus

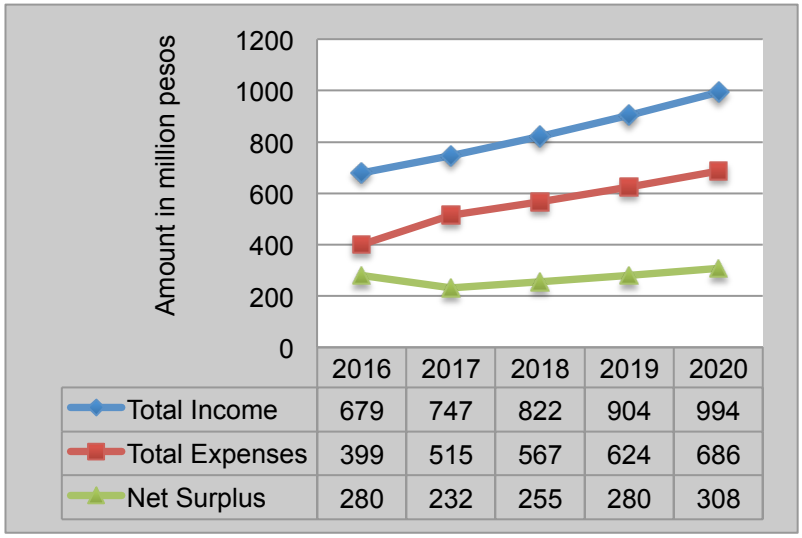
Sorsogon City exhibited an irregular trend both in total income and expenses over the three-year period. But having managed expenses better, lowering it by an annual average of 8%, compared to the 2% average yearly reduction in income, the city postured an increasing net surplus year on year, averaging Php130 million, or a growth rate of 14% (Figure 4.1). Based on its 2016 Budget, it expects to generate a net surplus of Php297 million in that year, although in the following section, the projections have been deliberately prepared more conservatively.



- **Figure 4-1 Historical Financial Profile 2013-2015 (in million pesos)**

### 4.1.4 Projected Net Surplus

Net surplus came close to 31% of total revenues yearly. Assuming the same trend will occur in the next five years while revenues increase by 10%, the city estimates to show an accumulated net surplus of Php1.4 billion in the next five years or approximately Php271 million annually. For the period ending June 30, 2016, the city realized Php108 million net surplus from its current operations, but expects to generate much more during the second half of the year.




| | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|
| Total Income | 679 | 747 | 822 | 904 | 994 |
| Total Expenses | 399 | 515 | 567 | 624 | 686 |
| Net Surplus | 280 | 232 | 255 | 280 | 308 |

- **Figure 4-2 Projected Financial Profile 2016-2020 (in million pesos)**

## 4.2 Financing the Landfill Capital Costs

With the amount needed to finance the landfill development, estimated at **Php31.4 million** (Php48 per USD; 15% contingency), the city would need to look for resources both internally and elsewhere in order not to disrupt the delivery of other public services.

### 4.2.1 Equity and Debt Alternatives

The study explored a number of potential financing mix, with a view to establishing an affordable means of repayment. These investigations considered the following equity and debt alternatives, and scenarios:

- 100% debt
- 90% debt and 10% equity
- 80% debt and 20% equity
- 15-year and 20-year amortization periods
- 5%, Municipal Development fund Office (MDFO); 7%, Government development bank (GFI)

These possibilities have evolved following the identification of the potential use of Municipal Development Fund Project (MDFP) financing window of MDFO, and the existing bank creditor of the city. It is anticipated that the existing bank creditor will follow the loan period of MDFO (from the existing loan term of 10 years to MDFO's 15-20 years, and with grace period on principal of from 1 year to 3 years).

The table below presents the various amortizations based on the different debt-equity alternatives.

- **Table 4-3 Comparative Annual Amortization ( estimates, amounts in million pesos)**

| | 15-year loan period | | 20-year loan period | |
|---|---|---|---|---|
| | MDFO i=5% | GFI i=7% | MDFO i=5% | GFI i=7% |
| 100% debt | 3.025 | 3.448 | 2.520 | 2.964 |
| 90% debt,10% equity | 2.723 | 3.103 | 2.268 | 2.668 |
| 80% debt, 20% equity | 2.420 | 2.758 | 2.016 | 2.371 |

The city will have to commit a percentage of the annual Development Fund (DF) for the yearly amortization of the landfill and/or required equity contribution at the start of the landfill construction. Its 2017 internal revenue allotment (IRA) is Php621.5 million per memo#74 dated June 15, 2016. Based on a conservative assumption that it is considered the average IRA in the next 20 years, the maximum estimated loan amortization will represent around 2.7% of the DF (see Table 4-3). This percentage is within the historical 10% yearly allocation to environmental projects from the city's Development Funds, and the 5% allocation to SWM from its annual budget.

- **Table 4-4 Potential Yearly Contribution of Development Fund of Loan Amortization**

| Particular | Amount In million pesos |
|---|---|
| 2017 IRA (assumed to be the average for next 20 years) | 621.53 |
| 20% Development fund (DF) | 124.31 |
| Estimated maximum annual loan amortization | 3.4 |
| | |
| % of estimated maximum annual loan amortization to DF | 2.7% |

### 4.2.2 Borrowing and Legal Debt Capacity Calculations (under BLGF approval)

The Bureau of Local Government Finance (BLGF) issues the Maximum Borrowing and Debt Service Capacity Certificate, which is a legal requirement by all financing institutions before any new LGU borrowing. Table 4.5 correspondingly uses the method being adopted by BLGF in computing the city's borrowing and debt service capacities.[1] The calculations assume a 20- and 15-year loan periods at 5% annual interest rate.

