MUNICIPAL SERVICE DELIVERY AND PPP GUIDELINES

TOOLKIT
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FEASIBILITY STUDY TOOLKIT: SOLID WASTE MANAGEMENT

NATIONAL TREASURY AND
DEPARTMENT OF PROVINCIAL AND LOCAL GOVERNMENT

MUNICIPAL SERVICE DELIVERY AND PPP GUIDELINES

FEASIBILITY STUDY TOOLKIT:

SOLID WASTE MANAGEMENT

ABOUT THIS TOOLKIT

The Feasibility Study Toolkit: Solid Waste Management is an appendix to the Municipal Service Delivery and PPP Guidelines. It deals with some aspects of the feasibility study for a solid waste management partnership:

- Stage 1: Needs analysis
- Stage 2: Technical options analysis
- Stage 3: Service delivery options analysis
- Stage 6: Value assessment.

The full process and procedures for considering any municipal service partnership are set out in the Guidelines. These processes and procedures must be followed carefully. Use the toolkit for the specific complementary information it provides.

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ACRONYMS

CBO	community based organisation
DEAT	Department of Environmental Affairs and Tourism
DPLG	Department of Provincial and Local Government
EIA	environmental impact assessment
HDPE	high density polyethylene
IDP	integrated development plan
IAP	interested and affected person
IWMP	integrated waste management plan
MFMA	Municipal Finance Management Act
MIG	municipal infrastructure grant
MSA	Municipal Systems Act
NWMS	national waste management strategy
PET	polyethylene terephthalate
REL	rear end loader
SMME	small, medium and micro enterprises

INTRODUCTION

A complicated service

Solid waste management is one of the most complicated services that a municipality provides. It is dramatically different from other municipal services, such as delivering water and electricity.

> **"Solid waste"** means waste of a solid nature generated by a person, business or industry.

Delivering water and electricity mainly requires a passive system of pipelines and wires, and the municipality controls the flow of the service to the customer. The municipality can meter the flow and interrupt the service if payment is not made. But collecting and disposing of solid waste requires an active system, which relies heavily on mobile equipment and labour. It is not just one material or service, but includes numerous materials and activities. Waste is generated by the customer, who must play an active role in ensuring that it is disposed of properly. The service is very difficult to meter, and interrupting it for any reason, including non-payment, will lead to public health and environmental problems.

The environment and human health

Failure to properly manage solid waste can result in significant environmental and health impacts. Piles of uncollected or illegally dumped waste are breeding grounds for many infectious diseases. Children are often attracted to waste, scavenging for reusable materials and food. Animals, including rats, and flies and mosquitoes are also attracted to waste. Their contact with the waste and each other spreads the diseases.

> **"Scavenging"** means the unauthorised separation of solid waste for recyclable materials and food for human consumption.

Uncollected or illegally dumped waste will also harm the environment. People often set piles of waste on fire, which pollutes the air. Waste oil and other liquids can pollute water, both underground and on the surface. And plastic bags, which we see everywhere, are unattractive to look at.

While households and others are primarily responsible for managing their own waste, there must also be an efficient, comprehensive government programme for collection and disposal to make sure that environmental and health impacts are kept within manageable limits.

Municipal service or municipal support activity?

Different legislation will apply, depending on the type of activity a municipality is assessing for service delivery options.

"Municipal service" means a service that a municipality in terms of its powers and functions provides or may provide to or for the benefit of the local community irrespective of whether: (a) such service is provided by the municipality through an internal mechanism or by engaging an external mechanism and (b) fees, charges or tariffs are levied in respect of such service or not.

The following solid waste management activities are municipal services:

- cleansing: street cleaning
- refuse removal
- refuse dumps
- solid waste disposal.

If the activity is a municipal service, the municipality must follow the provisions of the Municipal Services Act (MSA) Chapter 8. If after completion of MSA Chapter 78 (1), the municipality elects to explore external options involving a private party, the provisions of the Municipal Finance Management Act (MFMA) Section 120 also apply.

"Municipal support activity" means an activity that is reasonably necessary for or incidental to the effective performance of a municipal function and exercise of its powers that does not constitute a municipal service.

