George Local Municipality

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Waste Minimisation Plan

DRAFT

GE38216

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George Local Municipality
Waste Minimisation Plan
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CONTENTS

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03	07/06/2021	115	Version 3: Draft WMP	Z. Makapela and I. Malloy	I. Malloy	K. Flood

Distribution List

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Abbreviations / Acronyms / Definitions

BLM	Bitou Local Municpality
CCA	Chromated Copper Arsenate
CFL	Compact Fluorescent Lamp
CoJ	City of Johannesburg
COVID-19	Corona Virus Disease 2019
C&DW	Construction and Demolition Waste
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DEFF	Department of Environment, Forestry and Fisheries
EPR	Extended Producer Repsonsibility
GLM	George Local Municipality
GN	Government Notice
GRDM	Garden Route District Municipality
GRWMIS	Garden Route District Waste Management Information System
HCRW	Health Care Risk Waste

HHW	Household Hazardous Waste
HLM	Hessequa Local Municipality
IDP	Integrated Development Plan
IPWIS	Integrated Pollutant and Waste Information System
IWMF	Integrated Waste Management Facility
IWMP	Integrated Waste Management Plan.
KLLM	Kannaland Local Municipality
KLM	Knysna Local Municipality
MBLM	Mossel Bay Local Municipality
NEMA	National Environmental Management Act
NEMWA	National Environmental Management: Waste Act (59 of 2008)
NGO	Non-Governmental Organisation
NDP	National Development Plan
NWMS	National Waste Management Strategy
PET	Polyethylene Terephthalate
PPP	Public Private Partnership
RDF	Refuse Dervied Fuel
SAWIC	South African Waste Information Centre
SAWIS	South African Waste Information System
WCIWMP	Western Cape Integrated Waste Management Plan
WMP	Waste Minimisation Plan
WRAP	Waste and Resources Action Programme
WWTW	Waste Water Treatment Works

Appendices

To be added for later chapters of the report

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1 Introduction

The Garden Route District Municipality (GRDM) has identified the need to develop a waste minimisation plan (WMP) to address waste minimisation, recycling and diversion of waste from landfill across the district. There is also a need for each of the seven local municipalities in the district to have their own waste minimisation plans to drive waste minimisation efforts. The district is facilitating the development of WMPs for the seven local municipalities in the district to ensure uniformity in waste minimisation across the district. One of the key aims of the WMPs is to identify budgets required to implement waste minimisation projects.

The objective of a waste minimisation plan (WMP) is primarily to minimise waste generation and disposal.

GIBB Pty Ltd (hereafter referred to as GIBB) has been appointed for the development of WMPs for the GRDM and each of the seven local municipalities in the GRDM, namely:

- George Local Municipality (GLM)
- Mossel Bay Local Municipality (MBLM)
- Bitou Local Municipality (BLM)
- Hessequa Local Municipality (HLM)
- Kannaland Local Municipality (KLLM)
- Knysna Local Municipality (KLM)
- Oudtshoorn Local Municipality (OLM)

This WMP addresses waste minimisation, recycling and diversion of waste from landfill for the George Local Municipality (GLM).

1.1 Definitions

The following definitions of waste are used in this report.

The following definitions are taken from the National Environmental Management: Waste Amendment Act (Act 26 of 2014)

Waste:

a) any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to this Act; or

b) any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister by notice in the Gazette, but any waste or portion of waste, referred to in paragraphs (a) and (b), ceases to be a waste—

   i. once an application for its re-use, recycling or recovery has been approved or, after such approval, once it is, or has been re-used, recycled or recovered;

   ii. where approval is not required, once a waste is, or has been re-used, recycled or recovered;

   iii. where the Minister has, in terms of section 74, exempted any waste or a portion of waste generated by a particular process from the definition of waste; or

   iv. where the Minister has, in the prescribed manner, excluded any waste stream or a portion of a waste stream from the definition of waste.

Recycling:
the process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material'

Waste minimisation programmes:
A programme that is intended to promote the reduced generation and disposal of waste.

1.2 Contents of a WMP

There are no legislated requirements for the contents of a municipal WMP. The diagram below, outlines the typical contents and themes of WMPs based on a review of national and international examples.

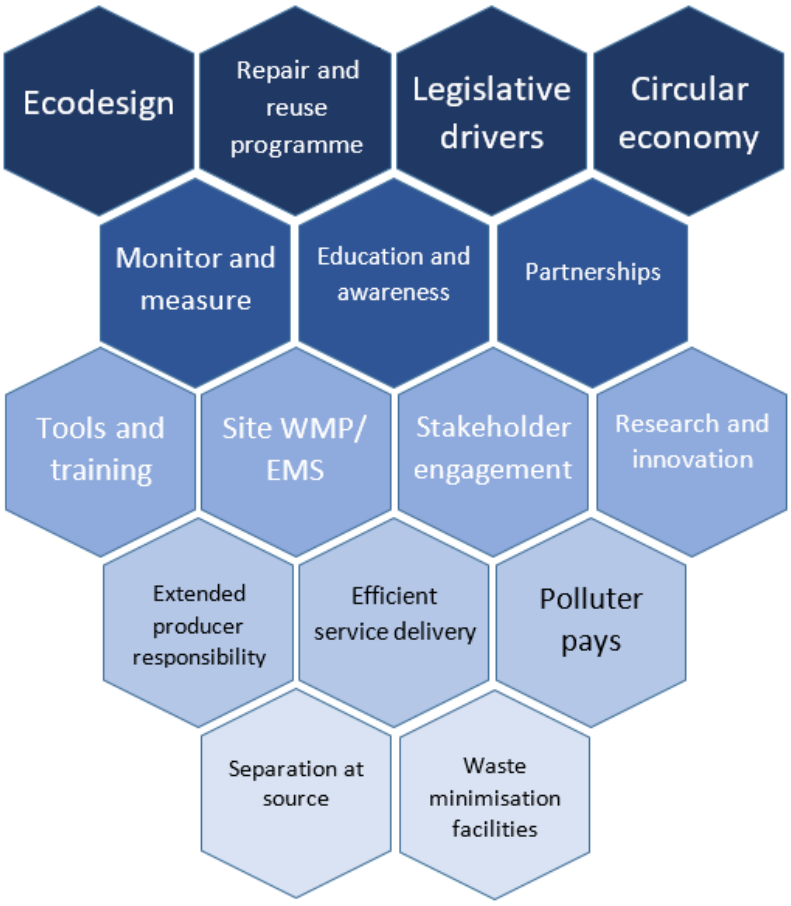


Figure 1: Common themes and contents of waste minimisation plans

1.3 History of Waste Minimisation Plans in the George Local Municipality

This is the second waste minimisation plan to be developed for the GLM. A solid waste diversion plan was developed for the GLM in 2017. This plan identified the need to develop composting facilities for the diversion of garden waste and crushing facilities for the diversion of construction and demolition waste (JPCE (Pty) Ltd, 2017). The plan also noted the

importance of public awareness programmes and food waste separation from the domestic waste stream. The plan however did not include a specific implementation plan.

The plan indicated that an insufficient quantity of food was generated in the GLM to economically justify anaerobic digestion, but that the food waste should be separated at source from households and used for composting. The plan also indicated that waste volumes are too low in the GLM to justify waste-to-energy technologies such as direct combustion, gasification and pyrolysis.

1.4 Objectives of a Waste Minimisation Plan

The key objectives of this WMP are:

- To move the GLM towards achieving the objectives of the Waste Act, namely:
  - Avoiding and minimising the generation of waste
  - Reducing, re-using, recycling and recovering waste
- Move the GLM towards legal compliance with national and provincial waste minimisation targets
- Streamline waste minimisation efforts across the GLM

Furthermore, it aims to determine the status quo of waste minimisation, recycling and diversion from landfill and identify measures to improve waste minimisation, recycling and diversion from landfill in the GLM.

The theme of waste minimisation is highlighted strongly in The National Waste Management Strategy of 2020 (NWMS). The NWMS presents the waste management hierarchy which outlines the preferred methods for management of waste. The preferred option for waste management is located at the top of the hierarchy, as you work down the hierarchy you encounter less preferred management methods.

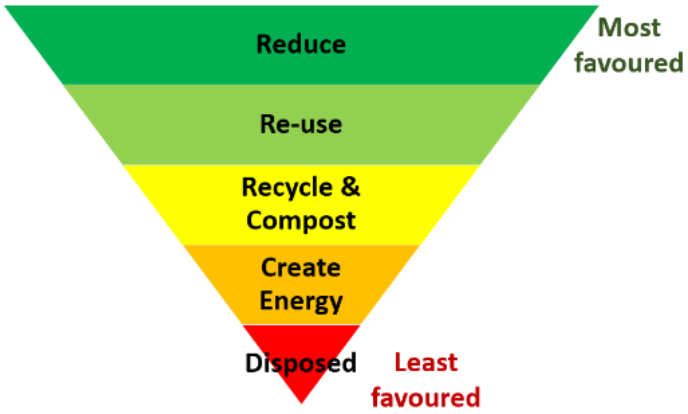


Figure 2: The waste hierarchy as per the National Waste Management Strategy (DEFF, 2020)

The goals and targets of the 2020 NWMS will be reviewed and incorporated into this WMP. The goals and targets as well as the implementation plan for the GLM WMP will be aligned to meet the goals and targets of the 2020 NWMS.

1.5 Waste Minimisation Plan Development Process

The terms of reference for the WMP outlines six phases for the development of the WMPs and is illustrated in the figure below. Each of these phases will be addressed as a chapter of this WMP.

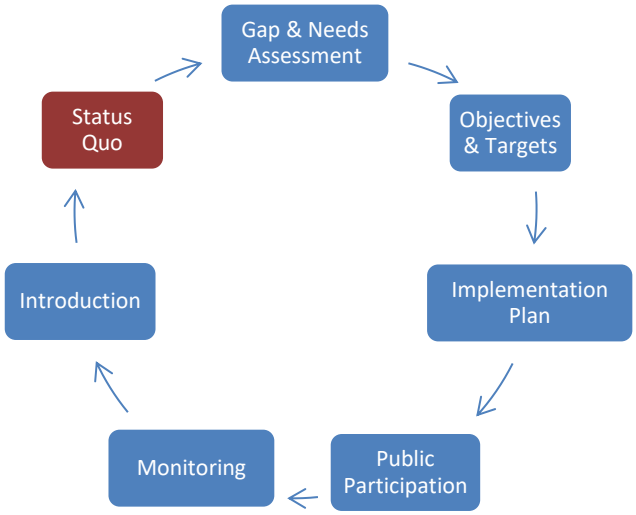


Figure 3: WMP planning phases

1.6 Scope of the Waste Minimisation Plan

This WMP is limited to the jurisdictional area of the GLM which covers an area of 5,191km^2 and is composed of 27 wards. The GLM has a population of 213,819 people (George 2019 IDP) in 62,722 households (GLM, undated). The GLM is one of seven local municipalities which fall in the Garden Route District Municipal (GRDM) area, formerly the Eden District Municipality, in the Western Cape Province.

The focus of the WMP is on the minimisation, diversion and recycling of general waste (organic, construction and demolition and a portion of household hazardous waste). The study will however exclude minimisation of industrial hazardous waste.

The scope will include the following, but is not limited to;

- Validate current waste minimisation infrastructure and levels of services
- Through the development of the Waste Minimisation plan identify waste minimisation gaps and prioritise actions and associated cost and timelines to substantially improve waste minimisation in the jurisdiction of the local municipalities covered by this plan
- Align the Waste Minimisation Plan with applicable legislative requirements, the National Waste Management Strategy and applicable sector plans
- Identify areas where minimisation actions on a district basis will be more sustainable to implement

- Identify possible partnerships with private businesses and industry and intergovernmental partnerships to promote waste minimisation in the Garden Route District Municipal area
- To increase community awareness, appreciation and responsiveness to municipal waste minimisation related initiatives
- Facilitate further education programmes across the community on waste minimisation
- Define a performance monitoring and review schedule.

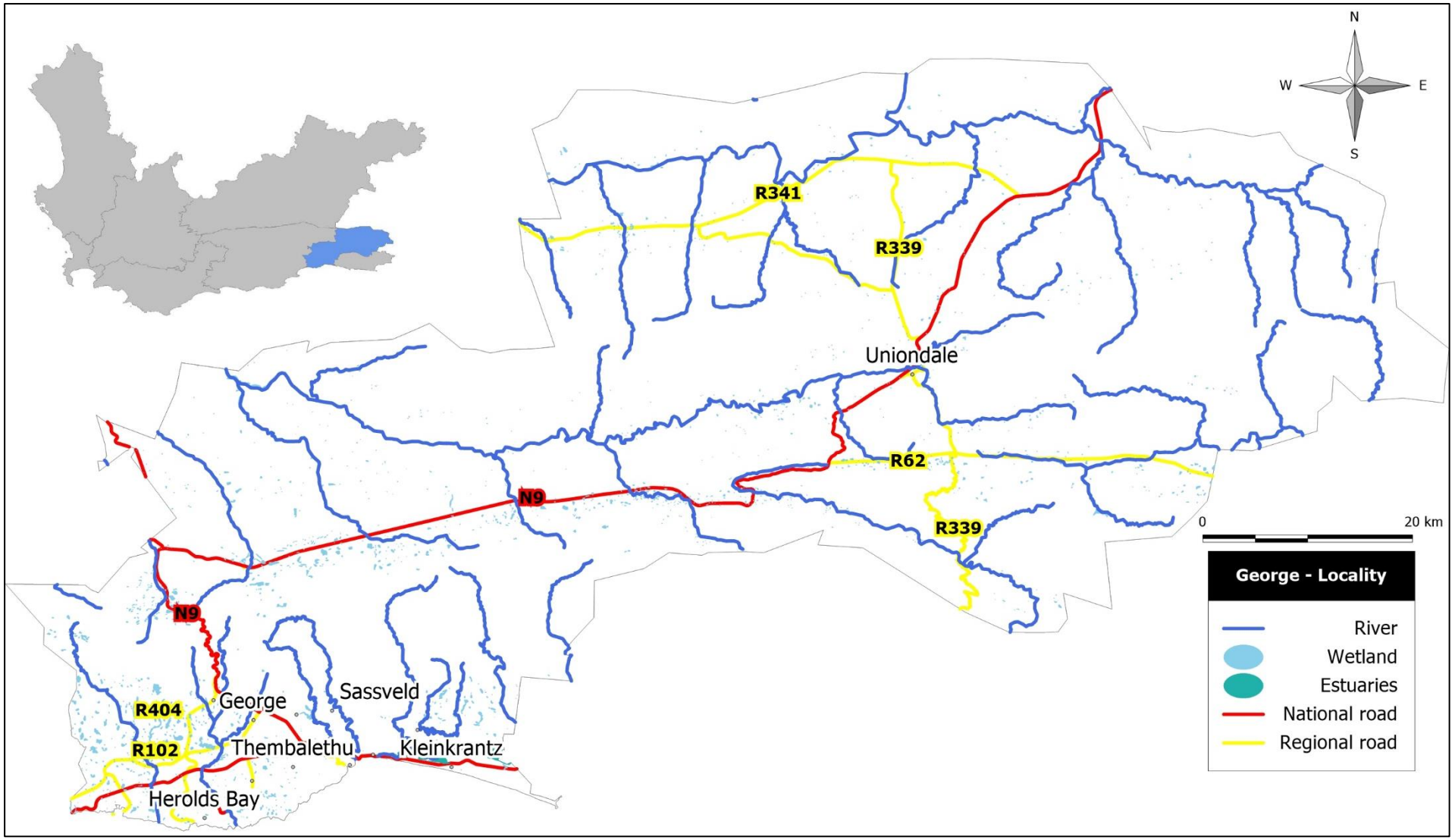


Figure 4: George Local Municipality Jurisdictional Area

2 Approach and Methodology

2.1 Project Scope

The scope of the project is for the development of a WMP for the GLM that will be incorporated into a district WMP to identify viable regional initiatives. The project will be undertaken in 6 phases. A brief description of each of the six phases is shown below. These phases are based on the scope of works as presented in the terms of reference for the project.