[1] BLGF calculates net debt service (payments of interest and principal) in any given year as not to exceed 20% of the annual average "regular" income[1] minus annual amortizations on existing debts, while the maximum borrowing capacity is estimated

- **Table 4-5 Estimated Borrowing Capacity (based on BLGF's calculations) in million pesos**

| Debt Service Capacity (DSC) | 140.55 |
|---|---|
| Net DSC | 102.83 |
| Borrowing Capacity (BC), 20 years @ 5% interest rate | 1,281.43 |
| Net BC | 1,103.70 |
| Borrowing Capacity (BC), 15 years @ 5% interest rate | 1,067.32 |
| Net BC | 889.59 |

Should the city decide to borrow 100% of the landfill capital requirements (Php31.4 million), it has both the debt service and borrowing capacities, adhering to the existing policy limits set by the BLGF.

### 4.2.3 Net Revenue Coverage of Debt Service Calculation

Since the current calculation of debt coverage is based on revenues and not on net surplus, it basically assumes that operating expenditures will have to be paid after all debts have been funded. In reality, however, all Personal Services (PS), maintenance and other operating expenses (MOOE) plus all other statutory expenditures have to be fulfilled first.

This study resolves to determine the effects of projected current liabilities to forthcoming debt payments, and therefore presents the Debt Service Coverage Ratio (DSCR) by dividing net operating surplus for the period June 30, 2016 (annualized), by the current financial liabilities as shown on the city's financial position as of June 30, 2016 (Table 4.6). Fortunately, the ratio is more than 1, which means that the city will be able to pay current debt obligations without having to borrow more.

- **Table 4-6 Estimated Debt Service Coverage Ratio (DSCR) (in million pesos, based on June 30 Financial Statements)**

| Surplus from Current Operation (annualized) | 224.38 |
|---|---|
| Financial liabilities | 142.83 |
| DSCR | 1.57 |

by multiplying the net debt service capacity by the annuity factor corresponding to the maturity period and interest rate of a proposed borrowing.

# 5. Financial metrics for Design Build Operate Private contract

The Project's financial metrics are depicted below. The crucial financial metric in any private sector participation is the required Return on Equity (RoE) of the proposition. The project has been modelled with the required RoE as objective and then working backward what the annual revenues to the operator then should be offsetting the CAPEX, OPEX, financing costs and equity return. In addition, and building on the DBO structure, we assume an additional payment during two years from the Municipality to the operator for the landfill investments financed by the Municipality.

An annual payment during the seven year contract term of the operator for operating the landfill of 13.35 PhP million is required in addition to the two years DB payment of 15 PhP million per year. We are assuming this latter would then be paid by the Municipality to the operator according to milestones and construction progress. In addition, the project's minimum debt service coverage ratio of 1.3 suggests that it is highly likely local financing may be obtained.

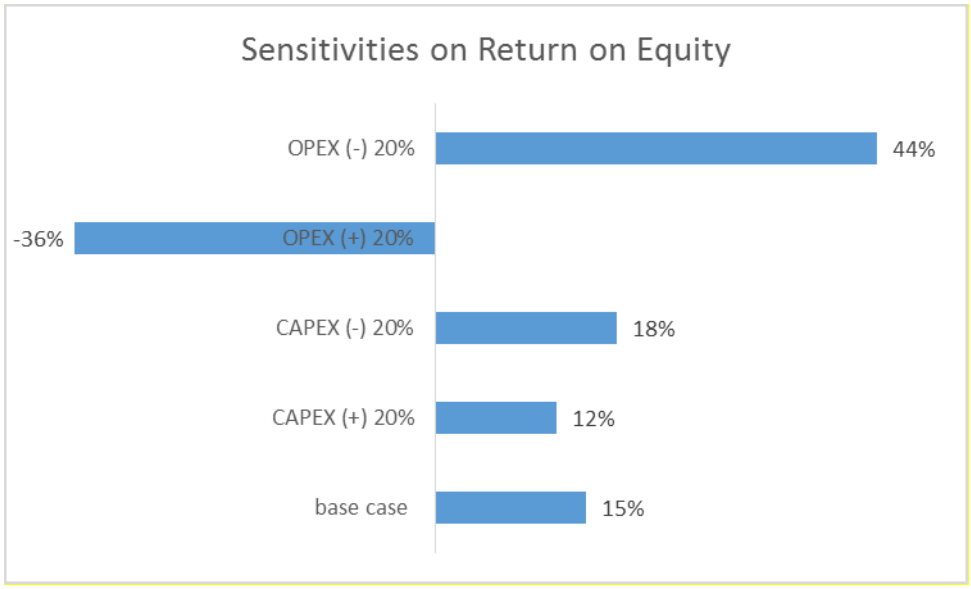
| INPUT | | OUTPUT | |
|---|---|---|---|
| CAPEX invested by operator (Php million) | 19.5 | Minimum DSCR | 1.3 |
| CAPEX in DBO structure (Php million) | 26 | Return on Equity | 15% |
| OPEX (PhP million) | 9.4 | Operating revenues/year (Php million) | 13.35 |
| Contract term management contract (years) | 10 | DBO milestones payment to operator (Php million) | 15 |
| DBO milestones payment to operator (years) | 2 | | |

- **Figure 5-1 Financial Input and Output Figures**

# 6. Risks related to Design Build Operate Private Contractor

## 6.1 Sensitivity Analysis

The purpose of the sensitivity analysis is to deepen our understanding of how realistic and robust the calculated annual revenues payment to the operator is. To this end we test the sensitivities of key variables on RoE. As can be expected, the OPEX have a crucial impact on a landfill's performance as in our PPP structuring the majority of costs paid by the operator are running costs. Remember that the CAPEX are folded into a DBO structure. CAPEX financed by the operator (excluded from the DBO structure) have a medium impact on the RoE only and depicted below.