There are many solid waste management activities performed by municipalities that are not defined as municipal services as they are not provided to or on behalf of the local community, nor are they listed in Schedule 4B or Schedule 5B of the Constitution. Most of these activities are cost saving measures that reduce the overall cost of waste collection and disposal or reduce the environmental impacts of waste management, including the following:

The following solid waste management activities are municipal support activities:

- recycling
- waste minimisation
- composting
- green and garden waste
- waste processing
- methane gas recovery.

"Recycling" means the sorting, processing, and transportation of solid waste materials, products or containers for the purpose of remanufacture or reuse.

"Sorting" means the authorised separation of solid waste materials for the purpose of recycling or disposal, either at the source of generation or at a solid waste management facility.

"Landfill gas" means the gaseous byproduct of organic decomposition of landfilled waste. Landfill gas contains significant concentrations of methane gas which is explosive at concentrations exceeding 5%.

If the function is a municipal support activity, MSA Chapter 8 does not apply, and MFMA Section 120 applies only if the external option is a PPP. If not a PPP, the municipal support activity may be procured as a municipal good or service, following standard supply chain procedures.

Waste management activities a municipality should not provide

There are some solid waste management activities which are not municipal responsibilities, including the handling, treatment and disposal of hazardous waste, medical waste, and radioactive waste. Municipalities should not provide these services because they are highly technical and the performance risks are high. Handling, treating and disposing of these wastes are the responsibility of the generators of those wastes and these activities are regulated by the national Department of Environmental Affairs and Tourism (DEAT). Municipalities should, however, play an active role in assisting DEAT to enforce national regulations and guidelines about these wastes.

"Treatment" means any method, technique or process that is designed to change the physical, biological, or chemical character or composition of a waste, or to remove, separate, concentrate or recover a hazardous or toxic component of a waste, or to destroy or reduce the toxicity of the waste in order to minimise the impact of the waste on the environment.

"Hazardous waste" means any waste which by reason of chemical reactivity, or toxic, explosive, corrosive or other characteristics causes danger or is likely to cause danger to human health or the environment, whether alone or in combination with other wastes. Hazardous waste is categorised in four hazard ratings with 1 being the most hazardous and 4 being the least hazardous.

"Medical waste" means any infectious or potentially infectious waste generated by hospitals, clinics, nursing homes, doctors' offices, medical laboratories, research facilities and veterinarians.

Development and strategic planning

Every municipality is required to complete an integrated development plan (IDP) and an integrated waste management plan (IWMP) in accordance with the national waste management strategy (NWMS).

The NWMS includes the following strategic objectives:

- Implement general waste collection services in unserviced and poorly serviced areas.
- Promote waste separation at source.
- Develop recovery centres following separation at source.
- Minimise the environmental impacts of waste disposal facilities and litter.
- Ensure that sufficient waste disposal sites are planned, permitted and developed.
- Develop and implement a waste information system.
- Capacitate people and create job opportunities.

An IWMP uses the strategic objectives of the NWMS to measure the municipality's service delivery performance and establish an implementation plan for eliminating these gaps. The gap may be an existing activity which is not meeting minimum standards, or a new activity to extend services to a new service area. The IWMP may also identify gaps in meeting some of the non-mandatory environmental goals, which may not involve a basic service, but are included within the NWMS. The implementation plan must prioritise the service delivery gaps and present recommendations. In general, gaps in meeting basic municipal services should carry a higher priority than those meeting functions which are not basic services or non-mandatory environmental objectives.

MSA trigger mechanisms

In addition to being defined by an IDP or IWMP some solid waste management activities which are municipal services must undergo an MSA 78 (1) review if the service meets one of the trigger mechanisms defined in MSA 77.

FEASIBILITY STUDY

Notify/consult stakeholders

After the municipality has notified government of its intent to consider a municipal service partnership, National Treasury will determine the need for a transaction advisor and other aspects of the feasibility study.

One of the more important aspects that National Treasury will determine is the depth of the stakeholder consultation plan. If the proposed activity is a municipal service involving significant financial, labour or environmental issues, a register of interested and affected persons (IAPs) may be required. Procedures for registering as an IAP will be included in the public notification. National Treasury and the provincial Treasury, the Department of Provincial and Local Government (DPLG), and any related national department will be on the register of IAPs. The IAP register will be used for all subsequent notifications and for the implementation of all elements of the stakeholder consultation plan.