Table 1: GLM WMP Phases

Phase 1	***Initiation/ Introduction*** ***1.1 Project inception meeting*** 1.1.1 Project start-up meeting between GIBB and GRDM. 1.1.2 Information requests to the GLM. 1.1.3 Present an action plan for the WMPs based on national and international research. ***1.2 Introduction*** 1.2.1 Draft introductory section of WMP.
Phase 2	***Status Quo*** 2.1 Meetings with GLM. 2.2 Meetings with waste management and recycling companies. 2.3 Stakeholder engagement – extended producer responsibility organisations, GreenCape, DEA&DP, non-governmental organisations (NGOs), business such as supermarkets. 2.4 Facility inspection and determining existing waste minimisation strategies and initiatives. 2.5 Review of waste management licenses/ permits conditions related to waste minimisation and local and district by-laws. 2.6 Review of information related to waste minimisation and diversion and systems in place to manage such information. 2.7 Literature review. • District and Municipal integrated waste management plans (IWMPs). • Waste quantities and characteristics. • DEA&DP position papers. • Policies, legislation and guidelines. • Demographics. • Economics and Financing of Waste Management. • National and international case studies. 2.8 Feasibility studies for waste minimisation projects.
Phase 3	***Gap and Needs Assessment*** 3.1 Identification of gaps in waste diversion and minimisation programme in the local municipalities and the district municipality. 3.2 Review of potential alternative waste treatment technologies which can be applied in the GLM.
Phase 4	***4.1 Objectives and Targets*** 4.1.1 Development of a set of objectives and targets for GLM to address waste diversion and minimisation needs over the short, medium and long term.

Phase 5	***5.1 Implementation Plan and Budget and Final Draft WMP*** 5.1.1 Develop an implementation plan for the GLM which extends from immediate interventions to a 10 – 15 year period. 5.1.2 Develop a Financial Plan for the implementation of the Waste Minimisation Plan for the GLM. **5.2 *Public Participation and Stakeholder Engagement*** 5.2.1 Present draft WMP to the municipal section 80 committee 5.2.2 Present draft WMP to the municipal council 5.2.3 Present the WMP at a public meeting 5.2.4 Update WMP based on comments received during public participation and the presentation to council
Phase 6	***6.1 Performance monitoring and review schedule*** 6.1.1 Develop a monitoring plan and reporting structure to allow the waste manager to monitor the implementation of the plan

2.2 Methodology

A phased approach was used to develop the WMP, as detailed in the subsections below.

2.2.1 Literature Review

A review of legislation was undertaken. This included the following key documents.

- Western Cape Provincial IWMP
- Western Cape Position Papers:
  - Position Paper on the Provision of Municipal Waste Management Services within the Context of Rapid Urbanisation (2017)
  - Position Paper on the Regionalisation of Waste Management Services (2017)
  - Position Paper on Organic Waste Management (2017)
  - Position Paper on Construction and Demolition Waste Management (2017)
- GRDM 3rd generation Integrated Waste Management Plan (2020 - 2025)
- GLM 3rd generation Integrated Waste Management Plan (2020 – 2025)
- Assessment of the Municipal Integrated Waste Management Infrastructure: Eden District (2016)
- Garden Route (Eden) Waste Management Information System (GRWMIS), Integrated Pollutant and Waste Information System (IPWIS) and South African Waste Information System (SAWIS) statistics
- George Local Municipality Solid Waste Diversion Plan (2017)
- George Integrated Development Plan (George IDP, 2020/21)
- Statistics SA Census 2011 and Community Survey 2016 data
- National and international examples of WMPs or waste minimisation strategies
- National and international case studies

A full list of documentation reviewed is available as the reference list at the end of this report.

Waste information systems:
This report refers to a number of different waste information systems. A brief description of the different systems is provided below.

1. **South African Waste Information System** (SAWIS) – A national waste information system managed by DEFF. Information reported on the SAWIS is publically accessible through the South African Waste Information Centre (SAWIC)
2. **Integrated Pollutant and Waste Information System** (IPWIS) – A provincial waste information system managed by DEA&DP. Data reported on the IPWIS is uploaded to the SAWIS on a quarterly basis
3. **Garden Route Waste Management Information System** (GRWMIS)– a district waste information system managed by GRDM

2.2.2 Interviews with Stakeholders

A questionnaire was developed for use when engaging with stakeholders. The aim of the questionnaire was to capture information on the generation and management of general waste with a focus on waste minimisation. A database of stakeholders in GLM was developed based on:

- Companies identified in the project initiation meeting
- Recommendations from the GRDM and GLM
- George Chamber of Business

Details of the industries to which the questionnaires were issued to are shown below.

The questionnaire was also uploaded as an online survey (details provided below).

Table 2: Summary of stakeholders engaged

Stakeholder	Method of engagement	Date of engagement
George Local Municipality (Wessel Robertson)	Face to face interview	24 June 2020
Garden Route District Municipality (Johan Gie)	Face to face interview	24 June 2020
Pick 'n Pay	Face to face interview	25 June 2020
Henque Waste	Face to face interview	25 June 2020
Interwaste	Face to face interview	25 June 2020
Go Green Organics and Planthire	Face to face interview	25 June 2020
Garden Route Mall	Face to face interview	25 June 2020
Eden Hospitality Service and Training (Pty) Ltd	Online survey	-
Curtains and Linens	Online survey	-
Henque Waste	Online survey	-
Tikketai	Online survey	-
Solien Energy Solutions cc	Online survey	-
Touw Meubels (Pty) Ltd	Online survey	-

2.2.3 Site Visits and Ground-Truthing

A site visit was undertaken to the GLM on 24 – 25 June 2020. Details of facilities visited and interviews undertaken are listed below.

Table 3: Facility inspections undertaken as part of this WMP

Facility	Date of visit
George Transfer Station	24 June 2020
George Composting Site	24 June 2020
Uniondale Transfer Station	24 June 2020
Henque Waste Recycling Facility	25 June 2020
Interwaste Recycling Facility	25 June 2020

2.2.4 Presentations and Workshops

Three presentations/ workshops of the GLM WMP are planned. Details and proposed dates are shown below.

Table 4: Presentations/ workshops planned for the GLM WMP

Date	Content of presentation/ workshop	Stakeholders in attendance
26/01/2021	Status quo workshop	GLM, GRDM & GIBB
10/02/2021	Status quo and gap and needs assessment workshop	GLM, GRDM & GIBB
19/04/2021	Objectives and targets and implementation plan workshop	GLM & GIBB
03/05/2021	WMP presentation to Council	GLM & GIBB

2.2.5 Business and Public Surveys

Online surveys were developed to gather information from business and industry and the public or waste minimisation in the GLM.

An invitation to complete the survey was distributed via email to identified stakeholders on 17 June 2020 and an invite to participate in the survey was posted on the GLM's official Facebook page on 15 June 2020 as well as the GRDM's official website on 12 June 2020.

GARDEN ROUTE DISTRICT MUNICIPALITY
WASTE RECYCLING AND MINIMISATION SURVEY INVITE

The Garden Route District Municipality (GRDM) has appointed GIBB Pty Ltd (GIBB) to develop a waste minimization strategy for the district municipality and the seven local municipalities in the district namely:

- Bitou Local Municipality
- George Local Municipality
- Kannaland Local Municipality
- Knysna Local Municipality
- Hessequa Local Municipality
- Mossel Bay Local Municipality
- Oudtshoorn Local Municipality

The aim of the waste minimization strategy is to identify mechanisms which can be used to minimize waste generation, increase waste recycling or treatment (including composting) and reduce waste disposal at landfill.

GIBB are engaging with local residents, business and industry, companies involved in waste management, non-governmental organizations, and environmental organisations to gather data and understand recycling and waste minimisation challenges as well as opportunities to increase waste minimization, recycling and diversion from landfill.

Business/ industry survey: https://surveys.gibb.co.za/index.php?r=survey/index&sid=338239&lang=en	**Public survey:** https://surveys.gibb.co.za/index.php?r=survey/index&sid=39065&lang=en
The business/ industry survey consists of 8 sections and the majority of questions are multiple choice or require a short answer. The survey should take no longer than 10 – 15 minutes to complete.	The public survey consists of 5 sections and the majority of questions are multiple choice or require a short answer. The survey should take no longer than 10 minutes to complete.
Questions/ queries can be directed to GIBB	**FAO: Mrs Kate Flood** Email: kflood@gibb.co.za all emails to be copied to wastesurvey@gibb.co.za Tel: 041 509 9160/ 084 631 1456
Deadline for responses:	**Both surveys will close on 10 July 2020**

Figure 5: Waste minimisation survey invite

Figure 6: Facebook survey advertisement (source, web reference 1)

2.2.6 Public Participation Process (PPP)

The GLM WMP will be made available for review by the public for a period of 14 days. The review of the WMP and the period for which the WMP will be made available to the public will be advertised in a local newspaper.

In there is sufficient demand, one public meeting to present the WMP will be held in George and the date of the meeting will be confirmed in due course. The public meeting will be scheduled to start after normal working hours.

The GLM's existing social media platforms will be used to inform the public of the availability of the report for review and the public meeting.

2.3 Assumptions and Limitations

This report has drawn information from a number of sources including interviews with municipalities and stakeholders, IWMPs, GRMWIS, IPWIS and SAWIS records, GRDM, municipal records and various literature sources. It is assumed that the information provided to GIBB verbally in interviews and documented information is accurate.

The waste generation and recycling data from 2019 was used to inform the status quo assessment of the WMP. Data from 2020 was not considered for the WMP due to the COVID-19 pandemic having a significant impact on waste generation and recycling rates and tonnages.

Data from 2020 would have subsequently not provided a true reflection of the status of waste generation and recycling within the GLM.

3 Context of Roles and Responsibilities for Waste Minimisation

3.1 National Government

The state is legislated in terms of the Waste Act to put in place measures that aim to minimise waste generation and disposal and to increase re-use, recycling and recovery of waste.

The Waste Act also tasks National government with the establishment of a National Waste Management Strategy (NWMS), which includes objectives, plans, guidelines systems and procedures for the avoidance of waste, re-use, recycling and recovery of waste.

3.2 Provincial Government

In terms of the Waste Act, Provincial governments must ensure the implementation of the NWMS and national norms and standards. Provincial governments may also develop provincial norms and standards. These norms and standards must not contradict national norms and standards and can cover waste minimisation.

3.3 Local Government

Local municipalities are required to comply with the provision of the NWMS, national norms and standards and provincial norms and standards. Other legislated requirements related to waste minimisation, recycling and diversion from landfill are detailed in section 3 of this report.

4 Legislative Overview

A summary of key South Africa legislation governing waste minimisation and recycling is presented in the table below.

Table 5: Summary of recycling requirements as defined in the Waste Act

Topic	Section	Requirements	Comments
General duty	3	The state must put in place measures that seek to reduce the amount of waste generated, and where waste is generated, ensure that it is re-used, recycled and recovered in an environmentally sound manner.	DEFF has initiated the development of guidelines and strategies to increase recycling in the province including a study on waste separation at source, a review of the 2011 National Waste Management Strategy (NWMS) and a study on options for recycling and re-use of construction and demolition waste.

Topic	Section	Requirements	Comments
Waste service standards	9 (2)	Each municipality must perform its duty in terms of waste management services by adhering to all national and provincial norms and standards	The municipality is required to comply with any national and provincial norms and standards related to waste minimisation.
	9 (3)	The Municipal may furthermore set local standards: • For separating, compacting and storing waste • Management of solid waste, i.e.: Avoidance, Minimisation, Recycling • Coordination of waste to relevant treatment or disposal facilities	The municipality should review their by-laws to determine if they are conducive to waste minimisation, recycling and diversion from landfill.
General duty I respect of waste management	16 (1)	A holder of waste must: • Avoid the generation of waste and where waste cannot be avoided minimise the amounts of waste that are generated • Reduce, re-use, recycle and recover waste	The municipality is classified as a 'holder of waste' as the municipality transports waste. As such the municipality must put in place measures which seek to minimise waste.

4.1 National Waste Management Strategy (2020)

The goals and targets of the 2020 National Waste Management Strategy (NWMS) related to recycling and waste minimisation are provided below. The NWMS clearly shows the intention of DEFF to prioritise diversion of waste from landfill sites and increasing the beneficiation of waste through recycling, organic waste beneficiation (mainly composting).

The following table presents a summary of the 2020 NWMS goals and targets related to waste minimisation.

Table 6: A review of National Waste Management Strategy Objectives related to recycling (NWMS, 2020)

Goal	Targets for 2020

1. Prevent waste, and where waste cannot be prevented, divert 40% of waste from landfill within 5 years; 55% within 10 years; and at least 70% of waste within 15 years leading to Zero-Waste going to landfill through reuse, recycling, and recovery and alternative waste treatment.	Waste Prevention:
	• Prevent waste through cleaner production, industrial symbiosis, and extended producer responsibility
	• Prevent food waste by:
	  • working with agricultural producers, food producers and transporters, retailers, the hospitality sector and consumers,
	  • improving consumer awareness
	  • developing guidelines, norms and standards for redistributing surplus foods and composting of spoilt foods.
	Waste as a Resource:
	• Divert organic waste from landfill through composting and the recovery of energy
	• Divert construction and demolition waste from landfill through beneficiation
	• Increase re-use, recycling and recovery rates
	• Increase technical capacity and innovation for the beneficiation of waste

2. All South Africans live in clean communities with waste services that	Waste Collection:

Goal	Targets for 2020
are well managed and financially sustainable.	• Separation of waste at source by integrating waste pickers into municipal collection services, develop an online training tool for municipal managers and develop a national awareness campaign on recycling and waste management Effective Integrated Waste Management Planning: • All local authorities (municipalities) to include provisions for recycling drop-off/buy-back/storage centres in their IWMPs by 2023

4.2 National Norms and Standards for the Disposal of Waste to Landfill (GN 636 of 2013)

The National Norms and Standards for Disposal of Waste to Landfill (GN 636 of 2013) identify a number of waste streams which will be banned from landfill. The following table summarises waste streams which are applicable to this WMP.

Waste from the GLM is disposed of at the George and Uniondale landfill sites. The GLM needs to screen waste to ensure that none of the prohibited waste streams are transported to the landfill sites.