- **Figure 6-1 Sensitivities on Return on Equity**

## 6.2 Key Risks

The nature of any Public–Private-Partnership structure is to allocate risks to those with the most competence to bear them. For the Landfill construction, operations and maintenance, the economics of the private contractor should be driven almost wholly by performance and cost management. The private contractor should be shielded as much as possible from risks it cannot control such as changes of law or City of Sorsogon policies. The following table lays out many of the most important risks for a business of this type and provides a suggested allocation:

- **Table 6.1 Risk Matrix Covering Landfill Operations and Management Risks**

| Category | Description | Allocation | Mitigation |
|---|---|---|---|
| **Construction Risk** | On Time, On Specification, On Budget Performance | City | Contractor agrees to fixed price, fixed term contract for New Landfill Construction and Existing Landfill Remediation Scope of Work |
| **Operating and Maintenance Performance** | Defined Performance Targets not being met | Private Operator | Liquidated Damages Penalties as Deduction from Operating Fee.<br>Accumulation of [ ] days of Performance Shortfall within quarter year period triggers a Private Contractor contract default and gives the City the right to terminate contract |
| **Cost Over-Run Risk on Equipment Purchase** | Project Costs Exceed Project Budget | Private Operator | Private Operator handles all equipment purchase and equipment is the property to private operator |
| **Need to replace equipment** | Private operator must replace equipment that was not in its budget | Private Operator | Private operator is responsible for correctly estimating reliability and life of equipment in its budget |
| **Domestic inflation risk** | Operating cost increase due to inflation | City | Contract price will be adjusted yearly based on official inflation rate |
| **Private Operator Bank Debt Interest Rate** | Any floating interest rate on Private Operator bank debt increases | Private Developer | The City has no relationship to the Private Developer's lenders. This issue is for the Private Developer to manage. |
| **Cost Overrun on Operations and Maintenance** | Project Costs Exceed Project Budget | Private Operator | Private Operator receives a fixed fee with an adjustment only for domestic inflation rate. Fixed fee is not adjustable for any other reason. |
| **Waste volume risk** | Monthly volume exceeds maximum contracted volume | City | Operator would require excess volume per ton fee. This event would be likely due to other LGU access to the landfill which would compensated by per ton fees paid to City of Sorsogon. |
| **Natural Force** | Sorsogon has | Commercial | Physical Loss Insurance to cover |

| Category | Description | Allocation | Mitigation |
|---|---|---|---|
| **Majeure** | vulnerability to natural force events i.e. weather, fire, etc. | Insurance | equipment losses should be purchased by Private Contractor for Landfill Facility<br>Private Operator is relieved of Performance obligations for time of relevant force majeure |
| **Political Force Majeure** | Municipal contract frustration risk, change of law, expropriation | City | Private Contractor is relieved of Performance obligations for time of relevant force majeure<br>Private Contractor can terminate contract after prolonged period and received contractually determined compensation |

# 7. PPP Commercial Structure

## 7.1 Lessons learned from other Philippine Landfill Operations Contracts

### 7.1.1 Quezon City Payatas Landfill and Controlled Dump

A temporary municipal waste disposal site was established at Payatas some 20 years ago. Initially it was uncontrolled dumping and the city hired a number of bulldozers and excavators from private companies to run the site. However, the equipment suppliers had little or no understanding or interest in running the site even as a controlled dump. It was essentially open dumping with bulldozers and excavators merely attempting to keep the waste within the allowed footprint and little more.

Some 15 years ago, one entire face of the mound collapsed and buried hundreds of local residents, many of whom were employed as scavengers on the site. Quezon City then used their emergency powers to direct hire IPM Contractors to remediate the site to a controlled dump standard and manage the incoming waste in parallel. The conversion to a controlled dump took a number of years and involved reprofiling the mounds, compacting, covering with soil and planting vegetation. Leachate collection drains were installed around the toe of the landfill leading to four leachate pump stations from where the leachate is either irrigated or reinjected.

In parallel, a concession was issued to Pangea, an Italian Company, to extract landfill gas and generate electricity.

Some five years ago, the Department of Environment and Natural Resources required Quezon City to install a controlled landfill on the site and complete the remediation and closure activities for the remainder of the site, and cease managing waste through a controlled dump approach. Initially a three-hectare landfill was developed on the site. This has been extended a number of times as the footprint in the Mondragon area has expanded northwards into land previously occupied by informal settlers that have been voluntarily resettled.