If the feasibility study is for a landfill or other activity covered by the Minimum Requirements for Waste Disposal by Landfill or other regulated activity under DEAT, an IAP register will also be required for the DEAT permit process. The IAP register for this feasibility study should include the DEAT permit process IAP register.

Stage 1: Needs analysis

If the municipality has completed an IWMP, it will have done a needs analysis to identify gaps in solid waste service provision, but this information may be too general for the feasibility study for a municipal service partnership.

Delivering effective solid waste management services requires an integrated approach, as most aspects of solid waste management are related to each other. The needs analysis must thus include all related activities. For example, a needs analysis for recycling must also assess waste generation and collection to determine the amounts of material available for recycling. And since recycling is a means of reducing disposal costs, the landfill and waste processing resources of the municipality must also be assessed to determine both current and future avoided costs.

A comprehensive needs analysis for waste management assesses:

- technical components of service delivery
- budget
- regulation and enforcement
- non-technical needs
- output specification.

Technical components of service delivery

- generation
- collection and transport
- minimisation and recycling
- treatment
- disposal.

Generation

How much waste is generated?

The estimate of how much waste is generated is usually based on population figures multiplied by a generation coefficient measured in kilograms per person per day. Waste generation coefficients will be much lower in poor, densely populated areas and higher in more affluent areas.

Table 1: Typical waste generation coefficients in South African cities

Socioeconomic level	Generation coefficient (kg/person/day)
Very high	2.1 to 2.5
High	1.6 to 2.5
Middle	0.5 to 1.1
Low/poor	0.5 to 0.6
Informal/very poor	0.2 to 0.4

Waste generation coefficients based on research are readily available in engineering reference documents.

What is the waste made up of?

Depending on the activity being assessed, the waste generation assessment should also include an analysis of the composition of the waste. For example: a recycling project will need an accurate estimate of the amount of recyclable material in the waste being generated; a waste incinerator or composting facility will need a very precise determination of waste composition, since the products will be the key economic factor in its success.

> **"Incineration"** means the controlled combustion of solid waste employing closed combustion chambers, controlled combustion air, temperature monitoring and control to ensure complete combustion of organic matter with a minimum of undesirable air emissions and wastewater discharges.

The impact of informal recycling

In 2001 Pikitup did a detailed waste composition study to determine the amount of plastic in its waste for a proposed PPP recycling project. The study found that due to informal recycling there was not enough plastic in the waste to justify the project.

Waste composition will also be different in different income groups. Waste generated by low income, high density residential areas usually contains very few recyclable materials.

Table 2: Percentage waste composition for various income groups in Cape Town

Waste component	Low income	Middle income	High income
Paper	17%	23%	12%
Plastics	29%	23%	17%
Glass	6%	5%	8%
Metal	8%	6%	4%
Textiles	12%	6%	3%
Kitchen waste	8%	9%	5%
Garden waste	5%	16%	34%
Fines/residue	13%	12%	8%

The implications for recycling

It is very important to consider both generation and composition when designing a waste management programme. For instance, Table 2 might indicate a lot of plastics in the low income group (29% of waste generated), but that income group generates only 0.5 kg/person/day. A middle income neighbourhood

which generates a lower percentage of plastics (23%) but a higher amount of overall waste (2.5 kg/person/day), generates nearly five times the amount of plastics that the low income area generates. This indicates that a waste recycling project would not be cost effective in a low income area.

Collection and transport

Collection is the most visible waste management activity in any municipality and is usually identified in most IWMPs as being deficient in one or more areas. It is also the most costly component of any waste management service, comprising up to between 70% and 90% of total waste management costs.

There are different reasons for service delivery gaps in waste collection and transport, but usually they result from a lack of resources. Solid waste management is often well below water and sanitation as a budget priority, and waste departments must make do with old and poorly maintained equipment. The requirements of organised labour can also be a constraint. For example, limiting operations to a single shift per day prevents equipment and facilities from being fully optimised.

What are the current service levels and where are service levels below local standards?