Table 7: Waste streams prohibited or restricted from disposal at landfill and compliance timeframes as defined in the National Norms and Standards for Disposal of Waste to Landfill (GN 636 of 2013)

Waste type prohibited or restricted in terms of disposal	Compliance timeframe
Waste which in the conditions of a landfill site is explosive, corrosive, oxidizing (according to SANS 10234 or SANS 10228)	Immediate (August 2013)
Waste with a pH value of <6 or >12	Immediate (August 2013)
Flammable waste with a closed cap flashpoint lower than 61 deg Celsius	Immediate (August 2013)
Reactive waste which may react with water, air, acids or components of the waste, or that could generate unacceptable amounts of toxic gases within the landfill	Immediate (August 2013)
Waste compressed gases (according to SANS 10234 or SANS 10228)	Immediate (August 2018)
Untreated health care risk waste (HCRW)	Immediate (August 2018)
POPs pesticides listed under the Stockholm Convention	8 years (August 2021)
Other waste pesticides	4 years (August 2017)
Lead acid batteries	Immediate (August 2013)
Other batteries	8 years (August 2021)
Re-usable, recoverable or recyclable used lubricating mineral oils and oil filters, but excluding other oil containing wastes.	4 years (August 2017)
Re-usable, recoverable or recyclable used or spent solvents	5 years (August 2018)
PCB containing waste (>50mg/kg or 50 ppm)	5 years (August 2018)
Hazardous waste electric and electronic equipment - lamps	3 years (August 2016)
Hazardous waste electric and electronic equipment - other	8 years (August 2021)
Tyres - whole	Immediate (August 2013)
Waste tyres – quartered	5 years (August 2019)
Liquid waste (i) Waste which has an angle repose of less than 5 degrees, or becomes free-flowing at or below 60°C or when it is transported, or is not generally capable of being picked up by a spade or shovel; or (ii) Waste with a moisture content of >40% or that liberates moisture under pressure in landfill conditions, and which has not been stabilised by treatment	6 years (August 2019)

Waste type prohibited or restricted in terms of disposal	Compliance timeframe
Hazardous waste with a calorific value of: (i) >25 MJ/kg (ii) >20 MJ/kg (iii) >10 MJ/kg (iv) >6% TOC	 4 years (August 2017) 6 years (August 2019) 12 years (August 2025) 15 years (August 2028)
Brine or waste with a high salt content (TDS >5%), and a leachable concentration for TDS of more than 100,000 mg/l	8 years (August 2021)
Disposal of garden waste (i) 25% diversion from the baseline at a particular landfill of separated garden waste (ii) 50% diversion from the baseline at a particular landfill or separated garden waste	 5 years (August 2018) 10 years (August 2023)
Infectious animal carcasses and animal waste	Immediate (August 2013)

4.3 National Domestic Waste Collection Standards (GN 21 of 2011)

This standard aims to provide a uniform framework within which domestic waste should be collected in South Africa in order to address the past imbalances in the provision of waste services. The standards aim to guide municipalities on how to provide acceptable, affordable and sustainable waste collection service to the human health and the environment.

Table 8: Recycling requirements of the National Domestic Waste Collection Standards (GN 21 of 2011)

Requirement	Comment
Separation at source must be encouraged in line with relevant industry waste management plans (indWMPs) and all households in metropolitan municipalities and secondary cities must be separating waste at source	The development of indWMPs is not the responsibility of the GLM. The GLM should however be aware of the indWMPs and the implications of these plans. The GLM is currently undertaking separation at source, however this programme needs to be expanded.
Service providers/ municipalities must provide clear guidelines to households on sorting of waste, appropriate waste containers and removal scheduled for different waste types	The GLM must ensure that clear recycling guidelines are provided to households.
Community involvement in recycling must be encouraged	The GLM needs to continue to encourage community participation in recycling programmes through participation in the separation at source program and dropping off their recyclables in the Uniondale transfer station which has recycling drop-off facilities.
Municipalities must provide an enabling environment for recycling through a kerbside collection service for mainstream recyclable or provision of communal collection points.	The GLM is providing an enabling environment for recycling as there is a kerbside collection service in place. The GLM completed construction on the Uniondale transfer station which also has recycling drop-off facilities.
Non-mainstream recyclable (e-waste, scrap metals batteries etc.) must be routed to drop-off centres	GLM has not had open days for HHW drop off since March 2020 and no records of waste collected were kept.
Recyclable waste must be removed from drop-off centres at least once a fortnight	The GLM must note this requirement for recycling drop-off facilities.

4.4 National Pricing Strategy for Waste Management (GN 904 of 2016)

The aims of the National Pricing Strategy for Waste Management (hereafter referred to as the Pricing Strategy) are:

- Mainstream the polluter pays principle
- Reduce waste generation
- Increase waste diversion from landfill
- Support the growth of South Africa's waste economy
- Reduce the environmental impacts of waste

The Pricing Strategy identified downstream, upstream and subsidy based instruments which could be used to increase recycling rates in South Africa. The National Pricing Strategy will be implemented by DEFF, however it is important that the GLM is aware of this legislation.

4.5 National Waste Information Regulations (GN 625 of 2012)

The National Waste Information Regulations (GN 625 of 2012) came into effect on 01 January 2013. The aim of these regulations is to improve waste information management for South Africa. Annexure 1 of the regulations lists activities including recovery and recycling, treatment and disposal of waste for which the person conducting the activity must register and report on the South African Waste Information System. Persons conducting the following activities or operating the following facilities in terms of recycling must comply with the National Waste Information Regulations.

- Recovery of waste at a facility that has the capacity to process in excess of 10 tons of general waste or in excess of 100kg of hazardous waste per day, excluding recovery that takes place as an integral part of an internal manufacturing process within the same premises
- Recycling of general waste at a facility that has an operational area in excess of 500m2
- Recycling of hazardous waste in excess of 100kg per day calculated as a monthly average.

Amendments to the National Waste Information Regulations were released for public comment in July 2018 (GN 701 of 2018). The major change in the regulations was the requirement for waste transporters to register. Other proposed changes to the regulations were a decrease in the allowable reporting timeframes from the closure of a reporting period from 60 days to 30 days and registration and reporting thresholds recovery of hazardous waste being decreased from 500kg to 100kg a day.

The GLM will be required to report waste information for waste disposed of at the municipal landfill sites on the IPWIS in line with these regulations.

4.6 National Norms and Standards for the Storage of Waste (GN 926 of 2013)

The National Norms and Standards for the Storage of Waste (GN 926, Nov 2013) specify the minimum requirements for waste storage facilities in the interest of protection of public health and the environment. The norms and standards are applicable to waste facilities that have the capacity to store in excess of 100m^3 of general or 80m^3 of hazardous waste.

At the time when these norms and standards were promulgated, GN 718 and 719, which present a list of waste management activities that require a waste management license, were amended to remove the storage of waste.

4.7 National Norms and Standards for Sorting, Shredding, Grinding, Crushing, Screening and Bailing of General Waste (GN 926 of 2013)

These norms and standards have two different requirements depending on the size of a facility:

- All waste facilities (used for sorting, shredding, grinding, crushing, screening of waste) **smaller than 100m^2** in size must be registered with the competent authority and provide details including the location, types of waste processed, and civil design drawings of the facility as set out in Section 4 of the standard.
- All waste facilities (used for sorting, shredding, grinding, crushing, screening of waste) **larger than 100m^2** in size must register with the competent authority as set out in Section 4 of the standard, as well as comply with requirements for the location, design, construction, access control and signage.

Operational requirements in Section 8 of the standard address management of operational impacts such as control of hazardous substances, air emissions, discharging of wastewater, noise and odour emissions. The standard also covers training, emergency response, monitoring and reporting, general requirements, requirements during the decommissioning phase and transitional provisions.

4.8 Draft National Norms and Standards for the Treatment of Organic Waste (GN 275 of 2021)

The draft National Norms and Standards for the Treatment of Organic Waste (GN 275 of 2021) were released for public comment on 29 March 2021.

The draft norms and standards are applicable to the following activities:

- Recycling of organic waste at a facility that has an operational area in excess of 500m^2
- Recovery of organic waste including the refining, utilisation or co-processing of organic waste in excess of 10 tons but less than 100 tonnes per day
- Construction and operation of any organic waste facility that has the capacity to process in excess of 10 tonnes but less than 100 tonnes of organic waste material per day
- Construction of any organic waste facility where the capacity of the facility is able to process in excess of 10 tonnes but less than 100 tonnes per day
- Construction and operation of any organic waste facility processing animal matter not intended for human consumption for installations handling in excess of 1 ton of raw material per day
- Construction and operation of any organic waste facility used applied heat (thermal treatment) in the treatment of general waste exceeding 10kg per day.

The Norms and Standards provide guidance acceptable treatment options for different types of organic waste. An organic waste treatment facility needs to registered with the licensing authority 90 days before the commencement of construction. The design requirement for a facility are specified in the Norms and Standards. One of the key design requirements for an organic waste treatment facility is that storage of material must occur on an impermeable surface (concrete, clay or heavy duty plastic) with a run-off collection area. This requirement will need to be factored into the design of organic waste treatment facilities if the Norms and Standards are finalised.

5 Alignment with Strategic Plans

There are a number of strategic plans on a national, provincial and local level which have been taken into consideration during the development of this WMP. A summary of these is provided in the section below.

5.1 National Strategic Plans

5.1.1 National Waste Management Strategy (2020)

The National Waste Management Strategy (NWMS) is structured around a framework of three pillars each with their respective goals. The goals along with their respective targets are to be achieved by dates (year) indicated in the NWMS. These are indicated in the table below and will guide the implementation of target projects as detailed in the implementation plan for the WMP. The 2020 NWMS has three strategic pillars to improve the waste management in South Africa:

1. Waste minimisation
2. Effective and sustainable waste services
3. Compliance, enforcement and awareness.

These are unpacked further in the table below.

Table 9: Summary of 2020 NWMS Goals (goals related to waste minimisation shown in bold)

Goal	Implementation mechanism

1. Prevent waste, and where waste cannot be prevented, divert 40% of waste from landfill within 5 years; 55% within 10 years; and at least 70% of waste within 15 years leading to Zero-Waste going to landfill through reuse, recycling, and recovery and alternative waste treatment.	**Waste Prevention:**
	• **Prevent waste through cleaner production, industrial symbiosis, and extended producer responsibility**
	• **Prevent food waste by:**
	  • **working with agricultural producers, food producers and transporters, retailers, the hospitality sector and consumers,**
	  • **improving consumer awareness**
	  • **developing guidelines, norms and standards for redistributing surplus foods and composting of spoilt foods.**
	Waste as a Resource:
	• **Divert organic waste from landfill through composting and the recovery of energy**
	• **Divert construction and demolition waste from landfill through beneficiation**

Goal	Implementation mechanism
	• **Increase re-use, recycling and recovery rates** • **Increase technical capacity and innovation for the beneficiation of waste**
2. All South Africans live in clean communities with waste services that are well managed and financially sustainable.	**Waste Collection:** • **Separation of waste at source by integrating waste pickers into municipal collection services, develop an online training tool for municipal managers and develop a national awareness campaign on recycling and waste management** • Safe and environmentally sustainable disposable of hazardous household wastes. **Effective Integrated Waste Management Planning:** • Development and implementation of 5-year provincial and municipal IWMPs. • **Improve collection, reporting and dissemination of information on SAWIS** • Build capacity in IWMP planning and provide guidelines for revision of IWMP • **All local authorities (municipalities) to include provisions for recycling drop-off/buy-back/storage centres in their IWMPs by 2023**
3. Mainstreaming of waste and awareness and a culture of compliance resulting in zero tolerance of pollution, litter and illegal dumping.	• Reduction of pollution, littering and illegal dumping through a national awareness campaign and greater public awareness • Enhanced capacity to monitor compliance and enforce the Waste Act and International Agreements • Municipal landfill sites and waste management facilities comply with licensing standards

5.1.2 Operation Phakisa: Chemicals and Waste Phakisa

Operation Phakisa, an initiative which looks to unlock South Africa's economic potential, sets a number of waste minimisation related national targets. These targets include:

- Reduce industrial waste to landfill by 75%
- Reduce municipal waste to landfill site by 50%
- Move towards zero sewage sludge to landfill by 2023
- Move toward zero meat production waste to landfill by 2023
- Increase e-waste recycling from 7% to 30%
- Create 1,000 jobs through recycling and re-use of government computers
- 50% of households in metropolitan municipalities separating at source by 2023
- 8,000 direct and indirect jobs through plastic recycling
- Produce building aggregates and construction inputs from rubble and glass

(a) National Development Plan

South Africa National Development Plan (NDP) was published in 2012 and outlined the required steps to eliminate poverty and reduce inequality by 2030.

The NDP sets the following objectives related to waste management:

- An absolute reduction in the total volume of waste disposed to landfill site each year through a national recycling strategy

- Carbon price, building standards, vehicle emission standards and municipal regulations to achieve scale in stimulating renewable energy, waste recycling and retrofitting buildings
- Consumer awareness initiatives and sufficient recycling infrastructure should result in South Africa becoming a zero waste society
- Implement a waste management system through rapid expansion of recycling infrastructure and encouraging composting of organic domestic waste to bolster economic activity in poor urban communities

The NDP also recognises the opportunity for the manufacturing sector to reuse waste.

5.2 Provincial Strategic Plans

5.2.1 Western Cape Integrated Waste Management Plan

The first generation Western Cape Provincial IWMP (WCIWMP) was revised in 2017. The WCIWMP is centred around 4 goals and 14 strategic objectives.

Table 10: Western Cape 2017 IWMP Goals and Objectives (goals related to waste minimisation shown in bold)

Goal	Strategic Objectives
Goal 1. Strengthen education, capacity and advocacy towards integrated waste management	**1. Facilitate consumer and industry responsibility in integrated waste management** 2. Promote and ensure awareness and education of integrated waste management 3. Build and strengthen waste management capacity
Goal 2. Improved integrated waste management planning and implementation for efficient waste services and infrastructure	1. Facilitate municipal waste management planning 2. Promote industry waste management planning 3. Promote the establishment of integrated waste management infrastructure and services; and 4. Ensure effective and efficient waste information management
Goal 3. Effective and efficient utilisation of resources	1. Minimise the consumption of natural resources 2. Stimulate job creation within the waste economy **3. Increase waste diversion through re-use, recovery and recycling**
Goal 4. Improved compliance with environmental regulatory framework	1. Strengthen compliance monitoring and enforcement 2. Remediate and rehabilitate contaminated land 3. Facilitate the development of waste policy instruments 4. Promote self/co-regulatory measures

As a local municipality within the Western Cape, the responsibility for the implementation of a number of projects in the WCIWMP falls to the GLM. The GLM WMP will be aligned with the WCIWMP and such projects will be incorporated into the implementation plan for the GLM WMP.

(a) Western Cape Waste Awareness Strategy

The Western Cape Waste Awareness Strategy was released by Department of Environmental Affairs and Development Planning (DEA&DP) in March 2018. The strategy is designed as a guideline to assist with the successful development and implementation of waste awareness

initiatives. The plan identifies several mechanisms to increase waste management awareness and outlines the advantages and disadvantages of each initiative.

5.3 Regional Strategic Plans

5.3.1 Assessment of the Municipal Integrated Waste Management Infrastructure: Eden District

DEA&DP commissioned a study of waste management infrastructure of the seven local municipalities in the GRDM (formerly Eden District Municipality) in 2016. The aims of the study were to:

- Improve compliance of waste facilities with existing waste management licenses (WML)
- Identify additional infrastructure which is needed to achieve a 20% diversion of waste from landfill by 2019
- Determine additional infrastructure requirements to allow municipalities to remain compliant up to 2030

The report identified infrastructure needs for each local municipality to bring them toward compliances with waste minimisation targets by 2020.

The following waste minimisation infrastructure needs were identified for the GLM:

- A transfer station at Uniondale as the Uniondale landfill site was issued with a closure licence and would be closed and rehabilitated. The transfer station has now been constructed in Uniondale and is operational.
- A composting facility to divert organic waste from landfill. At the time the GLM had appointed consultants to commence with the design of the composting facility. The composting has now been constructed behind the existing George transfer station. The GLM was in the process of appointing a service provider to manage the composting of organic waste generated in George.
- A crushing facility (or area at the George transfer station) to crush construction and demolition waste generated in George and divert this from landfill, to use as cover material at the landfill or to use in construction and road maintenance projects.
- An upgrade of the George transfer station to ensure the operations and the proposed expansions at the George transfer station.

5.3.2 Eden District Municipality Waste Management Policy

The Eden District Municipality (now GRDM) Waste Management Policy was approved by council in 2017. The policy outlines the mechanisms through which the GRDM will exercise its responsibilities in terms of waste management. The policy covers the following key items:

1. **Waste information management** – the implementation of the Garden Route (Eden District) waste management information system (GRWMIS).
2. **Waste management plans** – requirements for industry waste management plans and municipal IWMPs.