The engineering aspects implemented at Payatas would be similar to those required for any currently uncontrolled or even controlled dumpsite. Namely the site has to be reprofiled, compacted and covered and possibly leachate interception drainage systems retrofitted around the batter toe as required. The only difference between Payatas and many dump sites in the Philippines would be the scale, but the approach of integrated design, build, remediate and operate under one contract has proven effective. Should old dump sites be remediated, upgraded and operated under three separate contracts, it would be expected that significant inter-contract arguments would result regarding site access limits etc. Further, these upgrading activities would have possible disconnects with ongoing disposal operations as well. A fully integrated approach with design, remediation, construction and operation under one contract is the preferred model.

The contracting out of the landfill gas collection and power generation activities is generally only appropriate for sites receiving well over 500 tons per day of municipal waste. Therefore, many sites in the Philippines would not satisfy these criteria and electricity generation from gas recovery would be uneconomic.

## 7.2 Review of Legazpi City Landfill

The RETA 8566 consultant team conducted a site visit of the Legazpi City landfill which was funded by a grant from a Western European Country bilateral agency and has been in operation by city staff for about five years. The report from this visit in Annex 4 reaches the conclusion that “the landfill design is consistent with that of a controlled or even sanitary landfill but operation is an uncontrolled dump”. This conclusion highlights the need for a more specialist management of the landfill.

## 7.3 Proposed PPP Model

Given the potential liabilities involved with a landfill, private operators do not want to be involved in ownership. However, outsourcing of landfill construction and operations on a limited liability basis is common.

Design-Build-Operate Contracts generally are more effective if the Private Contractor’s return is based on both technical and commercial performance together. If only technical performance was required, then there is risk of little cost control. If cost control were the main objective, performance could be low.

# 8. Implementation Plan

## 8.1 Next Steps

Project Approval – The City of Sorsogon has authority to either (i) seek approval under the existing Philippine PPP law regulations or (ii) use its powers under Section 302 of the Local Government Unit Code. The Policy and Regulatory Reform paper will address areas of ambiguity in these approval processes for this project in particular.

Draft Bidding Documents and Draft Contract – Should be undertaken by professional advisors.

## 8.2 Time Table

- Prequalification and Bid Document Drafting ……..... [4] months
- Prequalification Stage ……... [2] months
- Bid period ……..... [4] months
- Evaluation ……... [3] months
- Contract finalization with preferred bidder and Award ……..... [2] months
- Financial Close ……. [6] months

# Annex 1: Financial model

- **A: Macro-economic**

| | Item | Unit | Value |
|---|---|---|---|
| | Corporate Income Tax | % | 25% |
| | Inflation CPI | % | 3.0% |
| | USD/PhP | PhP | 46 |
| | Escalation Revenues | % | 3.0% |
| | Escalation OPEX | % | 3.0% |
| | Operating Days per Year | # | 365 |

- **B: Project Timetable**

| Item | Unit | Value |
|---|---|---|
| Construction period | years | 1 |
| year -2 | %/total construction | 0% |
| year -1 | %/total construction | 0% |
| year 0 | %/total construction | 100% |
| concession term | year operations | 10 |
| Construction period | years | 1 |

- **C1: CAPEX: Financed by operator (excluded from the DBO)**

| CAPEX financed by operator (excluded from the DBO) | Unit | Number | PhP | Description |
|---|---|---|---|---|
| **Landfill Operating Equipment** | | | | |
| Dozer (Caterpillar D6 or equivalent with landfill blade) | Item | 1 | $250,000 | D6 size assumed and high quality supplier |
| Excavator/ end Loader - assume Caterpillar D200 or equivalent | Item | 1 | $100,000 | For loading cover soil and any waste to be relocated. Drain cleanouts. |
| 10 wheeler tipping dump truck | Item | 1 | $60,000 | New one just purchased |
| 8,000L Water tank with pump | Item | 1 | $12,000 | For watering gravel roads and fire control. Lifted onto the back of the 10 wheel tip truck when required. Also used for fire control if required. |
| Total | | | **$422,000** | |

- **C2: CAPEX Items**

| CAPEX items | USD | PhP million |
|---|---|---|
| trucks | 422,000 | 19.5 |
| **Items** | **US$** | **PhP (million)** |
| equipment | 422,000 | 19.5 |
| | **422,000** | **19.5** |
| sensitivity | 1 | |

- **C3: CAPEX Items (Additional Information for Equipment)**

| Equipment | years depreciation | 7 |
|---|---|---|
| Civil works | years depreciation | na |
| Annual depreciation equipment | US$ | 60,286 |
| Annual depreciation equipment | PhP million | 3 |

- **C4: CAPEX: included in the DBO contract**

| Item | Unit | Value |
|---|---|---|
| Total CAPEX in DB structure | US$ | 568,350 |
| Total CAPEX in DB structure | Php million | 26 |
| Years repayment DB to operator | years | 2 |
| Annual payment DB to operator | US$ | 324,076 |
| Annual payment DB to operator | Php million | 15 |