Informal and formal township areas are often given a lower level of service than middle and high income neighbourhoods. In many townships it is difficult if not impossible to provide an adequate service because vehicle access is difficult. Communal skips at convenient locations in the township is often the kind of service that it is possible to provide. A slightly higher level of service is providing 85 litre plastic bags to households and collecting them from a communal area. However, communal areas for waste collection often become uncontrolled dumping areas if they are not serviced and maintained regularly. Middle and high income neighbourhoods are typically better serviced with 240 litre wheely bins provided to each household.

> **"Domestic waste"** means waste emanating typically from homes and offices. Although classified as general waste, this waste contains organic substances and small amounts of hazardous substances.

Government's free basic service policy has been relatively well defined for water and sanitation, but due to the nature of the service there is no defined level of free basic service for solid waste. Many municipalities have established lower levels of service in their township areas and define these as a basic service, and thus they do not charge the township residents a service fee. Theoretically,

middle and high income areas pay higher fees to subsidise the free basic services to the township areas.

What is the status of collection vehicles and how can this be improved?
The poor status of waste collection vehicles is often the cause of below standard waste collection. Vehicles must be maintained and replaced at the recommended intervals to maintain their availability.

Which type of collection vehicle is appropriate?
Although the rear end loader (REL) compactor truck is the most commonly used waste collection vehicle, there are many others. The type and size of the appropriate vehicle will depend on:

- size of the community
- levels of service
- types of storage containers (bags or bins)
- street patterns
- distance to the landfill.

The needs analysis for waste collection should include:

- levels of services
- storage containers
- litter and street cleansing
- vehicle inventory (age, condition)
- equipment maintenance
- ability and willingness to pay for services
- private sector resources
- informal sector resources.

Determine the location, design and operation of transfer stations
With increased environmental awareness, there is a trend towards larger regional waste disposal facilities located in sparsely populated areas. But it is generally not cost effective for collection vehicles to drive long distances, so a transfer station is used to transport waste from the collection vehicles to the landfill.

"Transfer station" means a facility that receives solid waste from collection vehicles and reloads that waste into larger vehicles for transfer to a disposal or processing facility.

The needs analysis for the transfer station should include:

- waste volume and composition
- collection methods
- distance to the landfill
- highway access
- access to rail.

Will rail transport be cost effective?

In the past 10 years there has been a lot of emphasis on transferring waste by rail. Although technically sound, waste-by-rail is usually only cost effective over long distances. Truck transport is more cost effective for short and medium hauls. Waste-by-rail requires a much higher capital investment in loading and compaction equipment at the transfer station and offloading equipment at the landfill. This is somewhat offset by lower operating costs. But the balance between high capital investment and low operating costs only becomes cost effective for long distance hauls.

Using CBO and SMME contractors

Most municipalities have goals and objectives for local employment through community based organisation (CBO) and small, medium and micro enterprise (SMME) contractors. Some aspects of waste management provide opportunities for this. For example, waste collection and street sweeping in township areas can be difficult for large compaction trucks and mechanical sweepers because of socioeconomic conditions and physical constraints, presenting opportunities for employing small local contractors. However, these arrangements are vulnerable to many technical, financial and social problems, and often poorly planned and implemented, and there are many examples of CBO and SMME systems which have failed. But there are also many successful systems, and skilled, competent CBO and SMME contractors are emerging and developing in response to the demand.

There is no one formula. Every potential CBO or SMME system must be evaluated and designed individually. The more successful systems usually use an intermediary contractor between the municipality and the CBO or SMME contractor, who provides technical, financial and management skills and training. This system is also designed to filter out political interests and favouritism.

Minimisation and recycling

The NWMS lists recycling as a national goal and objective. At present, this is a voluntary objective and seldom mentioned in IWMPs as a strategic, high priority objective.

What are the local environmental impacts?

Waste minimisation and recycling are municipal support activities not municipal services, so gaps in public health, safety or the environment are not what would justify these activities. The needs analysis for waste minimisation and recycling should be looking at local environmental impacts. However, while waste minimisation and recycling have identifiable positive global environmental impacts, the local impacts are sometimes less significant. Apply the slogan "think globally, act locally" to any needs analysis for waste minimisation and recycling.

What are the avoided costs?

There are many groups and organisations in South Africa calling for very high goals for waste minimisation and recycling.

> In 2001 at the National Waste Management Summit in Polokwane, the participants adopted a resolution calling for zero waste to landfills by the year 2022 and a 50% reduction in waste to landfills for 2012. Although these goals are admirable, they are not attainable. Worldwide experience indicates a 40% to 50% reduction goal is more realistic.