3. **Waste minimisation and recycling** – **encourage waste minimisation and recycling, introduce a system of accreditation for waste collectors, transporters and recyclers**
4. **Municipal service** – adoption of waste management tariffs for the regional landfill site, establishment of a district inter-municipal waste management forum.
5. **Service provider**- makes provision for the GRDM to enter into a public private partnership (PPP) with a service provider who can be used to provide waste management services.
6. **Categorisation of waste and the management of certain types of waste** – implementation of the National Norms and Standards for Assessment of Waste for Landfill.
7. **Commercial services and the accreditation of service providers** – allows for the development of a permit system for hazardous waste management companies.
8. **Administrative enforcement** – enforcement of waste management by-laws, training of municipal officials.

As a local municipality within the GRDM these by-laws are also applicable to the GLM.

(a) Garden Route District Municipality Integrated Waste Management Plan 2020 – 2025

The GRDM 2020 – 2025 IWMP was reviewed by DEA&DP and returned to the municipality with a few comments to be addressed. Once the GLM has addressed all the comments, the IWMP should be submitted to council for adoption.

The plan identified seven goals to improve waste management in the district. Goal 6 specifically addresses waste minimisation and recycling. Goal 1 and 2 are also of importance to this study as effective waste reporting, waste information management and waste education and awareness are key to increasing waste minimisation. These seven goals are:

1. Effective waste information management and reporting
2. Improved institutional functioning and capacity
3. Improved waste education and awareness
4. Provision of efficient and financially viable waste management services
5. Increased waste minimisation and recycling
6. Improved compliance and enforcement
7. Improved future planning

5.3.3 Garden Route District Municipality By-Laws

The GRDM has by-laws which were promulgated in 2017 under the title Eden District Municipality: District Waste Management By-Law (Provincial Gazette 7818 of 2017). In terms of waste minimisation and recycling the by-laws require the following:

- The establishment of a district waste management information system to gather waste information from waste generators, holders, service providers and permit holders.

- Provision of information to the GRDM on the source, type, quantity of waste as well as details of waste management facilities and current waste management methods.
- Request for the provision of waste management plans for specific waste streams through a notice in the provincial gazette.
- Waste is avoided as far as possible, where it cannot be avoided it must be minimised, reused, recycled or recovered as far as possible.
- For waste to be separated at source for recycling following the publishing of a notice in a provincial gazette.

5.4 Alignment with Local Strategic Plans

5.4.1 George Local Municipality Fourth Generation Integrated Development Plan

The fourth generation GLM Integrated Development Plan (IDP) covers the period 2017 – 2022. The IDP is centred around five strategic objectives:

1. To develop and grow George, through revitalising the business district and job creation.
2. Keep George safe, clean and green, through maintenance and cleaning of the physical environment. Developing on current recycling initiatives and creating green spaces. Reduce waste by keeping George clean.
3. Provide affordable services, by reducing Service-delivery backlogs. Provide low-cost housing and GAP housing to the people of George. Develop an integrated public transport network and improve road conditions
4. Provide Participative Partnerships within the community of George. Increase public inputs in strategic decision-making and increase partnerships with different stakeholders to strengthen the public-private partnerships in George
5. Promote Good Governance and Human Capital. This can be done through comprehensive audit of operations, processes, duties and service delivery standards of Directorates. Look to implement the Long-Term Financial Plan.

The following waste-related programmes were planned for the GLM before 2022:

- To provide an integrated waste-management service for the total municipal area
- To provide basic services to informal settlements that comply with the minimum standards
- To build on current recycling initiatives and secure a meaningful reduction in waste levels
- To maintain and improve on blue and green drop status in water and sewage services by the retaining of capacity and the further improvement of capacity.
- To build on the current waste co-operative governance relationship

5.4.2 George Local Municipality 3rd Generation IWMP 2020 – 2025

The GLM 3rd generation IWMP was submitted to DEA&DP for endorsement and subsequently returned to the municipality with a few comments to address. Once comments have been

addressed the IWMP should be tabled for final approval by council. One of the objectives in the IWMP was 'increased waste minimisation and recycling' (GLM, 2020).

The projects related to waste minimisation, recycling and waste diversion from landfill identified in the IWMP are listed in the table below:

Table 11: GLM IWMP projects related to waste minimisation and recycling

No.	Action	Timeframe	Relevance to waste minimisation
Goal 1: Effective waste information management and reporting			
Objective 1.1 Accurate waste information is reported on the IPWIS and GRWMIS on a regular basis. The GLM is aware of the type and quantity of waste generated in the municipality.			
1.1.1	The George landfill will continue to operate and data recorded from this facility will be reported on IPWIS. GLM needs to commence reporting for the Uniondale facility.	Until Closure	These actions are critical in improving waste information gathering and management. In order for the GLM to measure the success of waste minimisation initiatives accurate baseline data is required. At present there are no accurate waste disposal records for green waste and construction and demolition waste for the GLM.
1.1.2	Gate controllers to be stationed at all municipal facilities to record incoming waste.	Until Closure	
1.1.3	All new gate controllers to undergo DEA&DP waste calculator training prior to commencing work, and all existing gate controllers to undergo refresher training	Until Closure	
1.1.4	All municipal waste facilities are registered and reporting on the GRWMIS	Until Closure	
1.1.5	Domestic waste characterisations are undertaken once every 3 years. A representative sample is used from different suburbs across the municipality	Until Closure	Domestic waste characterisations can be used to measure the effectiveness of waste minimisation initiatives. If waste characterisations are undertaken before and after awareness initiatives or implementation of programmes such as home composting or swop shop the success of these programmes can be measured through comparison of the domestic waste stream before and after implementation.
1.1.6	Identify the major private waste management companies operating in the GLM area and request monthly records of waste managed in the GLM area. This information can be requested in line with the GRDM waste management by-laws.	2020 - ongoing	Data from private waste management companies operating in the municipality can help the municipality determine the total tonnes of waste that is collected for recycling.
Objective 1.2 The 2020 IWMP is regularly reviewed and the implementation status of project is monitored.			
1.2.1	Undertake annual performance reviews of this IWMP, and send reports to GRDM and DEADP	Until Closure	The GLM should continually track the implementation of waste minimisation projects to ensure they are on track to achieve the targets set in the IWMP.
Objective 1.3 Effective internal management of waste related data			
1.3.1	Develop an inventory of all internal waste related data sets	2020 - 2025	The GLM should develop one system to capture all internal waste related data. This should also be utilized to capture waste minimisation and recycling information.
1.3.2	Develop systems for effectively capturing and storing waste data sets identified in the above inventory, such that they are readily available	2020 - 2025	
Goal 2: Improved education and awareness			
Objective 2.1 Waste awareness campaigns are well planned and executed. Sufficient awareness materials are available for the waste awareness campaigns			
2.1.1	Develop an annual waste awareness calendar with dates for events.	2020 - 2025	This target refers to waste education and awareness as a whole. Waste minimisation and recycling awareness campaigns form a key part of waste education and awareness. The need for an annual calendar is critical in ensuring programmes are planned and executed efficiently. Developing a calendar in advance will also allow the GLM to co-ordinate local programmes with

No.	Action	Timeframe	Relevance to waste minimisation
			district, provincial and national awareness programmes.
2.1.2	Waste awareness campaigns are to be undertaken by trained and experienced personnel. Environmental educators to receive waste management training	2021	A lack of awareness campaigns has been attributed to a lack of employees to implement the programmes. The appointment of additional employees for waste awareness will increase the amount of awareness undertaken in the GLM.
2.1.3	The GRDM waste mascot is to be incorporated into future waste awareness materials	2020 - 2025	In order to standardise waste educational and awareness materials used across the district the districts mascot Rocky the Rooster should be incorporated into all of the GLM's awareness materials.
Objective 2.2 The public, business and industry are informed of what constitutes hazardous waste and how hazardous waste should be managed			
2.2.1	GLM to undertake hazardous waste awareness programmes with business and industry at least once a year.	2020 - 2025	There is a lack of awareness with regards to what constitutes hazardous waste resulting in inappropriate disposal thereof. Hazardous waste awareness campaigns should be undertaken to increase awareness of what constitutes hazardous waste, provide disposal alternatives and therefore minimize the amount of hazardous waste that ends up in landfills.
2.2.2	GLM to undertake hazardous waste awareness programmes with the public with a focus on HHW	2020 - 2025	
2.3 Waste awareness campaigns are mainstreamed at schools and all learners and educated on good waste management practices			
2.3.1	Waste awareness campaigns to be undertaken at all schools in GLM	2020 - 2025	Waste awareness campaigns, with a focus on waste minimisation and recycling are required in schools to educate learners on this topic.
Goal 3: Improved institutional functioning and capacity			
Objective 3.1 The Solid Waste and Environmental Health Services department has sufficient well capacitated employees to allow for the waste management function to be actioned effectively and for the IWMP to be implemented			
3.1.1	The Solid Waste and Environmental Health Services organogram is to be reviewed to determine if sufficient positions are listed to allow implementation of this IWMP. All key positions to be filled	2021/22	The GLM needs to ensure the sufficient staff are appointed to allow the waste minimisation, recycling and diversion projects listed in the IWMP to be implemented.
3.1.2	KPIs to be added to the waste educators to increase waste education and awareness programmes being undertaken	2020/24	Implementation of the IWMP projects should be added to the WMO and waste educator's KPIs to ensure waste minimisation, recycling and diversion projects are actioned.
3.1.3	Implementation of the IWMP to be added as a KPI to the Waste Manager or supervisors performance evaluation criteria.	2020/21	
3.1.4	Training schedule developed with training needs for employees at different levels identified.	2020/21	All GLM employees should receive basic training on waste minimisation. More in-depth training would be required for management and employees responsible for waste education and awareness.
Goal 5: Increased waste minimisation and waste diversion from landfill			
Objective 5.1 The diversion of recyclables from waste generated is increased			
5.1.1	Ensure a greater participation of households in the separation at source programme. The municipality should draft a plan of how to increase participation at source.	2020 - 2025	A kerbside separation at source programme is the easiest recycling programme for the public to become involved with as it requires less effort than having to transport recyclables to a drop-off facility. The GLM has a programme in place, however participation rates range between different suburbs.
5.1.2	GLM to develop a pilot swop shop/ buy back centre	2020 - 2025	Swop-shops and buy-back centres can be used as an incentive for people to recycle.
5.1.3	Add recycling drop-off facilities to the George transfer station and Uniondale transfer station	2020 - 2025	Construction of the Uniondale transfer station is complete and recycling drop-off facilities have been added.

No.	Action	Timeframe	Relevance to waste minimisation
5.1.4	The in-house recycling programme should be extended to all municipal offices. Records of waste collected through this system to be reported separately by the service provider who collects the recyclables.	2020 - 2025	The municipality should lead by example. Recycling should be rolled out to all the municipal offices as office paper is utilized extensively in the offices.
5.1.5	Complete construction of the MRF	2020/21	The MRF will allow the GLM to sort waste collected at drop-off facilities and through the two bag system.
5.1.6	Incorporate existing informal reclaimers on the George landfill site into the new MRF.	2020/21	Informal reclaimers play a vital role in recycling. Informal reclaimers operate in poor working conditions and reclaimation of waste at the George landfill site is not permitted in terms of the waste management license. The GLM must consider formalising the informal pickers and employing them at the MRF.
Objective 5.2 The diversion of organic waste from landfill is increased			
5.2.1	Roll out of the home composting programme to additional households	2020 - 2025	The GLM has launched a pilot home composting programme. This programme should be rolled out to additional households to increase the volume of organic waste diverted from landfill.
5.2.2	Finish construction of the George composting facility	2020 - 2025	The composting facility should be commissioned as soon as possible and all green waste diverted to the facility.
5.2.3	Assess the feasibility of developing a composting facility in Uniondale versus the cost to transport green waste to George.	2022 - 2023	The feasibility of developing a composting facility in Uniondale versus the cost to transport green waste to George should be determined.
5.2.4	GLM to provide green drop-off facilities with chippers at the George transfer station. .	2022 - 2023	Provision of drop-off facilities for green waste at the George transfer station and future waste facilities will allow the public to drop-off green waste. The public must be educated that only 'clean' green waste e.g. green waste which is not mixed with any other waste streams will be accepted. This green waste can then be chipped and taken to the composting facility.
5.2.5	Develop organic waste diversion strategies for both landfill sites	2021	An organic waste diversion strategy is required to guide the GLM is diversion efforts.
Goal 7: Improved future waste infrastructure planning			
Objective 7.1 Plans are in place to guide the development of waste management infrastructure which is required to meet national and provincial waste diversion targets			
7.1.1	The George municipality to develop and implement a waste infrastructure masterplan to guide the development of waste facilities over the next 10 – 20 years.	2020 - 2021	A waste infrastructure masterplan would guide development of waste minimisation infrastructure in the long term. It would assess the need for additional infrastructure such as drop-off facilities, composting facilities, alternative waste treatment technologies.
7.1.2	Implement the waste infrastructure masterplan	2021 - 2041	Once George has developed a waste masterplan, it should be implemented accordingly. GLM currently has no budget to develop and implement the waste infrastructure masterplan. Priority is to close the landfills.

5.5 National Waste Management Interventions

On a national level there are a number of government programmes which assist municipalities with waste management. These are discussed briefly below.

5.5.1 Expanded Public Works Programme

The Expanded Public Works Programme (EPWP) was initiated in 2009 as a mechanism to reduce unemployment and reduce poverty. The EPWP programme focuses on creation of labour-intensive employment opportunities. The Department of Public Works provides an oversight role and EPWP beneficiaries assist municipalities usually with community services or service delivery (Department of Public Works, undated).

5.5.2 Community Work Programme

The Community Work Programme (CWP) provides part time employment to underemployed or unemployed people. The CWP programme is involved with development of public assets, and community development. The CWP beneficiaries clean up open spaces and illegal dump sites within the George municipal area on a daily basis.

5.5.3 Youth Community Outreach Programme

Employees were deployed to the GLM by DEFF for the youth jobs in waste programme. However, according to the GLM, they usually come with very little to no experience and no clear objectives and end up fulfilling ad hoc roles.

5.5.4 Source to Sea

The Source to Sea programme is a national programme managed by DEFF. The aim of the programme is to address marine litter through managing it in the catchments. Each district municipality is provided with 100 employees to assist with litter removal from watercourses. Teams will be provided with equipment such as rakes and bags, PPE and given a scale to weigh waste collected. The participants will collect litter from hotspots in and around watercourses.

6 Benefits of Waste Minimisation

There are a number of benefits of waste minimisation. These are discussed briefly below.

6.1.1 Reduced Consumption of Resources

Waste minimisation and recycling can reduce the consumption of resources. Material which is collected and recycled can replace virgin content. In the case of plastic, recycled plastic can replace oil. Crushed construction and demolition waste (C&DW) can replace mined virgin material in some construction projects.

6.1.2 Preservation of Landfill Site Airspace

Due to stringent legislated requirements the development and operation of landfill sites is very expensive. Diversion of waste away from landfill site can increase the lifespan of landfill sites. Landfill sites require a large area of land to accommodate the site footprint as well as a buffer region. Once a landfill site is closed and rehabilitated development options for the site are very limited.
Preserving landfill site airspace will ultimately decrease the demand for new landfill sites.

6.1.3 Avoided Waste Transportation and Disposal Fees

At present the GLM transports domestic waste which includes an organic component to the PetroSA landfill site. Reducing the volume of organic waste being disposed of at the PetroSA landfill site will result in a financial saving from reduce transport cost and disposal fees.

6.1.4 Reduction in Negative Impact Associated with Landfilling of Waste

Landfill disposal of waste can result in a number of negative impacts. These can be minimised through good management of sites and design in line with legislated requirements.