- **D: OPEX**

| Item | Description | Hours/ day | Number | No of Days/ year | Rate (US$) | Unit | Annual Cost (US$) |
|---|---|---|---|---|---|---|---|
| **Staff** | General Manager (office based mainly) | 1 | 1 | 312 | 1000.00 | month | 1,500 |
| | Site Engineer (Part time) | 1 | 1 | 312 | 800.00 | month | 1,200 |
| | Site Supervisor | 8 | 1 | 312 | 450.00 | month | 5,400 |
| | Dozer Driver/Excavator Driver | 8 | 1 | 312 | 350.00 | month | 4,200 |
| | Truck Driver | 8 | 1 | 312 | 300.00 | month | 3,600 |
| | Gate keepers/clerk recording waste loads | 8 | 2 | 312 | 300.00 | month | 7,200 |
| | General Hands | 8 | 4 | 312 | 250.00 | month | 12,000 |
| **Equipment** | | | | | | | |
| Dozer | Caterpillar D6 or equivalent | 3 | 1 | 312 | 35 | hour | 32,760 |
| Excavator/Loader | Caterpillar 200 series or equivalent | 1 | 1 | 312 | 30 | hour | 9,360 |
| Truck | Rigid body 6 X 4 10 wheel tipper | 1 | 1 | 312 | 20 | hour | 6,240 |
| Leachate Pumps | 5kW electric motor driving a submersible progressive cavity pump | 2 | 1 | 365 | 4 | hour | 2,920 |
| **Materials** | | Cubic Metres/year | | | | | |
| Cover soil | Assume 10% soil to waste volume on average | 1870 | | | 0 | Cubic Metres | |
| | | | | | | | |
| **Miscellaneous** | | | | | | | |
| Topographical Survey of landfill | Annual | | 1 | | | Item | 2,500 |
| Minor items and utilities | Allowance for general office power, water, phone and other minor items, such as signage | | 1 | | | Item | 6,000 |
| **TOTAL** | | | | | | | **$94,880** |

- **E: Revenues**

| Item | Value | Unit | Return on Equity |
|---|---|---|---|
| Annual payment municipality | 13.35 | PhP million | 15% |
| Annual payment municipality | 289,588 | USD | |

- **F: Funding and Senior Debt**

| Items | Unit | Value |
|---|---|---|
| **Funding** | | |
| Required Return on Equity | % | 15% |
| gearing ratio debt | % | 70% |
| gearing ratio equity | % | 30% |
| net working capital/% total revenues | % | 10% |
| **Senior debt** | | |
| Interest rate | % | 8% |
| Loan tenor | years | 7 |
| Grace period interest payment | years | 0 |
| dividend pay out ratio available cash | % | 1 |
| WACC | % | 9.23% |

- **Income Statement (PhP)**

| INCOME STATEMENT (PhP million) | | Year | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| **1** | **Revenues** | | | | | **13.751** | **14.163** | **14.163** | **14.588** |
| 1.1 | Payment municipality | | | | | 13.751 | 14.163 | 14.163 | 14.588 |
| **2** | **Operating Expenditures** | | | | | **9.655** | **9.945** | **9.945** | **10.243** |
| 2.1 | Total O&M | | | | | 9.655 | 9.945 | 9.945 | 10.243 |
| **3** | **Operating results (EBITDA)** | | | | | **4.095** | **4.218** | **4.218** | **4.345** |
| **4** | **Other costs** | | | | | **3.869** | **3.713** | **3.557** | **3.402** |
| 4.1 | Depreciation equipment | | | | | 2.779 | 2.779 | 2.779 | 2.779 |
| 4.2 | Interest loans | | | | | 1.089 | 0.934 | 0.778 | 0.623 |
| **5** | **Net profit/loss before corporate income tax** | | | | | **0.227** | **0.505** | **0.661** | **0.943** |
| **6** | **Corporate income tax** | | | | | **0.057** | **0.126** | **0.165** | **0.236** |
| **7** | **Net profit/loss after corporate income tax** | | | | | **0.170** | **0.379** | **0.496** | **0.707** |

- **Income Statement (PhP) (Con't)**

| INCOME STATEMENT (PhP million) | | Year | | | | | |
|---|---|---|---|---|---|---|---|
| | | 5 | 6 | 7 | 8 | 9 | 10 |
| **1** | **Revenues** | **15.026** | **15.476** | **15.941** | **16.419** | **16.911** | **17.419** |
| 1.1 | Payment municipality | 15.026 | 15.476 | 15.941 | 16.419 | 16.911 | 17.419 |
| **2** | **Operating Expenditures** | **10.867** | **11.193** | **11.529** | **11.875** | **12.231** | **12.598** |
| 2.1 | Total O&M | 10.867 | 11.193 | 11.529 | 11.875 | 12.231 | 12.598 |
| **3** | **Operating results (EBITDA)** | **4.159** | **4.283** | **4.412** | **4.544** | **4.680** | **4.821** |
| **4** | **Other costs** | **3.246** | **3.090** | **2.935** | **2.779** | **2.779** | **2.779** |
| 4.1 | Depreciation equipment | 2.779 | 2.779 | 2.779 | 2.779 | 2.779 | 2.779 |
| 4.2 | Interest loans | 0.467 | 0.311 | 0.156 | 0.000 | 0.000 | 0.000 |
| **5** | **Net profit/loss before corporate income tax** | **0.912** | **1.193** | **1.477** | **1.765** | **1.901** | **2.042** |
| **6** | **Corporate income tax** | **0.228** | **0.298** | **0.369** | **0.441** | **0.475** | **0.510** |
| **7** | **Net profit/loss after corporate income tax** | **0.684** | **0.895** | **1.108** | **1.324** | **1.426** | **1.531** |