For a municipality, waste minimisation and recycling must be assessed on an avoided cost basis. If a municipality has very high landfill and transport costs, waste minimisation can reduce disposal and transport costs, but this depends on many variables, including the market price of the materials being recycled. Materials with relatively high, stable market prices cost less to recycle than it would to transport and dispose of them (the avoided costs). Unfortunately, there is only a market for 20% to 30% of the waste stream at present, and the costs of programmes to minimise waste above this percentage will far exceed landfill costs. The avoided costs must be assessed in Stage 6: Value assessment.

The needs analysis for waste minimisation and recycling should include:

- waste generation and composition
- collection and transport systems
- existing recycling activities, both formal and informal
- materials market analysis
- landfill avoided costs.

Assess informal recycling activities

There is informal recycling in most communities. In some communities, such as Johannesburg, informal recycling is encouraged by buy-back centres sponsored directly by the municipality and the end markets. Although these centres eliminate

middle men and improve the markets for some materials, their overall impacts are limited and can be detrimental to a more comprehensive recycling programme with higher removal goals. Informal workers are limited in what they can collect and usually remove only the high value materials such as cardboard, office paper and metal. Many people refer to this as cherry picking. In a comprehensive waste minimisation programme, the higher value materials are needed to offset the lower value materials such as plastics or glass. By allowing or promoting informal recycling, a municipality may compromise a more comprehensive waste minimisation programme with higher removal goals.

Treatment

Even after recycling, there are treatment methods that can further reduce the volume of waste that needs to be disposed of in the landfills that most municipalities use.

Composting

The most popular treatment method in South Africa is composting, which is the logical next step in a comprehensive waste minimisation programme. Although there are some food waste composting facilities in the country, most of the successful facilities are composting only garden and green waste. Composting garden and green waste is easier to control and produces a cleaner more uniform product with fewer contaminants, and the final product can be certified as organic compost. Compost derived from general mixed waste is more difficult to control, and the product is often contaminated and can only be marketed for landscape applications.

In many cities green and garden waste can comprise as much as one third of the total waste. This is especially true in areas with high and moderate rainfall. The main challenge in composting is collecting, pre-processing and transporting the bulky material to centrally located processing facilities.

> The City of Cape Town has established a goal of zero green waste to landfill. They have implemented a system of privately operated local drop-off centres where green and garden waste is collected and chipped, and then transported to a central composting facility. The system saves approximately 560,000m^3 in landfill airspace per year.

Green and garden waste collection and processing is most effective when combined with bylaws prohibiting this waste to be mixed or disposed of with normal household waste.

Other waste treatment options

Although incineration, gasification, fermentation and other emerging technologies are often seen as disposal technologies, they all still produce a residue that must be landfilled. For instance, incineration can reduce the waste volume by 90%, but the remaining ash must still be landfilled. The residues are often more problematic than the original waste and more costly to dispose of. The technologies are usually promoted by the manufacturer of the technology, and municipalities must be very careful when they evaluate the need for such technologies. They are all very expensive and seldom meet the risk adjusted value-for-money test.

Landfills in South Africa are still reasonably low cost and environmentally acceptable. With the exception of composting, municipalities should only consider additional treatment options if they are proven to be less expensive than landfilling.

Disposal

Even with the most comprehensive waste minimisation and treatment programmes, there will always be some waste left to dispose of. South Africa still has enough land available in favourable geology for the location and operation of sanitary landfills, and landfills will continue to be the most cost effective disposal option here for the foreseeable future. The location, operation and closure of solid waste landfills is regulated by DEAT through a permitting process.

Evaluate existing landfills

The needs analysis must evaluate each existing municipal landfill according to DEAT regulations and its operating permit, and should include, for each landfill:

- permit status
- site classification
- waste quantities(tonnes/day, m^3/month, tonnes/month)
- location, size, buffer zones
- resources (plant and personnel)
- remaining life (airspace)
- access (signage, fencing, controls)
- waste deposition (operation, cover)
- drainage and erosion
- aesthetics and nuisances (dust, odours, litter, visibility)
- health and safety
- monitoring and record keeping
- operating costs (R/month, R/tonne)
- site specific issues.