(a) Greenhouse Gas Emissions

When organic waste is disposed of at a landfill site, compacted and covered it can breakdown anaerobically. The anaerobic breakdown of waste results in methane emissions. Methane is a greenhouse gas which is 25 times more potent that carbon dioxide (CO_2) over its lifespan (web reference 4). When organic waste is broken through composting it is broken down aerobically and the release of methane is avoided (web reference 5).

Composting of organic waste instead of landfilling can reduce methane emissions which contribute to climate change.

(b) Reduction in Leachate Generation

Due to a high water content, organic waste can increase leachate generation in landfill sites. Leachate, if not managed correctly is a pollution risk to ground and surface water resources. Leachate management systems can be used to manage leachate, these systems can be expensive to install and maintain.

(c) Reduction of Fire Risk

On landfill sites such as Gwaing (George) landfill where a large volume of dried green waste has accumulated the material present a fire risk. The accidental burning of green waste can result in fires spreading to surrounding areas and greenhouse gas emissions.

Fires can also negatively impact on human health through the release of smoke and the potential for the fire to spread to other areas.

6.1.5 Economic Opportunities

Organic waste can be composted. If a market exists compost can be sold to the public, farmers, business or industry. The revenue generated from sale of compost can be used to manage a composting facility and provide sustainable employment opportunities. Compost generated from municipal organic waste can also be used in municipal parks and gardens instead of outsourcing supply. This can result in financial savings.

As composting of waste is typically more labour intensive than landfilling of waste. Composting of waste may result in job creation.

6.1.6 Improvement to Soil

The use of compost has benefits over fertilizers. Fertilizers release nutrients quickly whereas compost released nutrient more gradually over a longer period. Compost can also assist with the growth of beneficial microbes and assist with water retention in the soil.

7 Status Quo Assessment

The following chapter provides an overview of the status quo of waste management in the GLM with a focus on waste minimisation, recycling and waste diversion from landfill. A comprehensive status quo assessment of the entire ambit of waste management in the GLM is available in the GLM 2020 IWMP (GLM, 2020).

This chapter has been structured around the processes identified in the waste management hierarchy.

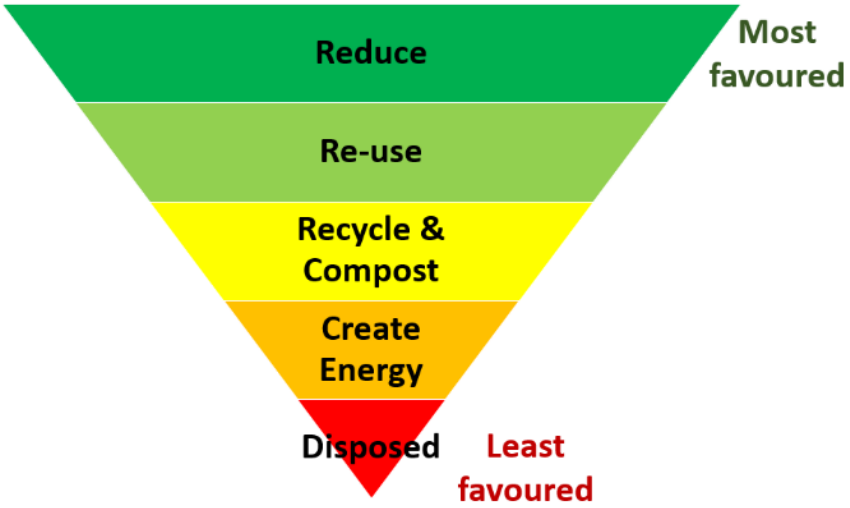


Figure 7: The waste hierarchy as per the National Waste Management Strategy (DEFF, 2020)

7.1 Waste Generation and Disposal

In order to understand the current status of the implementation of the waste management hierarchy, an understanding of the waste generation in the municipality is needed.

The following sections discuss waste generation and disposal for the GLM.

7.1.1 Waste Disposal Records

The municipality has two operational landfill sites and one operational transfer station. Details on how disposal records are undertaken at the facilities are listed hereunder:

- **George (Gwaing) landfill site** – The George landfill site is still in use and closure is due to commence by August 2022. Individual businesses and households transport bulky green waste and construction and demolition waste directly to the landfill. Waste entering the landfill is recorded using the weighbridge at the transfer station. When the weighbridge is out of order the gate controller estimates the volume of waste using the DEA&DP calculator sheet, a tool that was developed by DEA&DP for municipalities to quantify their waste

- **Uniondale landfill site** – The landfill site is used for the disposal of domestic, green, C&DW, and commercial and industrial waste from Uniondale and surrounding small towns. Waste entering the Uniondale landfill site is not recorded.
- **George Transfer station** – Domestic and commercial and industrial waste generated in George that is collected by the Municipality is temporarily stored at the George transfer station prior to transport to the PetroSA landfill site. The waste entering the transfer station is recorded using the weighbridge. When the weighbridge is out of operation, waste entering the transfer station is recorded manually based on visual estimates using the DEA&DP waste calculator sheet. PetroSA also provides records of domestic and commercial and industrial waste received from the GLM and reports waste disposal tonnages to the GLM.

Below are the municipal waste disposal records for 2019/20 as provided by the GLM and data sourced from the Integrated Pollutant and Waste Information System (IPWIS), a waste information system managed by DEA&DP. These records exclude municipal waste disposed of at the PetroSA landfill site.

Table 12: Waste disposal records (tonnes) (data source DEADP and GLM)

Month	Organic waste - garden waste (tonnes)	C&DW (tonnes)	Municipal waste (tonnes)	Commercial and industrial waste	Total (tonnes)
January 2019	426.5	-	4,366.1	545.0	**5,337.6**
February 2019	271.5	-	2,802.7	381.3	**3,455.5**
March 2019	692.5	685.0	3,107.3	1,800.0	**6,284.7**
April 2019	259.6	819.5	2,969.8	3.5	**4,052.3**
May 2019	0.5	639.3	3,114.2	265.0	**4,018.9**
June 2019	244.2	676.5	2,493.9	0.9	**3,415.5**
July 2019	657.0	468.1	3,172.0	109.3	**4,406.3**
August 2019	105.6	400.3	3,235.1	-	**3,741.0**
September 2019	104.3	339.5	3,222.0	-	**3,665.8**
October 2019	274.8	840.0	3,087.5	11.2	**4,213.5**
November 2019	153.7	15.2	2,965.7	15.2	**3,149.8**
December 2019	116.6	322.5	3,294.8	0.2	**3,734.1**
Total tonnes	**3,306.6**	**5205.8**	**37,831.1**	**3,131.5**	**49,474.9**
Average tonnes/ month	**275.6**	**520.6**	**3,152.6**	**313.2**	**4,261.9**

*Domestic waste records provided by GLM, other records sourced from DEA&DP

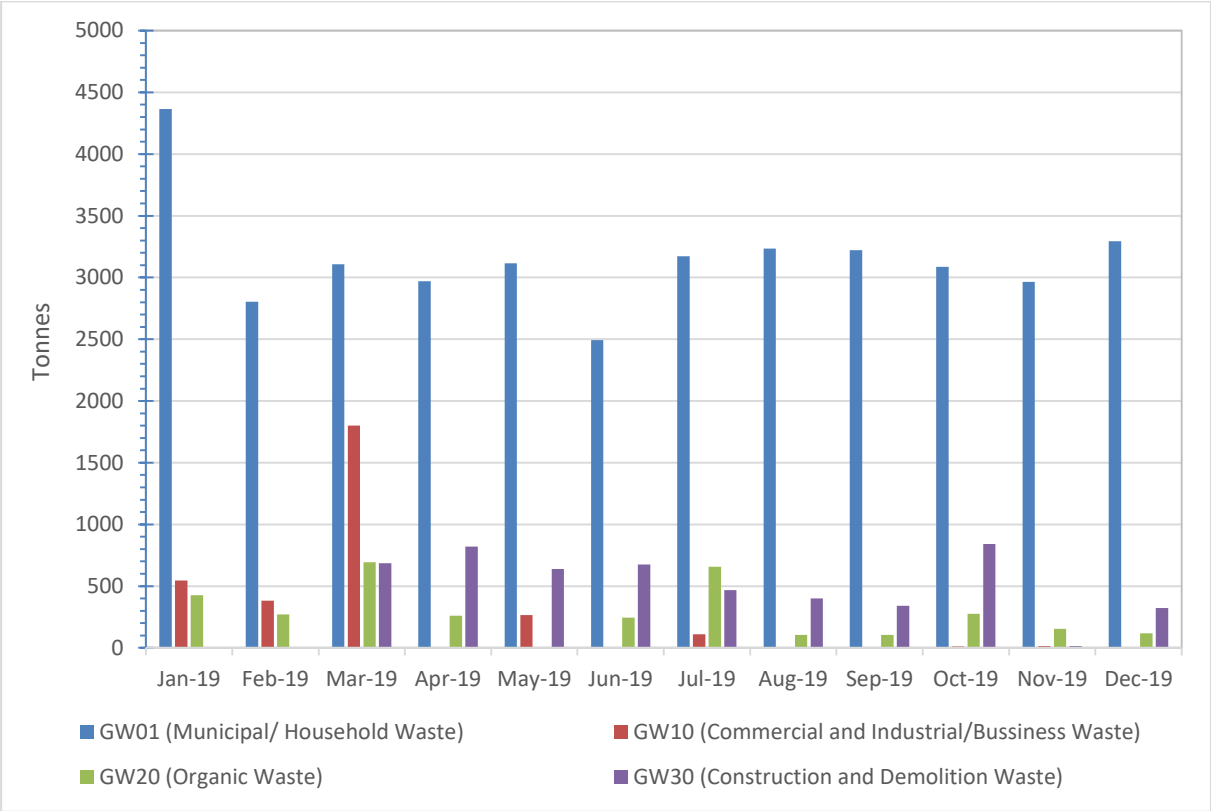


Figure 8: George Local Municipality waste disposal tonnages (2019)

7.1.2 Hypothetical Domestic Waste Generation

An understanding of future waste generation is valuable for waste planning and therefore should be considered in this WMP. An estimated 38,512.0 tonnes of domestic waste was generated in the GLM in 2020. As the population of the municipality grows so too will domestic waste generation rates. Projected waste generation rates based on population growth for 2024 and 2029 will be 42,139 and 46,070.5 respectively. Waste generation rates have been estimated based on historic and anticipated population growth. The population of GLM increased by 8.1% between 2019 and 2024 (approximately 1.8% per annum) (GLM,2020).

Table 13: Future domestic waste generation rates based on projected population growth rate of 1.8% per annum

Year	Population	Projection of generation quantities based on population	Projection based on weighbridge data (tonnes/annum)
2019	217,054	38,543	37,831.1
2020	220,961	39,236.8	38 512.0
2024	237,305	42,139	41,360.7
2029	259,445	46,070.5	45,219.6

7.2 Domestic Waste Profile

A waste characterisation exercise was undertaken by the Garden Route District Municipality in 2018. The aim of the study was to determine the profile of domestic waste which was being disposed of to landfill.

During the waste characterisation exercise 4.8 tonnes of domestic waste was collected and sorted into 15 categories. The results of the waste characterisation are presented below. The hypothetical mass generated per waste type is presented in the table as well. This provides an indication of tonnages of each waste type available in the domestic and commercial and industrial waste stream that can be diverted from landfill and reused, recycled, composted or treated. The 2019 estimated domestic waste profile (38,543 tonnes in 2019) were used in the calculation.

Table 14: Domestic waste profile and estimated mass per waste type generated for GLM (source: Garden Route District Municipality, 2016)

Waste category	Percentage of total mass (%)	Domestic mass generated per waste type in 2019 (tonnes)
Soft plastics	8.2	3,145.11
Hard plastics	7.6	2,929.27
Paper	5.3	2,027.36
Cardboard	7.3	2,805.93
Glass	7.3	2,813.64
Metal	2.7	1,040.66
Recyclables sub-total	**38.3**	**14,761.97**
Food Waste	24.7	9,520.12
Garden Waste	15.1	5,819.99
Organic waste sub-total	**39.8**	**15,340.11**
E-waste	0.3	115.63
Hazardous & HCRW	0.6	231.26
Household Hazardous waste sub-total	**0.9**	**346.89**
Nappies	8.0	3,083.44
Textiles	4.6	1,772.98
Inert	1.7	655.23
Rest	6.7	2,582.38
Total	**100.0**	**38,543.00**

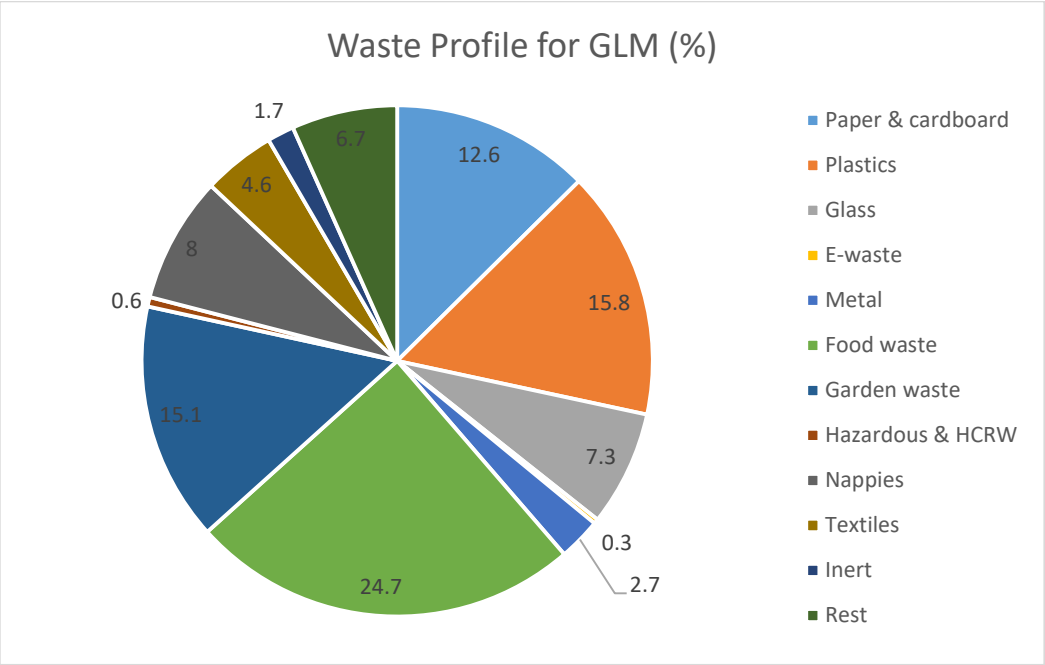
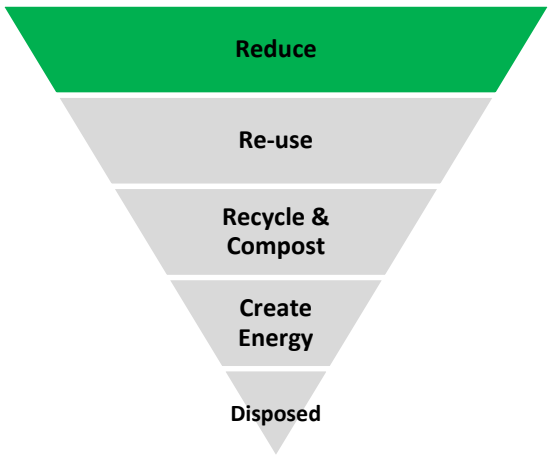


Figure 9: Waste Characterisation results for GLM (Source: Garden Route Municipality, 2018)

7.3 Reduce

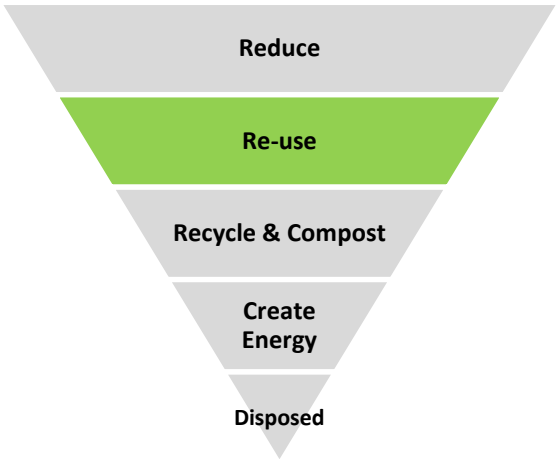


Waste reduction is the aspiration of the waste management hierarchy, but is largely beyond the control of a local municipality.