- **Sources and Application of Funds (Php million)**

| | Total | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| **Cashflow operating actiities** | | | | | | | | | |
| Net profit | | | | | | 0.1700 | 0.3789 | 0.4956 | 0.7073 |
| Depreciation | | | | | | 2.7792 | 2.7792 | 2.7792 | 2.7792 |
| **Net cash flow operating activities** | | **0** | **0** | **0** | **0** | **2.9492** | **3.1581** | **3.2748** | **3.4864** |
| **Cashflow investment activities** | | | | | | | | | |
| Investments equipment | | 0 | 0 | 0 | 19.5 | | | | |
| **Net cashflow investment activities** | | **0** | **0** | **0** | **-19.5** | **0** | **0** | **0** | **0** |
| **Cashflow financing activities** | | | | | | | | | |
| Loan disbursements | | 0 | 0 | 0 | 14 | | | | |
| Equity contributions | | 0 | 0 | 0 | 5.8 | | | | |
| Principle debt servicing | | | | | | 1.9454 | 1.9454 | 1.9454 | 1.9454 |
| **Net cashfow financing activities** | | **0** | **0** | **0** | **19.5** | **-1.9454** | **-1.9454** | **-1.9454** | **-1.9454** |
| **Free cashflows** | | **0** | **0** | **0** | **0** | **1.0038** | **1.2127** | **1.3294** | **1.5410** |
| **Free cashflow accumulated** | | **0** | **0** | **0** | **0** | **1.0038** | **2.2164** | **3.5458** | **5.0868** |

- **Sources and Application of Funds (Php million) (Con't)**

| | Year | | | | | |
|---|---|---|---|---|---|---|
| | **5** | **6** | **7** | **8** | **9** | **10** |
| **Cashflow operating activities** | | | | | | |
| Net profit | 0.6844 | 0.8946 | 1.1077 | 1.3237 | 1.4260 | 1.5313 |
| Depreciation | 2.7792 | 2.7792 | 2.7792 | 2.7792 | 2.7792 | 2.7792 |
| **Net cash flow operating activities** | **3.4635** | **3.6738** | **3.8869** | **24.1029** | **25.2052** | **26.3105** |
| **Cashflow investment activities** | | | | | | |
| Investments equipment | | | | | | |
| **Net cashflow investment activities** | **0** | **0** | **0** | **0** | **0** | **0** |
| **Cashflow financing activities** | | | | | | |
| Loan disbursements | | | | | | |
| Equity contributions | | | | | | |
| Principle debt servicing | 1.9454 | 1.9454 | 1.9454 | 1.9454 | 1.9454 | 1.9454 |
| **Net cashflow financing activities** | **-1.9454** | **-1.9454** | **-1.9454** | **-1.9454** | **-1.9454** | **-1.9454** |
| **Free cashflows** | **1.5181** | **1.7284** | **1.9415** | **22.1575** | **23.2597** | **24.3650** |
| **Free cashflow accumulated** | **6.6049** | **8.3333** | **10.2748** | **71.5385** | **94.7983** | **119.1633** |

# Annex 2: Value for Money (VfM) Analysis

Given the constraints of the current PFS, we have prepared a quantitative VfM assessment only and have excluded other qualitative decision making variables such as Government funds availability, contract management and bidding capacities, The NPV of total revenues minus total life cycle costs (CAPEX and OPEX) gives an indication of the VfM in both procurement strategies. In the public procurement options, due to in-transparencies and in-efficiencies of public entities in general, we assume both CAPEX and OPEX distortions presented below. VfM then equals the difference in NPV between both procurement strategies and we can observe below that the PPP procurement has a clear VfM advantage vis-a-vis the public procurement.

| **Value for Money PPP vs Public Procurement**<br>***Cashflows to project discounted @ WACC*** | |
|---|---|
| CAPEX distortion in public sector procurement | 50% |
| OPEX distortion in public sector procurement | 20% |
| NPV (PhP million) PPP procurement | -11.3 |
| NPV (Php million) public procurement | -25.8 |

# Annex 3: Legazpi Landfill Inspection

The landfill was inspected on the 1st of September 2016.

The landfill was constructed in 2010/11 and has been operating for about five years. It cost approximately PhP50M at the time of construction, which included the landfill proper, associated buildings and road works but not equipment. The grant came from Spanish bilateral funds.

At the time of inspection, the landfill bulldozer was under repair, and appeared to not have been operating for a protracted period.

## Landfill lining

The lining consists of a HDPE liner with a geotextile protective barrier on top. However, over the years, the geotextile has completely disintegrated in the second cell and only remnants remain at the bottom of the liner slope. This does not mean the underlying HDPE liner is compromised but it will be susceptible to damage as waste is placed into the cell.

The geotextile protective layer is also destroyed within the active cell as shown below where there are only ribbons of geotextile remaining along the liner batter.

No physical damage of the HDPE liner either within the active or the future cell could be observed. However there may be damage to the liner underneath waste that has been placed previously.

## Landfill operation

The landfill design is consistent with that of a controlled or even a sanitary landfill, but the operation is an uncontrolled dump.

Waste is placed relatively randomly within the active cell and only a very small portion of the entire cell has ever been covered with soil. The waste is placed essentially at a flat grade which would result in almost all rainfall falling onto the waste percolating into the mound and generating leachate. Even if budgetary constraints mean that sufficient quantities of cover material are unavailable, the site could be far better operated in terms of providing significant slope on the waste to at least limit the amount of rainfall infiltration into the waste that is currently occurring.

The active tipping face is not clearly defined and should only be a maximum of 25 m wide for such a relatively small operation. Furthermore, waste should be placed at the base of this tipping area to facilitate better compaction as the bulldozer or other equipment compacts the waste by pushing up the slope. At the moment, the waste is merely dumped somewhat randomly without consideration of compaction and other cell construction requirements.