The needs analysis for a new landfill is very different from that for an existing landfill and will have been covered in the IWMP.

"Special waste" means non-hazardous waste which requires special or separate handling at a landfill. Special wastes include but are not limited to tyres, asbestos, demolition waste, non-hazardous industrial sludges, paper mill sludge, olive oil waste, abattoir wastes and petroleum waste oil.

Experience has shown that landfills operated by the private sector are more efficient and meet higher environmental standards than those operated by the public sector. This is partly because landfill operations are so specialised. But the main reason is accountability. It is often difficult to hold the public sector accountable for its performance, but the private sector must meet its performance indicators or face penalties or non-payment under the contract.

Budget

The ability of a municipality to provide effective solid waste management services will ultimately depend on its ability to establish and collect fees to cover the costs of the services. This is often the biggest challenge in implementing waste management programmes. Municipalities often do not collect all that is owed to them and the fees do not come close to covering even operational costs. Waste management includes many services: from collection from individual households and businesses to street cleaning and litter removal. The issue of free basic services also complicates the funding of waste management.

Although the "polluter pays" principle should form the basis of funding any waste programme, in reality the funding must come from a variety of sources, including user fees, tariffs and government funding such as the municipal infrastructure grant (MIG) and the equitable share.

The needs analysis for the budget should include:

- ability and willingness to pay
- service levels, including free basic services
- cross subsidies between income groups
- business, institutional and household generation and service levels
- available grants and loans.
- punitive measures for non-payment.

Regulation and enforcement

Effective solid waste management programmes are seldom successful without a strong set of local bylaws. Containers, collection times, littering, informal recycling and landfill scavenging need to be controlled through bylaws and an effective enforcement policy. The needs analysis should address the current bylaws, if any, and make recommendations for revisions based on the alternatives presented.

Non-technical needs

The above discussion has concentrated mostly on the technical needs for providing solid waste services, but many municipalities have other non-technical needs to assess.

Job creation

One very obvious need in many municipalities is job creation in township areas. Although this will come into the options analysis as well, the municipality's job creation objectives must be defined and included in the needs analysis and output specification.

Education

Since every waste management programme begins with the generator of the waste, education is a key component. The cost and implementation of an effective education programme must be included in the needs analysis.

Aesthetics and the environment

Many communities also place importance on aesthetics and environmental issues when it comes to solid waste management, and this should be included in the needs analysis.

> When Knysna, a Garden Route municipality that relies heavily on tourism, began looking at waste transfer options, they were concerned about the aesthetic and environmental impacts of truck traffic to and from the transfer station, located near the harbour. This concern, defined in the needs analysis, ultimately lead to a waste-by-rail transfer system. It may not have been the best technical or lowest cost option, but it met the municipality's higher aesthetic and environmental impact needs.

Output specification

The needs analysis concludes with an output specification, which is a detailed description of the activity, its current deficiencies or gaps, and most importantly the desired performance levels to remove the deficiencies. The output

specification must give enough detail to fully define the problem so that options and costs can be determined in the next phases of the feasibility study.

The output specification must define performance (what needs to be done) but not methodology (how it will be done). In considering a partnership for delivering a municipal service, the private partner must understand the performance requirements but be given the flexibility to meet those requirements in the most efficient way.

Stage 2: Technical options analysis

What are the technical options?

A municipality's IWMP may already have defined the technical options for meeting the output specifications for many of the solid waste activities identified in the needs analysis. But solid waste activities are complex, and there are many technical options for nearly every activity. For instance, the technical options for waste collection can vary from donkey carts and wheelbarrows, to farm tractors and trailers, to the most modern compaction vehicles with capacities of 25m^3 or more. These must all be assessed before recommendations can be made.

What are the technical variables?

The technical options may also include many technical variables.

Some of the technical variables in a recycling programme

- separation at source or at a sorting station?
- informal or formal systems?
- which materials?
- buy-back centres?
- drop-off facilities?
- collection vehicles?
- material specifications?

In addition, many recycling programmes include a considerable amount of volunteer labour through civic organisations and schools. The technical options analysis must take this into account as an operational risk, since the volunteer labour may not be sustainable in the long term.

The technical options analysis will be driven by the needs identified in each category of service delivery: generation, collection and transport, minimisation and recycling, treatment, and disposal.