Waste reduction can be practiced by industry through streamlining manufacturing processes to reduce wastage.

The public can reduce waste generation through steps such as saying no to single use plastics such as drinking straws and minimising food waste in the home through meal planning. Municipalities can encourage residents to reduce waste through waste awareness campaigns.

7.4 Re-Use



The Waste Act defines re-use as *'to utilise the whole, a portion of or a specific part of any substance material or object from the waste stream for a similar or different purpose without changing the form or properties of such substance, material or object'.*

Options for a municipality to re-use waste are limited. One example of waste re-use which a municipality can participate in is re-use of construction and demolition waste. Clean (uncontaminated) construction and demolition waste can be utilised as fill material for construction projects.

The public can participate in waste re-use through actions such as reusing plastic bags, shopping bags or using empty yoghurt containers for food storage, and reusing plastic water bottles.

7.4.1 Construction and Demolition Waste

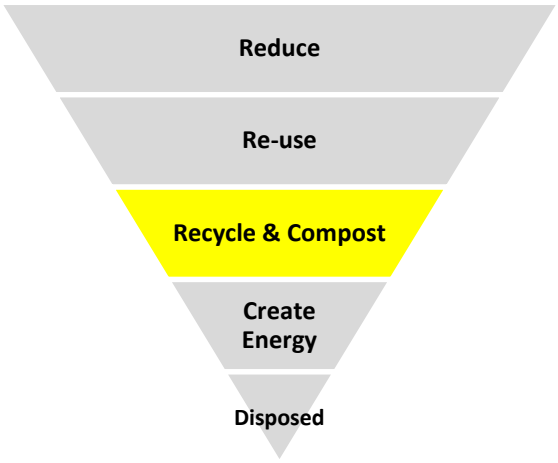
(a) Targets for Construction and Demolition Waste

- Divert 40% of waste from landfill in 5 years, 55% in 10 years and 70% within 15 years leading to zero waste going to landfill – NWMS, 2020 (DEFF,2020)
- Construction and demolition waste (C&DW) only disposed of as cover material by 2021 NWMS, 2020 (DEFF, 2020)

(b) Current Management of Construction and Demolition Waste

Construction and Demolition waste is accepted at both the Uniondale and George landfill sites. At the George landfill site the C&DW is stockpiled separately. Clean uncontaminated C&DW was used for the construction of the first phase of the composting facility at the George transfer station. Phase 1 of the composting facility has been completed and phase 2 is due to commence in 2021.

7.5 Recycling and Composting



The Waste Act defines recycling as *'the process where waste is reclaimed for further use, which process involves the separation of waste from a waste stream for further use **and** the processing of that separated material as a product or raw material'*

Recycling refers to the entire process from collection and sorting of waste, through to converting a waste into a new product or raw material.
For the purposes of this plan, activities linked to one of more of the phases of recycling (e.g. separation of waste at source) are covered under the recycling section.

Composting is defined in the Draft National Norms and Standards for Organic Waste Composting (GN 1135 of 2019) as '*a biological process in which organic materials are broken down by micro-organisms by means of an aerobic process to produce compost or fertiliser*'.

7.5.1 Recycling

(a) Definitions

The following definitions are used in the next sections of the report.

Separation at source – this refers to the practice of separating waste at the point of generation.

Mainstream recyclables – these are waste types which are commonly generated by households and businesses but excludes hazardous waste. Mainstream recyclables are paper, cardboard, plastic, glass, cartons and metal.

Recycling drop-off facilities- a facility where the public can drop-off source-separated recyclables free of charge. There is no financial or other incentive for the public to use these facilities

Swop shops – these are facilities where the public can exchange source-separated recyclables for items such as groceries, clothing or stationary. Swop-shops typically need to be subsidised to remain operational

Buy-back centre – these are facilities where the public can sell recyclable material. The value paid for recyclable material is generally below market value to allow the operator of the buy-back centre to make a profit.

Material recovery facility – this is a facility where sorting of waste occurs. MRFs can be broadly classified as 'clean' or 'dirty'. A clean MRF processes recyclable waste which has been separated at source. A dirty MRF processes an unsorted waste.

(b) Legislative Targets for Waste Recycling

The following key legislated targets for recycling need to be noted:

- 40% of waste diverted from landfill within 5 years; 55% within 10 years; and at least 70% of waste within 15 years leading to Zero-Waste going to landfill including recyclable waste – NWMS, 2020

- All local authorities to include the development of MRFs at new and existing landfill with longer airspace for recycling by 2021 – NWMS, 2020

In addition to the legislated requirements the 2017 Western Cape Provincial IWMP sets the following recycling targets:

- 20% diversion of recyclables by 2019

The 2020 GLM IWMP sets a number of targets, the key ones are:

- Increase participation rates in the separation at source programme
- Develop a pilot swop-shop/ buy-back centre
- Add recycling facilities to the George and Uniondale transfer stations
- Complete construction of the MRF at the George transfer station

(c) Recycling Records

The table below details recycling records for the GLM for the period from August 2019 to January 2020. The records as outlined in the table below are recyclable waste tonnages:

- Collected through the municipal separation at source programme (2 bag system)
- From private recycling businesses operating in the GLM.

In 2019 11,693.2 tonnes of recyclable were collected. On a monthly basis an average of 974.4 tonnes of general domestic waste is recovered for reuse or recycling.

Table 15: Recycling records January 2019 – January 2020 (source, GLM and GLM IWMP, 2020)

Month	2 bag system	Private recyclers	Total
January 2019	544.6	*Monthly total not available, average of 400.7 tonne/ month*	945.3
February 2019	428.1		828.8
March 2019	519.5		920.2
April 2019	548.1		948.8
May 2019	558.4		959.1
June 2019	549.0		949.7
July 2019	636.4		1,037.1
August 2019	613.0		1,013.7
September 2019	624.6		1,025.3
October 2019	690.5		1,091.2
November 2019	685.3		1,086.0
December 2019	468.3		869.0
January 2020	655.4		1,056.1
Total	**6,884.8**	**4,808.4**	**11,693.2**
Average/ month	**573.7**	**400.7**	**974.4**
Average/annum	**6,884.8**	**4,808.4**	**11,693.2**

[1]Tonnages of recyclable waste collected through the 2-bag system from business by the service provider appointed by the GLM

[2]Tonnages of recyclables sold by private recyclers within GLM that responded to the survey. The companies were only able to provide monthly averages

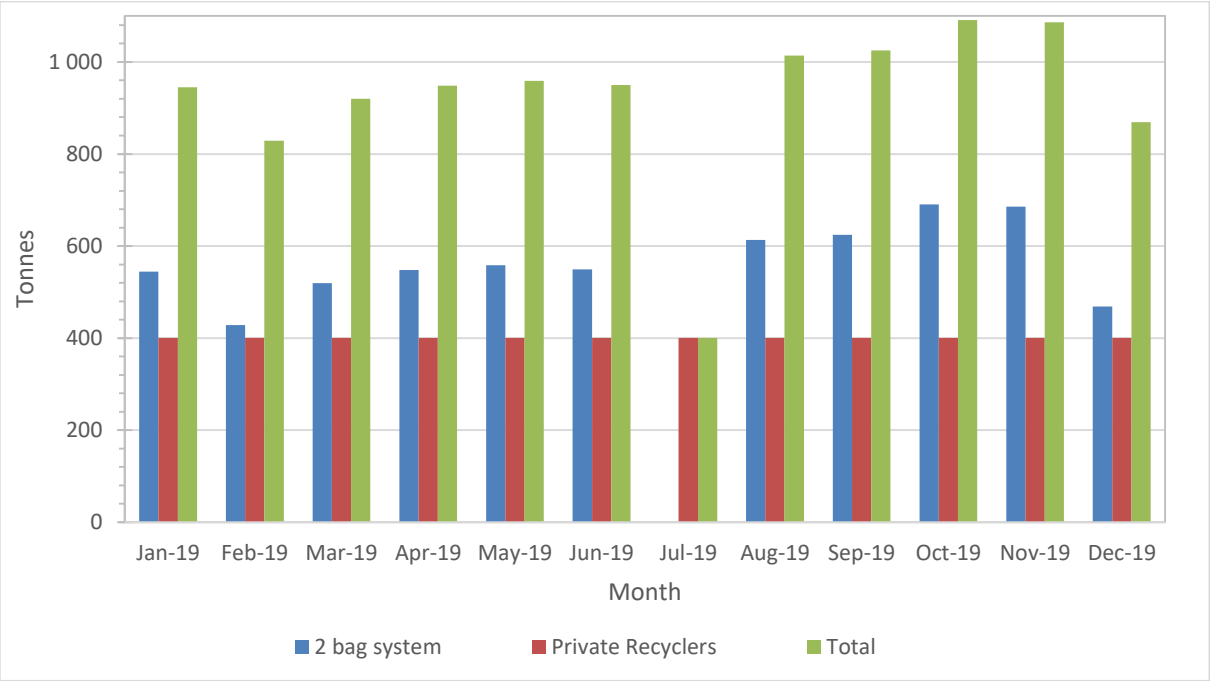


Figure 10: George Local Municipality monthly recycling tonnages for 2019/20

The different recycling programmes used in the GLM are detailed in the following sections that follow.

(d) Separation at Source Programme

The GLM has a multi-bag waste collection system in operation. The bags are colour-coded as follows:

- **Black bags**: for non-recyclable general waste, and these are collected by the municipality.
- **Blue bags**: The source-separated recyclables are collected by the municipality. This service was previously undertaken by a service provider until July 2020.
- **Green bags**: Garden waste is collected by the municipality. This service was previously undertaken by a service provider.

The blue-bag system has been rolled out throughout George, in the high to medium income areas. The blue bag system was tested and subsequently ceased in the low-income areas due to low participation rates. The municipality was not able to quantify the participation rate in the separation at source program and indicated that the participation rates vary between areas. Participation rates in some high-income areas can reach 60%, whereas in the middle income areas the participation rate can vary between 10 – 20%. Blue bags are collected weekly from residential areas listed in the table below.

Table 16: Areas serviced by the blue bag system

Monday (weekly)	Tuesday (weekly)
Heather Park, Heatherlands, Victoria Bay, Blue Mountain Village, Glenbarrie, Groenkloof, Heroldsbay, Blanco, Riverlea	Lawaaikamp, Borcherds, Wilderness, Kleinkrantz, Thembalethu, Levallia, Rosemore, Conville, Protea Park, Parkdene, Ballotsview, Tousranten, Constancia Kloof
Wednesday (weekly)	**Thursday (weekly)**
Blommekloof, Twee Riviern, Camphersdrift, Fernridge, Denneoord, Bo-dorp, Hoekwil, Die Vleie, Hoogekraal	Rooirivierrif, Pacaltsdorp, Rosedale, Dormehlsdrift, George South, Bos en Dal, Groeneweide Park, Hansmoeskraal, Le Grand, Kingswood, Earls Court, Wilderness Heights
Friday (weekly)	
Bersig, Eastern Extention, Glenwood, Loerie Park, Eden George, Kraaibosch Estate & Manor, Genevafontein, Denver Park	

The separation at source programme (green and blue bags) was previously outsourced and managed by a service provider. The service provider abruptly terminated their contract with GLM in July 2020. The GLM had since then managed the separation at source service in-house. The GLM initially decided that all recyclables would be collected and transported to the George transfer station where it would be sorted by local recycling companies. Once sorted, the recyclables would be resold by the recycling companies and the remaining waste and recyclables would be collected and disposed at the PetroSA landfill site. The GLM indicated that managing several local recycling companies, ensuring that the blue and green bags were collected on time and that the recyclables were sorted quickly enough so that waste does not gather at the transfer station was too chaotic and unmanageable. From December 2020, the GLM decided to collect the blue and green bags and dispose of this waste at the PetroSA landfill site.

The following challenges have been experienced since managing the programme in-house:

- Smaller recycling companies in George were assisting the GLM to collect blue and green bags, but this presented logistical challenges and the GLM took over the collection. The GLM started with collecting all blue and green bags in December 2020.
- Since collecting the blue and green bags in the GLM, there was not enough personnel and trucks to collect the green and blue bags and provide the collection service for black bags
- A large number of complaints about the recycling programme have been received from the public since the GLM decided to provide the separation in-house. This was mainly due to the blue and green bags not being collected per the municipality
- Blue bags were disposed of at PetroSA landfill due to logistical challenges and no municipal recycling was occurring in the GLM since December 2020.
- There are no records of waste separated at source since June 2020

During December 2020, the GLM decided to advertise the separation at source programme for the appointment of a service provider to conduct the separation at source programme. The GLM appointed a new service provider to commence with the S@S programme on 01 March 2021. The scope of works for the S@S service provider are provided below:

- The S@S programme will commence in 2 phases. Phase 1 was to collect separated recyclables from areas that received a S@S collection service. Phase 2 is focussed on

expanding the S@S programme and collecting separated recyclables from areas that do not currently receive a S@S service. The SoW indicates that the service provider should commence with Phase 2 collections 6 months after being appointed. The service provider should therefore commence with these collections by September 2021. The areas include in Phase 2 of the S@S programme include the areas listed below with an estimated total of 20,860 households:

- Ballotsview
- Borcherds
- Conville
- Lawaaikamp
- Nu Dawn
- Pacaltsdorp
- Parkdene
- Protea Park
- Rosemore
- Sea View
- Thembalethu

- The service provider was to have a suitable facility within the GLM where the recyclables can be received, weighed, sorted, baled and stored. The facility should meet legislation for National and Provincial Government and have the necessary waste licences for the facility if applicable.
- As per the Municipal PPPFA Policy of 2017, the service provider should appoint two subcontractors for the duration of the contract to assist with the S@S programme. The service provider is tasked to train the subcontractors on waste management and recycling over the three-year appointment period.
- The service provider must provide all households with two blue bags for recycled waste and two green bags for garden waste. The bags for the S@S programme should be recycled bags. Once collected, the service provider should replace the number of bags used by the household for the S@S programme. The service provider is to also provide non-participating households with 2 blue and 2 green bags on a quarterly basis.
- Awareness campaigns are to be planned and implemented by the service provider. This includes
    - advertising of the S@S programme in 2 local newspapers every 3 months,
    - biannual awareness campaigns at schools, and handing out of 1000 pamphlets at each school and placing 30 posters in each school on notice boards
- The service provider must provide the following reports to the GLM:
    - weekly collection report with a vehicle tracking system showing the areas covered and distance travelled during the week.
    - monthly summary report with tonnages of recyclables collected from households and businesses, awareness campaigns conducted, feedback on involvement of sub-contractors and payment of salaries, monetary value of recycled material.
    - quarterly summary report with summarised values from monthly summary and invoicing report, and a month-to-month comparison of the S@S programme
    - annual summary report with summarised values from monthly summary and invoicing report, and a year-to-year comparison of the S@S programme
- green bags containing domestic garden waste must be disposed of at the composting facility opposite the Gwaing transfer station or safely disposed at a composting or garden refuse handling facility. Proof of safe disposal at a composting or garden refuse handling facility must be provided to the municipality if the service provider does not dispose of

garden waste at the Gwaing transfer station. However, once the composting facility is operational all green bags must be dropped off at that location.