Even if this profiling to achieve the desired 1 vertical is to 2.5 horizontal cannot be achieved for some reason, then at least the surface of the mound should be compacted and all localised depressions removed. The large number of minor depressions over the site will guarantee the formation of excess leachate.

## Leachate

Along the northern face of the active landfill cell, leachate is leaking out over the majority of this face. The leachate is not directly escaping from the site at present because it enters the perimeter concrete storm water drainage network. However, following protracted wet weather when the leachate flows would be higher, then this leachate will be exiting the site. The fact that leachate is overflowing from the cell even during dry weather indicates that the entire cell is full of leachate from the top of the liner to the base.

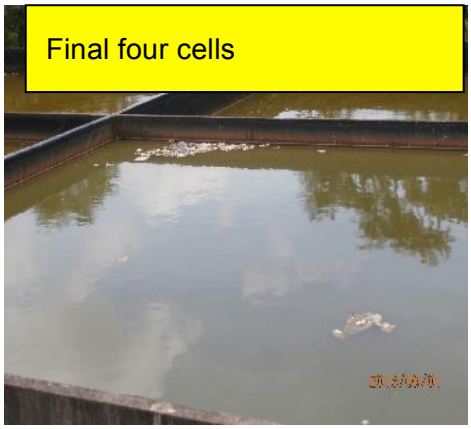
This leachate expression would indicate that the leachate pipe network designed to intercept and collect the leachate and divert it to the adjacent leachate treatment plant is not functioning correctly. Samples of the leachate pipe were displayed in the administration building and it is considered that this is an inappropriate type of pipe to be placed under only waste mound. It consists of a cardboard structure pattern with an inner and outer plastic lining with a ripple packing structure in between. The completed pipe diameter can be made to set exact requirements but it is not a structurally strong piping system.

It is believed that the pipe system has been crushed by the placing of waste, therefore, leachate is merely building up in the cell and not being conveyed to the adjacent leachate treatment plant.

## Leachate treatment plant

The leachate treatment plant was also inspected. It does not appear to be receiving a significant (if any) amount of leachate from the adjacent active cell. This corresponds with the observation that the current active cell is overflowing with leachate, which should be flowing into the treatment plant. But as noted above, it is likely that the pipe network has been destroyed because of an inappropriate choice of material for the leachate piping.

The contents of the leachate treatment plant indicated an algal rich environment, which would be typical of aerobic or facultative conditions rather than typically anaerobic conditions associated with impounded leachate. In such cases, the leachate treatment plant contents would be expected to be of a blackish or dark grey


colour.

## Conclusion

In summary, no benefit has been obtained from the provision of the landfill infrastructure as it is merely an open dump. Leachate will exit the site in protracted wet weather causing localized pollution. The uncovered waste will be attracting vermin, producing malodours, allowing windblown litter to exit the site as well as attracting excessive bird populations.

Budgetary limitations are not an excuse for this unacceptable standard of operation as better operational knowledge and the following of a suitable staging plan could significantly improve the facility without significant additional cost.

It should be emphasized that this is far from being a unique situation and is, in fact, the expected outcome of good intentions by providing the appropriate physical infrastructure, but not following through with sufficient training or support for operation and implementation.

# Annex 4 – Performance Criteria for Landfill Contract

- **Table: Performance Monitoring Measures for Solid Waste Collection Operations**