The technical options analysis should:

- define each option
- present a preliminary cost estimate
- identify the environmental and financial risks.

The objective is to develop each technical option to the point where the municipal decision makers can make an informed decision about which options to pursue.

Legislation and regulations

In assessing technical options, the municipality must considered local, provincial and national legislation and regulations.

Landfills

Every landfill disposal and treatment facility must meet the conditions of the DEAT Minimum Requirements for Waste Disposal by Landfill. These comprehensive requirements cover every aspect of locating, designing, operating and closing a landfill, and must be incorporated into landfill performance specifications regardless of whether the landfill is publicly or privately operated.

Broader regulations

DEAT's 1997 and 1998 environmental impact assessment regulations cover a broad range of activities. These national regulations are administered by provincial DEAT offices. Due to the health and safety issues involved in almost any waste management activity, the provincial DEAT office must be contacted when the municipality notifies government of its intention to consider a municipal service partnership so that DEAT can determine if and when the activity requires an environmental impact assessment (EIA). Whether there is to be an EIA or not may have an impact on the assessment of the options. For instance collecting waste sorted into recyclable materials at source may not require an EIA, but sorting recyclable materials from mixed waste at a central facility probably would. The EIA can have both technical and financial impacts.

Stage 3: Service delivery options analysis

In the service delivery options analysis, the municipality assesses the options for delivering the service. Specifically the municipality must assess the capacity for and cost of delivering the service itself.

Section 76 of the MSA defines the various service delivery options.

Internal options include:

- the municipality
- a municipal department
- a business unit under the sole control of the municipality.

External options include:

- another municipality
- a municipal entity
- a national or provincial organ of state
- any private entity, institution or person.

Municipal service

If the service being assessed is an existing municipal service, under MSA Chapter 8 the municipality should give equal importance to internal and external options, but may assess them at the same time.

The assessment of internal options must consider:

- direct and indirect costs
- capacity to deliver
- all benefits of delivering the service internally.

The internal options must then be compared with the external options, presenting the advantages and disadvantages of both. This sequence of decisions is established in the MSA Section 78(1) to (3).

Municipal support activity

If the service is a municipal support activity, the municipality must still follow the requirements of MFMA Section 120 and may designate in its feasibility study resolution that only external service delivery options should be considered. The decision only to consider external options should be based on the capacity to perform the activity internally and the associated resources and risks. For

example, recovering methane gas from a completed landfill is a municipal support activity that is highly technical and involves considerable technical and financial risks, making it difficult for municipalities to undertake this activity internally.

A municipality can save transaction costs and time spent on the feasibility study by minimising the assessment of internal delivery options.

Human resources and organisational capacity

If the service involves an existing activity, both MSA and MFMA require an assessment of the impacts on existing resources, including staff, assets, liabilities and revenue.

Both the IWMP and the feasibility study's needs analysis should have prepared an inventory of the municipality's equipment and human resources. The service delivery options analysis should refer to the equipment inventory and determine the impacts each option will have. Each option should include a plan for equipment and other assets which will be made obsolete by that option, and a plan for addressing labour issues created by each option. The human resources plan must conform to the appropriate provisions of labour relations legislation and the stakeholder consultation plan.

Solid waste collection requires equipment and labour. Disposal and treatment may also impact on existing equipment and human resources, but these activities are not as labour intensive as collection activities.

Stage 6: Value assessment

Value assessment includes the basic cost categories of labour, operations and maintenance, capital, administrative and taxes. Also included is a discussion and guideline for adjusting an option's value based on its risks.

Reducing waste: What are the avoided costs?

When a technical option for a waste management activity reduces the amount of waste being landfilled, the value assessment of that option must include the savings in landfill costs, referred to as avoided costs. These are the costs that the municipality avoids when it recycles or in some other way reduces the amount of waste which needs to be transported and disposed of. Avoided costs are further broken down into current avoided costs and future avoided costs.

Current avoided costs

Current avoided costs are the reductions in the current waste transport and landfill costs due to the reduction in the amount of waste. Most current transport and landfill costs are fixed and will not change much with a reduction in the amount of waste. For instance, labour, equipment and administration costs will not be significantly reduced by a 10% or 20% reduction in the amount of waste. Depending on the method, waste reduction affects transport costs more than landfill costs. For instance, savings on fuel and labour will be significant if waste has to be transported over long distances.