(e) Recycling Facilities

The GLM has recently upgraded the George transfer station to include a MRF and completed the construction of the Uniondale transfer station. Recycling drop-off facilities have been included at the Uniondale transfer stations.

The George MRF building is complete and the first equipment (conveyor belts) has been procured. Purchase of the equipment has been budgeted over a three-year period. The aim is to begin operations at the MRF in 2024/25. The MRF will operate as dirty MRF, processing waste collected in black bags.

Table 17: Recycling drop-off facilities

Facility name	Area	Facilities available	Waste types accepted	Comments
George transfer station	George	MRF	General waste	A MRF has been added to the George transfer station and it will be operated as a dirty MRF.
Uniondale transfer station	Uniondale, George Municipality	Recycling drop off facilities	General waste	Recycling drop off facilities have been added to the Uniondale transfer station.

Figure 11: George MRF and transfer station A - C. Uniondale transfer station and recycling drop off D – F.

(f) Swop Shops and Buy Back Centres

There are currently no municipal swop shops or buy back centres in the GLM. One of the projects set out in the 3rd Generation IWMP was to develop pilot swop shops/buy back centres between 2020 – 2025. A low income area, Thembalethu, has been earmarked for the development of a pilot buy back centre.

(g) In-house Recycling Programme

Recycling bins are provided in the GLM offices to encourage employees to recycle at work. No records of the volume of waste collected through in-house recycling are available to quantify the success of the programme.

(h) Planned Recycling Facilities

The MRF at the George transfer station is in the final stages of construction. The GLM are planning to set up swop shops but no funding has been secured.

(i) Private Recycling and Waste Minimisation

There are private recycling companies operating in the GLM. Approximately 400.7 tonnes per month of recyclable material is collected by these companies.

(j) Domestic Waste Available for Recycling

A waste characterisation exercise was undertaken by the Eden District Municipality (now GRDM) in 2015 (Eden District Municipality, 2016). The aim of the study was to determine the profile of domestic waste which was being disposed of to landfill.

The table below presents the results of the waste characterisation exercise. These results were used to determine the hypothetical availability of recyclable materials in the domestic waste stream. According to the waste characterisation results, approximately 38.4% of the domestic waste stream is recyclable waste.

Table 18: Waste profiles, including the mass and volume of each recyclable waste type, for GLM (source: Eden District Municipality, 2016)

Waste type	Percentage of total mass (%)	Amount of waste type (tonnes/annum) domestic waste
Soft plastics	8.2%	3 145.1
Hard plastics	7.6%	2 929.3
Paper	5.3%	2 027.4
Cardboard	7.3%	2 809.8
Glass	7.3%	2 852.2
Metal	2.7%	1 025.2
Total per annum	38.4%	**14 762.0**
Total per month	-	**1 230.2**

An estimated 14,762 tonnes of recyclable waste was generated in the domestic waste stream in 2019. During the same year 11,693.2 tonnes of recyclables were collected from the S@S system and various private recycling programmes. The waste collected for recycling is also sourced from business and industry and is not all from domestic sources.

In 2019, a total of 40,962.6 tonnes of waste was disposed of at landfill (domestic and commercial and industrial waste). Therefore, a total of 22.2% of the domestic and business waste stream going to landfill, was diverted through recycling by the private sector and through municipal programmes.

This percentage is not considered accurate as there are no records for the generation of recyclable material in the commercial and industrial waste in the municipality and there is no accurate data of waste disposed of at the Uniondale landfill site. The actual figure for diversion of waste from landfill through recycling is most likely lower than 22.2%.

7.5.2 Household Hazardous Waste Recycling

(a) Definitions

The following definitions is used in the next sections of the report.

Hazardous waste -
Schedule 3 of the Waste Act defines hazardous waste act:

Any waste that contains organic or inorganic elements or components that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and environment and includes hazardous substances, materials or objects within business waste, residue, deposits and residue stockpiles

(b) Targets for Households Hazardous Waste Management

The 2020 NWMS requires a 10% reduction in hazardous waste to general waste landfill sites.

(c) Description of Household Hazardous Waste

Common types of HHW are:

- Used batteries
- Used motor oil
- Thinners, resins and certain paints
- Cleaning chemicals
- Health care risk waste (HCRW) used needles (sharps), medication, used bandages
- Fluorescent light bulbs – tubes and compact fluorescent light bulbs (CFLs)
- E-waste, due to the hazardous nature of some component of e-waste
- Asbestos products generated through home renovations
- Pesticides

These waste streams should be managed separately to general domestic waste. Certain portions of HHW are recyclable, including used motor oil, e-waste and fluorescent light bulbs.

The National Domestic Waste Collection Standards (GN 21 of 2011) require municipalities to provide clearly marked drop-off centres for recyclable HHW. The HHW collected at these drop-off centres should be collected by the private sector.

(d) Household Hazardous Waste Generation

There are no records available for the generation of HHW. A 2015 waste characterisation survey was undertaken in the GLM by the Eden District Municipality (now GRDM). Domestic waste was sorted into 15 categories including e-waste and hazardous waste.

The table below summarises the results of the waste characterisation for e-waste and HHW

Table 19: Domestic waste characterisation – HHW results (GRDM, 2016)

Waste type	Examples	% of total domestic waste stream	Domestic waste stream in 2019 (tonnes)
E-waste	Electrical or battery operated objects	0.3%	115.6
Hazardous waste	Paints, resins, glue, fluorescent tubes, batteries, pesticides, asbestos	0.6%	231.3
Total per annum (tonnes)-		**0.9%**	**346.9**
Total per month (tonnes)-			**28.9**

Based on the results of the domestic waste characterisation a small portion (0.9%) of the domestic waste stream is composed of HHW.

In 2019 an estimated 38,543.0 tonnes (GLM, 2020) of domestic waste was generated in the GLM. If 0.9% of this waste was composed of HHW, then 346.9 tonnes of HHW was generated in the GLM in 2019.

(e) Households Hazardous Waste Drop-Off Facilities

There are currently no drop-off facilities for HHW in the GLM and there are no plans in place to establish these drop-off facilities at any of the waste facilities in the GLM. The GLM should provide drop-off facilities for HHW at the George and Uniondale transfer stations. The GLM has not had open days for HHW disposal since March 2020.

A used oil container was previously sourced by GRDM for the GLM. The container is currently located at the George transfer station, however it is being used to store equipment and not as a drop-off facility for used oil.

7.5.3 Financial Savings from Diversion of Recyclable Material from Landfill

At present the GLM uses the PetroSA landfill for the disposal of general, commercial and industrial waste, and the George and Uniondale landfill sites for the disposal of minor tonnages of general, C&DW and green waste. Both the George and Uniondale landfill sites are to commence with closure and rehabilitation by 2024. The GLM pays a rate per tonne for disposal at the PetroSA landfill site. Once the GRDM regional site is operational, the GLM will be disposing of waste at this site at a fixed cost per tonne. There is an opportunity for the GLM to make a financial saving on transport and disposal costs by diverting recyclables from the landfill.

Table 20: Potential cost savings from diversion of recyclable materials from landfill

Year	Tonnes recyclables	Cost per tonne for disposal*	Cost per tonne for transport*	Combined transport and disposal cost	Total cost for transport and disposal/ annum
2020	15,066.92	R 450.00	R 200.00	R 650.00	R 9,793,498.00
2024	16,181.38	R 568.11	R 252.50	R 820.61	R 13,278,527.68
2029	17,691.09	R 760.27	R 337.90	R 1,098.17	R 19,427,749.86

*a 6% increase has been added to the disposal and transportation costs per annum to take into account escalation.

Based on the above calculations, the GLM could save up to R9.8 million in 2020. This amount will increase to R19.4 million in 2029 through diversion of recyclable materials from landfill. These calculations exclude the cost for implementation of diversion mechanisms such as the development of swop shops and buy back centres. In addition to potential financial savings from recycling, new jobs can also be created.

7.5.4 Financial Costs Associated with Recycling

Separation at source is one of the mechanisms which can be used by municipalities to create an enabling environment for recycling and to obtain high quality, uncontaminated recyclables. There can, however, be high costs associated with separation at source which can range between R350 – R500 per tonne of waste on top of the standard cost to collect domestic waste. Waste which is separated at source requires further sorting which requires a sorting facility (a clean MRF) and labour. The cost of a separation at source programme, including transport and sorting costs, is estimated at R840 per tonne (Smith, F.H and Trois C 2018).

The GLM outsourced the separation at source programme at a cost of R435,000.00 per month. However, this contract was terminated by the service provider in July 2020. An average of 573.7 tonne per month was collected by the service provider, this equate to a cost of R758.24 per tonne for the recycling programme.

The service was temporarily undertaken in-house and was outsourced to a new service provider as from 1 March 2021.

7.5.5 Composting

(a) Definitions

The following definitions are used in the next sections of the report.

Treatment - - any method, technique or process that is designed to:

a) Change the physical, biological or chemical character or composition of a waste; or
b) Remove, separate, concentrate or recover a hazardous or toxic component of a waste; or
c) Destroy or reduce the toxicity of a waste (National Environmental Management Waste Amendment Act, Act 26 of 2014)

Compost – is the product of controlled aerobic, biological decomposition of biodegradable materials. The organic waste undergoes mesophilic and thermophilic temperatures, which significantly reduces the viability of pathogens and weed seeds, and stabilises the carbon such that is beneficial to plant growth (Draft National Norms and Standards for Organic Waste Composting, GN 1135 of 2019).

Composting – a controlled biological process in which organic materials are broken down by micro-organisms by means of an aerobic process to produce compost or fertiliser (Draft National Norms and Standards for Organic Waste Composting, GN 1135 of 2019).

(b) Legislative Drivers for Organic Waste Diversion from Landfill

The following key legislated targets for organic waste diversion from landfill need to be noted:

- 25% reduction of garden waste to landfill by 2018 and a 50% reduction by 2023 – National Norms and Standards for Disposal of Waste to Landfill (DEA, 2013)

In addition to the legislated requirements the following targets are set in the 2017 Western Cape Provincial IWMP.

- 50% diversion of organic waste by 2022
- 100% diversion of organic waste by 2027 (DEA&DP, 2017).

(c) Organic Waste Generation

Organic waste generation in the GLM was estimated by taking into consideration the amount generated based on a hypothetical calculation and the 2019 organic waste disposal records available on IPWIS. In 2019, an estimated 26,818.2 tonnes of organic waste was generated in the GLM. The largest contribution of organic waste disposal was garden waste disposed at the George landfill site. Thereafter food waste generated in the domestic waste stream is the second largest contributor of organic waste at the George landfill site. A small portion was the garden waste generated by households and disposed of in black bags with domestic waste.

According to the waste characterisation study, a large percentage of the organic waste stream (a total of 24.7%) is food waste which is landfilled and could potentially be used for organic waste diversion projects such as home-composting.

Table 21: Waste profile of organic waste for GLM (source: Eden District Municipality, 2016 and GLM records)

Waste type	Percentage of total domestic waste stream by mass (%)	Amount of waste type in 2019 (tonnes)
Food waste (domestic waste stream)	24.7%	9,516.3
Garden waste (domestic waste stream)	13.2%	5,091.5
Garden waste (received at landfill sites)	-	12,210.4
Total	**37.9%**	**26,818.2**

Important to note is that the above figures are based on a hypothetical waste generation rate as well as data for green waste disposed of at the George landfill site. The figures above excludes organic waste that is disposed at the Uniondale landfill as waste entering the Uniondale landfill is not recorded.

(d) Landfill Site Disposal of Organic Waste

Disposal of organic waste in the GLM is undertaken at the George (Gwaing) and Uniondale landfill sites. The two landfill sites were issued with closure licences for closure to commence in the 2019/2020 financial year and 2024 respectively. Closure of the George landfill site is due to commence within August 2022. Closure activities, fencing and installing access control access have commenced. Green waste is currently stockpiled at the George landfill site and will be transferred to the composting facility that has been recently been constructed adjacent to the George landfill once the facility has been commissioned and starts to operate.

(e) Composting Facility

A composting facility is under construction adjacent to the George landfill site. Phase 1, the first platform for the composting facility has been completed. Construction and demolition waste is being stockpiled for use in the construction of the second platform. Operation of the George composting facility will be outsourced and GLM will play an oversight role. In year one of operation, all profits generated from the facility will go to the service provider and from year two onwards, 10% of all earnings will be payed to the GLM by the service provider. A service provider will be appointed in 2022 to operate the facility.

Figure 12: George composting facility

(f) Home Composting Programme

The GLM completed a pilot home composting programme in conjunction with the GRDM from April 2019 until March 2020. The programme trialled the use of compost bins, worm farms and compost heaps to divert organic waste from landfill. The GRDM provided training on the respective home composting and worm farm project, training material, worms for the worm farms and managed the data collection and capturing for the project. The GRDM also provided the bins and placed newspaper adverts in the GLM local newspaper inviting households to register to take part in the programme.

Forty-six (46) households participated in the programme, by the end of the programme 19 of the households had stopped submitting data. It is unknown whether these households continued to divert organic waste after they stopped reporting data.
According to data and records retained, a total of 7.6 tonnes of organic waste was diverted from landfill by the 46 participating households between March and December 2019.
Data collection for the programme ceased in 2019 as majority of the participating households discontinued reporting.

The table below gives a breakdown of the results over the 12-month period.

Table 22: Home composting pilot programme results (June 2018 – May 2019) (data source, GRDM)

Waste diverted through worm farms	Waste diverted through compost bins	Waste diverted through compost heaps	Total waste diverted over 12 month pilot (kg)	Monthly Average (kg/hh/m)
1,534.6	4,338.1	1,879.6	7,751.8	14.0

Worm farms can be rolled out to complexes, apartments and households that do not have yards or gardens but still generate organic (food) waste.

(g) Financial Savings from Diversion of Organic Waste from Landfill

The GLM uses the PetroSA landfill site for the disposal of general waste. Food waste makes up 24.7% of the domestic waste stream. There is an opportunity for the GLM to divert food waste from landfill sites and avoid transportation and disposal costs.

The GLM could provide households with home composting bins or worm farms so households can manage their own organic waste.

Table 23: Financial analysis of the provision of home composting bins

Item	Cost	Quantity	Total
Composting bin*	R 650.00	62,722	R 40,769,300.00
Disposal fees/ tonne	R 450.00	14,870.7	R 6,691,831.81
Transportation cost/ tonne	R 150.00	14,870.7	R 2,230,610.60
Annual disposal and transportation costs (2020 rates)	R 600.00	14,870.7	R 8,922,420.00

*a 6% increase has been added to the disposal cost per annum to take into account escalation

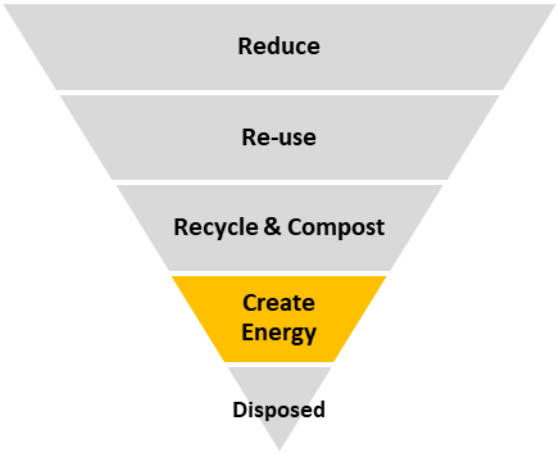
If the GLM were to purchase 62,722 home composting bins the pay-back period (period when the cost of the bins would equal the saving in disposal fees and transport costs) would be 5 years at 2020 rates. The pay-off period would be shorter as disposal fees and transportation costs will increase each year, whereas the purchase of bins is a once-off cost. Thereafter the GLM would make an annual saving of in excess of R8.9 million per annum.