| Performance measures | What is measured? | How is it measured? | Where is it measured ? | How often is it measured? | By whom is It measured ? | Basis for sanction ? |
|---|---|---|---|---|---|---|
| **Quantity of waste received for landfill** | Waste quantity per shift<br>Waste quantity per day | Weighbridge records (if weighbridge installed)<br>Landfill inspection reports<br>Landfill records<br>Vehicle log books | Landfill | Daily | City | No |
| **Construction of landfill base according to design** | Compaction of base soils at optimum moisture<br>Slope of base soils<br>Placement and sealing of impermeable liners<br>Placement and slope of leachate collection system | Survey instruments observed to be used during construction<br>Construction inspection reports | Landfill | During Construction | City | Yes |
| **Construction of landfill cell according to design** | Daily delineation of working face boundaries<br>Survey of coordinates and elevations of daily cell construction, including slope of working face<br>Continuous on-site availability of design drawings and O&M manual<br>Closure of cell when final design elevation is reached<br>Respect of maximum angle for side slopes<br>Respect of minimum requirement for base slopes | Survey instruments observed to be used daily<br>Marking up of daily progress in cell construction on design drawings<br>Topographic survey map of completed cell area when final design elevation is reached | Landfill | Daily | City | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Remediation of open dump areas** | Survey of coordinates and elevations of cell construction, including slope of working face<br>Continuous on-site availability of design drawings<br>Closure of cell when final design elevation is reached<br>Respect of maximum angle for side slopes<br>Respect of minimum requirement for base slopes if waste is removed and not covered in-situ | Survey instruments observed to be used daily<br>Marking up of daily progress in cell construction on design drawings<br>Topographic survey map of completed cell area when final design elevation is reached | Old dump areas/site | Weekly | City | Yes |
| **Adequacy of internal access roads** | Roads free of waste<br>Roads usable in all weathers<br>Adequate drainage to keep roads<br>free of flooding | Vehicle log books (Operational delays of collection vehicles at landfill)<br>Landfill inspection reports | Landfill | Daily | City | No |
| **Cleanliness of access routes to landfill** | Litter<br>Clandestine waste piles<br>Waste in drains Improperly placed waste bins | Zone inspection reports | Service Zones | Daily | City | Yes |
| **Residents' and private haulers' satisfaction with landfill** | Perception about environmental<br>acceptability of landfill operation<br>Willingness to pay<br>Willingness to participate with service requirements | Surveys of customer satisfaction<br>Surveys of willingness to pay | Area around landfill<br>All haulers | Semi-annually | City<br>Local districts | No |
| **Residents' dissatisfaction with landfill** | Complaints about landfill noise, dust, odour, traffic, appearance and increase in vectors | Inspection reports<br>Records of complaints | Area around landfill | Monthly | Districts | Yes |
| **Private haulers' dissatisfaction** | Complaints about landfill noise, dust, | Inspection reports | All haulers | Monthly | City | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| **with landfill** | odour, traffic, appearance<br>Complaints about delays suffered by collection vehicles at landfill, damage to vehicles and tires, inappropriate tipping fee charges, operation of weighbridge, difficulty in driving to working face | Records of complaints<br>Records of follow-up to complaints | | | | |
| **Worker productivity** | Number of workers in service<br>Waste quantity per worker and shift<br>Absenteeism | Landfill inspection reports<br>Records at landfill | Landfill | Monthly | City | No |
| **Equipment productivity** | Number of equipment units in service<br>Waste quantity per equipment unit each shift<br>Waste quantity per equipment unit each day<br>Equipment downtime | Landfill inspection reports<br>Records at landfill | Landfill | Monthly | City | No |
| **Recycling achievements** | Types of secondary materials recycled<br>Quantity of secondary materials recycled | Landfill inspection reports<br>Records from sales of recyclables | Landfill | Monthly | City | No |
| **Environmental controls** | Control of equipment exhaust emissions<br>Windblown litter<br>Dust<br>Noise<br>Control of area of working force<br>Daily compaction of deposited waste<br>Use of adequate daily cover at the end of each day's work | Equipment emission inspection reports<br>Landfill and area inspection reports<br>Complaints about emissions, noise, dust and litter<br>Fly count, rodent count, bird count<br>Pesticide application records<br>Size of daily refuse cell<br>Monitoring of leachate treatment | Landfill and surrounding area | Weekly | City<br>Districts | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Washing of equipment<br>Flies, rodents, birds<br>Leachate treatment and discharges<br>Control of landfill gas<br>Drainage of surface water- adequacy and maintenance<br>Presence of unauthorized people or Records of incoming animals<br>Presence of hazardous wastes<br>Recording of all collected waste loads<br>Provision and maintenance of an attractive vegetative buffer around operational areas | plant discharges<br>Groundwater and surface water monitoring<br>Monitoring of landfill gases<br>Records of incoming waste loads | | | | |
| **Hazardous waste segregation** | Refusal to accept industrial or commercial hazardous waste<br>Provision of special collection and storage area for household hazardous waste | Landfill inspection reports<br>Inspection of loads at disposal sites | Landfill Disposal sites<br>Records from service provider | Monthly | City | Yes |
| **Fair labour practices** | Wage paid - minimum or above<br>Payment for overtime<br>Medical expenses coverage<br>Vacation and holiday allowances<br>Adequacy of work breaks<br>Proper hiring and justifiable termination procedures | Landfill inspection reports<br>Survey of workers | Landfill Records from service provider | Monthly | City | Yes |
| **Occupational health and safety** | Use of gloves and boots | Landfill inspection reports | Landfill Records | Monthly | City | Yes |

| | | | | | | |
|---|---|---|---|---|---|---|
| **controls** | Use of respiratory masks<br>Functioning air conditioning on all equipment units<br>Adequacy of roll-bars<br>Replacement of filters on air conditioners<br>Use of uniforms<br>Annual medical checks<br>Provision of vaccinations<br>Control over size and weight of lifted loads<br>Number of accidents<br>Health and safety training of all landfill personnel<br>Practice of emergency and evacuation procedures<br>Continuous presence and functionality of fire protection and other emergency equipment<br>Continuous on-site presence of health & safety manual<br>Posting of health & safety telephone numbers<br>Adequate accident liability coverage<br>Operational night-time illumination<br>Reversing lights and audio signals on all equipment | Survey of workers<br>Medical records<br>Accident records<br>Inspection of equipment units<br>Insurance policies | from service provider | | | |
| **Fuel consumption** | Fuel records on consumption – per hour and per tonne<br>Maintenance records on engine | Equipment log books<br>Equipment maintenance reports | Landfill Records from service provider | Monthly | City | No |

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| | calibration | | | | | |
| **Reliability** | Downtime of equipment<br>Number of accidents<br>Number of slides, erosion events | Equipment log books<br>Landfill inspection reports | Records from service provider | Monthly | City | No |
| **Communication** | Notification of service problems<br>Continuous accessibility by radio | Correspondence files<br>Landfill inspection reports<br>Radio functioning between landfill and central offices | Letters from service provider | Monthly | City | No |
| **Finance** | Payment of government property, income, VAT, and corporate taxes, etc., as required<br>Regular payment of fair wages and benefits to workers | Financial records<br>Independent auditor reports | Records from service provider | Yearly | City | Yes |