Future avoided costs

The real value in recycling and other waste reduction projects is in the future avoided costs. These are the savings due to the reduction in the required landfill airspace. In very general terms, if a municipality with a 100 tonnes/day waste stream recycles 10% of that waste, they will save 10 tonnes of landfill airspace per day or 3,650 tonnes/year.

This gets a bit more complicated when the density of the waste material is taken into account. Landfill airspace is usually measured in cubic meters (volume), while waste collection and recycling is usually measured in tonnes (weight). To assess the future avoided costs of recycling a specific material we need to know how much airspace that material takes up if it is landfilled. This is the material's landfill density.

The Municipal Infrastructure Investment Unit (MIIU) sponsored a recycling study at the Highlands landfill in the Western Cape. The study measured the landfill density of the more common recyclable materials in order to determine their avoided costs. One dramatic example is polyethylene terephthalate (PET) bottles. Since these bottles do not compact well and many people dispose of them with the caps on, their landfill density was measured to be only 14kg/m^3. That means that for each tonne of PET bottles recycled the municipality saves 71.4m^3 of landfill airspace. At an estimated current landfill airspace cost of R50/m^3, the avoided costs for each tonne of recycled PET bottles is R3,570. Landfill airspace will certainly cost more than R50/m^3 in future, so future avoided costs will be even greater.

Future avoided costs will vary for each material depending on its landfill density.

Table 3: Typical future avoided costs for different materials

Recycled material	Landfill density (kg/m^3)	Landfill airspace saved	Future avoided landfill airspace costs (at R50/m^3 cost of landfill airspace)
Newspaper	212kg/m^3	4.7m^3/tonne	R235
Plastic PET bottles	14kg/m^3	71.4m^3/tonne	R3,575
Plastic HDPE bottles	19kg/m^3	52.6m^3/tonne	R2,630
Metal beverage cans	228kg/m^3	4.4m^3/tonne	R220

The table shows that materials with a low landfill density, such as PET and high density polyethylene (HDPE) bottles, are very cost effective to recycle. These materials have a high recycle value. Even only considering current avoided costs, the income exceeds the current costs of recycling. When future avoided costs are considered as well, the benefits of recycling these materials is overwhelmingly positive. The future avoided costs of materials with a higher landfill density, such as newspaper and metal beverage cans, are less significant, so the relative value of recycling these materials is lower.

Future avoided costs are long term savings. They are only realised when the life of the current landfill is extended or a new landfill can be made smaller or have a longer life. Municipal decision makers want to see cost savings and reduced budgets immediately, and since the current avoided costs of recycling and waste reduction programmes are low, decision makers tend to be reluctant to implement them. This is the biggest impediment to implementing recycling and waste processing programmes. When assessing a recycling or waste processing option, prioritise materials by their current avoided costs and their total avoided costs. This will give municipal decision makers a better picture of the options.

Risk

One of the clauses in the MFMA defines a PPP as the transfer of "substantial financial, technical and operational risks" to the private party. One of the more important aspects of the feasibility study is to define the operational and technical risks of the activity.

Operational risks

Waste collection and recycling activities are active systems and rely heavily on equipment and labour. The major risks in performing these activities will be operational. Operational risks are transferred to the private party through the tendering and contract documents, and specifically through penalty clauses and performance standards, secured in the form of a performance bond. The feasibility study assesses the operational risks and recommends performance standards to be used in the contract.

Technical risks

Other waste management activities will include significant technical risks. The design of a landfill or the operation of a methane gas recovery system, for example, will involve significant technical risks, which should be borne by the private party. The technical risks involved in an incinerator or any treatment facility should also be totally transferred to the private party.

Shared risks

The risk assessment should also identify the risks that should be shared. These typically include changes in the law, strikes, severe weather, or any activity beyond the reasonable control of the private party. Although a contract could transfer all these risks to the private party, the cost of the activity will then increase to reflect the private party's higher exposure to risk.

CONCLUSION

This toolkit highlights aspects of the feasibility study specifically for a possible municipal service partnership to deliver waste management activities. Please work through the full Municipal Service Delivery and PPP Guidelines when considering such a partnership.