This calculation is based on the following assumptions

- All household would use the composting bins
- All the food waste and garden waste (which would usually be placed into black bags) is placed into the composting bin

This calculation excludes the replacement of compost bins. The calculation is based on the organic waste (garden waste and kitchen waste) found in the domestic waste stream. It excludes garden waste generated by households which is transported directly to the landfill site and transfer stations. If households issued with composting bins also composted garden waste which they currently take to the landfill sites, further cost savings would be realised and the pay-off period for the composting bins would be reduced.

7.6 Create Energy



The Waste Act defines recovery as *'the controlled extraction or retrieval of any substance, material or object from waste'*

In recovery, waste serves as a replacement of other materials which would have been used to fulfil a particular function and involves the replacement of virgin materials with recovered materials. Waste recovery is largely limited to recovery of waste as part of manufacturing processes. As such it is excluded from this WMP which focuses on waste minimisation from a municipal perspective.

7.6.1 Legislative Targets to Create Energy from Waste

The 2020 NWMS does not contain any targets for local municipalities related to creation of energy from organic waste. Under pillar 1, waste minimisation the NWMS has several actions related to recovery of energy from organic waste.

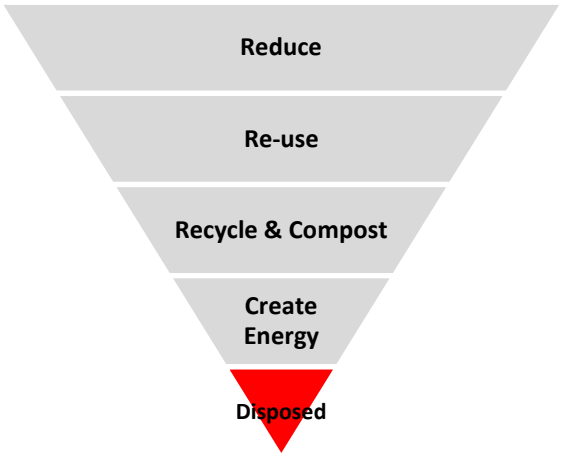
(a) Definitions

The following definitions is used in the next sections of the report.

Waste to Energy – the process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source (DEFF, 2020)

Refuse derived fuel –a fuel produced from various types of waste such as municipal solid waste, industrial waste or commercial waste

7.7 Disposal



The Waste Act defines disposal as *'the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto land'*

Disposal of waste should be used as a last option in the management of waste. Disposal of waste will continue to be one of the management methods used in the GLM and across South Africa in the long term. The GLM has two operational landfill sites which are both licenced for closure. The GLM also uses the PetroSA landfill site in Mossel Bay for disposal of domestic and commercial and industrial waste. While the disposal of waste to landfill is unavoidable, the GLM must in line with aims of this plan seek to reduce the volume of waste disposed of at landfill sites and also ensure that landfill sites are operated correctly to minimise negative impacts thereof.

7.8 Waste Education and Awareness

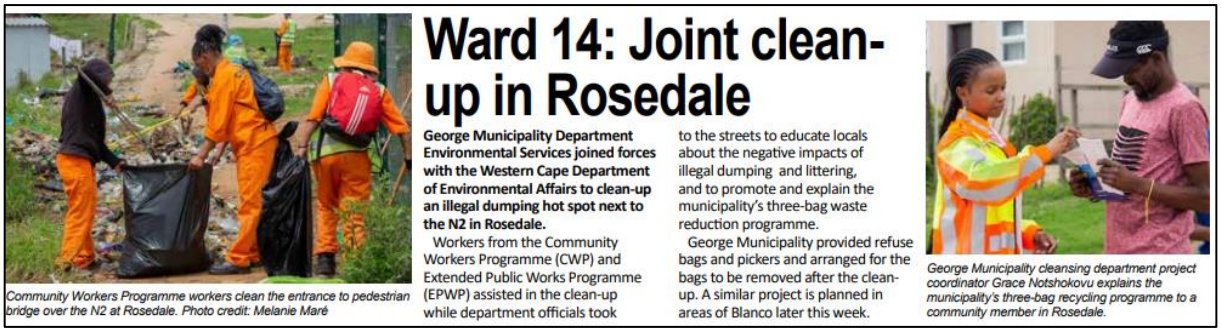
7.8.1 GLM Waste Education and Awareness

The GLM has undertaken various waste education and awareness campaigns. The education and awareness campaigns are generally conducted on local and international environmental awareness days such as Arbour Day, Water Week, Earth Day, and World Environment Day, and are generally held with school children. Approximately 10 schools with approximately 100 pupils in each school were visited in the 2018/19 financial year. Illegal dumping and waste

management were the two topics mostly covered during the visits to the schools. The campaigns were deemed as successful by the coordinators based on the number of pupils reached and the understanding displayed during the questions and answers session at the end of the training. The GLM has no systems in place to measure the level of success post awareness campaigns. Gaps identified by the GLM staff involved in waste management education and awareness vary from limited funds and lack of human resources to conduct the awareness campaigns, to lack of enforcement of waste management by-laws.

Education and Awareness campaigns are usually planned and conducted by the GLM's two Environmental Project Coordinators and four Environmental Educators in partnership with other departments and organisations such as the GRDM, Cape Nature, and NGO's based in George such as the Land Mark Foundation. The GLM have commenced with waste education and awareness campaigns on a local radio station to increase waste awareness to youth and adults. A brief list of the education and awareness campaigns conducted in the GLM is provided hereunder.

- **Blue and green bag education** - undertaken throughout George in the form of an awareness campaign
- **GLM participation in the Cape Nature Exhibition**
- **Clean-ups -** undertaken in areas where dumping is an issue using the 3 bag system to separate recyclables and green waste from general waste (refer below)
- **ECO bricks discussion and awareness -** was undertaken at the following Primary Schools: Holy Cross, Heiderdal, Mzoxolo, Conville, Hibernia, Kretzenhoop, St Pauls, Delville, Parkdene and George Pre-Primary. The bricks were made from two litre cool drink bottles stuffed with recycled plastic bags to make structures
- **Distribution of recycling pamphlets** in communities and public areas (shopping centres, municipal buildings, police stations, traffic lights)
- **Radio slots on Eden FM** - bi-monthly discussions on the separation at source programme and other waste related topics by the municipal staff
- **George municipality newspaper -** the GLM published a quarterly newspaper. Waste management is addressed in the newspaper (refer below).



Ward 14: Joint clean-up in Rosedale

George Municipality Department Environmental Services joined forces with the Western Cape Department of Environmental Affairs to clean-up an illegal dumping hot spot next to the N2 in Rosedale.

Workers from the Community Workers Programme (CWP) and Extended Public Works Programme (EPWP) assisted in the clean-up while department officials took to the streets to educate locals about the negative impacts of illegal dumping and littering, and to promote and explain the municipality's three-bag waste reduction programme.

George Municipality provided refuse bags and pickers and arranged for the bags to be removed after the clean-up. A similar project is planned in areas of Blanco later this week.

Community Workers Programme workers clean the entrance to pedestrian bridge over the N2 at Rosedale. Photo credit: Melanie Maré

George Municipality cleansing department project coordinator Grace Notshokovu explains the municipality's three-bag recycling programme to a community member in Rosedale.

Figure 13: Extract from the GLM December 2019 newspaper

7.8.2 District Waste Awareness Campaigns

The GRDM IWMP (2020) identified the need for a regional approach to the implemented for waste awareness campaigns. This will be achieved through:

- Each municipality developing a waste awareness calendar and aligning it with district programmes
- GRDM waste mascot, Rocky the Rooster to be incorporated into the local municipalities waste awareness materials
- Waste awareness campaigns at schools to be undertaken in consultation with the municipalities
- GRDM to undertake a public perception survey to determine the public preferred method of engagement.

District waste awareness campaigns have largely been put on hold due to the COVID-19 pandemic. Prior to the pandemic the GRDM had a number of programmes in place, including:

- Waste Minimisation Public Awareness and Education Campaign: The campaign aims to encourage residents to reduce waste generation and divert waste from landfill.
- Wise Up on Waste: Development of waste educational materials including videos as well as teacher guides have been developed under the programme.
- Waste Management in Education (WAME) programme materials which were developed by DEA&DP are available on the GRDM website. The GRDM previously coordinated WAME workshops for all schools in the GRDM.
- Information banners: GRDM procured banned featuring Rocky the Rooster and contained recycling facts for different waste streams. The GLM can make use of the banner at public meetings and awareness events.

Figure 14: Examples of waste information banners featuring the GRDM waste mascot Rocky (image provided by GRDM)

- Home Composting Pilot Projects: The home composting programme was previously rolled out to the GLM.
- Waste management webpage: The GRDM's website contains a link to page which is dedicated to waste management. The website (http://wastemanagement.edendm.co.za/) contains information on the GRWMIS, information on the home composting project, Wise Up on Waste educational materials and useful links to the website of extended producer responsibility (EPR) organisations and non-government organisations involved in waste management.

  Mascot: The GRDM has developed a mascot called Rocky, the mascot is used for the recycling campaign and to spread the message of reduce, reuse recycle. The mascot features on the waste information banners and Rocky also visits schools and part of the school waste awareness programmes and events such as the HHW open days at local municipalities.

7.8.3 George Local Municipality Website

There is a page dedicated to waste management on the GLM official website (george.gov.za/community-services-2/refuse-waste-management). Information provided in the webpage includes:

- A guide to the different colour bags
- Collection days for refuse including blue and green bags and areas serviced
- Information on what materials can be recycled
- Hazardous waste identification and details of hazardous waste management companies

7.9 Waste Management By-Laws

A brief review of the GLM by-laws related to waste management was undertaken to identify gaps in the by-laws in terms of waste minimisation and recycling. This review does not constitute a full legal review.

One by-law addresses waste management in the GLM.

- The Solid Waste Disposal By-law (2014)

The following gaps were noted in the by-laws

- While the by-laws state that the GLM may require generators to separate waste it does not make this requirement mandatory. In areas where the two bag system is in place, participation may be increased through making use of this system mandatory

7.10 Waste Management Budget for Waste Minimisation and Recycling

Budget allocated for waste minimisation and waste education and awareness for the 2019/20 financial year is R90,000.00.

The GLM was paying R435,000 per month to the service provider to manage the separation at source programme. The service provider terminated their contract in July 2020.

8 Waste Minimisation Survey Results

8.1 Waste Survey Limitations

The public waste minimisation survey was limited to an online survey. No door-to-door or face-to-face surveys were undertaken. It is therefore anticipated that responses from residents in low income areas are underrepresented.

The business/industry survey consisted of an online survey and telephonic/face-to-face surveys with larger business and industry. The focus on the business/ industry survey was on larger businesses and industry in the municipality.

The responses to open questions have been summarised for reporting purposes.

8.2 Participation Rates

A total of 11 online responses from business and 104 responses from the public were received on the survey. An additional four businesses were interviewed during fieldwork.

Table 24: Waste minimisation survey results

Respondent group	Completed surveys
Business/ industry	11
Business interviews – face-to-face	4
Public	104
Total	**119**

8.3 Business/ Industry Survey Results

Due to the low response rate to business survey a quantitative analysis of results has not been undertaken. Comments and suggestions related to waste minimisation communicated through the survey have been summarised and included. Feedback from businesses given during face-to-face interviews is also summarised below.

Responses from the following business/ industry groups were received:

- Waste management companies
- Retail stores
- Mall
- Restaurants
- Hospitality industry – hotels, B&B, hospitality service and training centre, etc.
- Environmental consulting company
- Pharmacy
- Carpentry and furniture business
- Composting company

8.3.1 Waste Generation and Management

The following table summarised waste generated per waste category and management measures used by respondents.

Table 25: Waste generated per month and management methods

Waste stream	Tonnes/ month generated	Management method
Mixed recyclable waste (bottles, plastic and tins) from restaurant	0.75	Recycled
Food waste from B&B (26 x 20 L bins) (at 400kg/m^3 density for organic food)	0.21	Disposed
Bottles and paper (5 x 20 L bins) (at 200kg/m^3 density for dry recyclables)	0.02	Recycled
Cardboard (2 respondents)	0.7	Recycled
Food waste as general waste	0.2	Disposed
Paper products (packaging from businesses, offices, hospitals, etc.)	341	Recycled

Waste stream	Tonnes/ month generated	Management method
Plastic (packaging material)	31.6	Recycled
Glass (business such as bars and restaurants)	22.8	Recycled
Aluminium and metal tins (bars and restaurants)	3.8	Recycled
Wood waste (5.5 m^3) (at 350kg/m^3 density of wood chips)	1.93	Create energy (fuel source for kiln to dry wood)
Total	403	

8.3.2 Waste Minimisation Programmes

Where business and industry undertake waste minimisation programme in-house they were request to provide details of challenges and lessons learnt.

Table 26: Internal waste minimisation programmes successes/ lessons learnt

Successes	Lessons learnt
• Staff have become aware of recycling and the importance of recycling • Waste is burnt in a kiln to create heat • Very limited amount of waste to landfill on a monthly basis • Drying of timber using wood waste has resulted in a big saving of electricity • Wood shavings were successfully utilised for horse bedding	• Everyone needs to recycle and think about waste (generating less waste and reusing and recycling their waste) • Information on flyers and in media should be short and bold; people do not read (or do not want to read). • People show more interest at public events such as roadshows.

Respondents were asked to give their opinion of municipal waste recycling programmes. The responses are summarised below.

- Waste collection on road P1660 only occurs once a month with a small truck which is not able to collect recycled waste
- The municipality does not enforce the tender conditions onto the service provider
- The public do not know who the service provider is for the 2-bag system
- The 2-bag collection service is continuously interrupted or halted
- The George landfill is full (has reached capacity), this is an indication that too much waste is going to landfill.
- No one has informed the businesses of the municipality's waste minimising programmes or anything related to waste minimisation/recycling
- Awareness campaigns are not promoted by the municipality and the municipality relies on the appointed service provider to do all the awareness and the service provider does no awareness
- The municipality should enforce separation at source of garden waste and allow composting businesses to collect the garden waste
- Residents do not trust the municipal recycling programme and prefer to take their recyclables to private recyclers.

8.3.3 Waste Education and Awareness

Respondents were asked to identify their preferred method for the municipality to contact them. Email communication and social media platforms were the preferred method of engagement for businesses.

8.3.4 Waste Minimisation and Recycling Challenges

The following challenges are experienced by business and industry in terms of waste minimisation and recycling:

- Some businesses are unsure of what can be recycled and what cannot be recycled
- Fabric disposal poses a challenge
- The public and municipality believe that recyclers (and recycling) are self-sustainable without external funds, which is not true. The price for recyclables is constantly decreasing
- Businesses are unaware of what happens to the waste that is collected by the municipality, how this waste is disposed of and the inherent environmental challenges of landfilling of waste
- Waste management practices at some industrial companies and businesses are not being monitored
- The GLM budgets are inadequate to promote waste minimisation to its fullest. The costs of collection, compacting and transporting of waste to Mossel Bay exceeds the budget made available by the GLM for recycling
- There is a lack of communication by the GLM with the general public and businesses
- There is a lack of awareness campaigns
- The municipality does not collect source separated material from business.

The following mechanisms were identified which the municipality can use to assist business and industry to increase waste minimisation and recycling:

- Provide more information to businesses on waste management, diversion and recycling initiatives conducted in the GLM.
- Inform businesses how manage fabric strips.
- Advertise and encourage participation in the current recycling programme.
- Reduce the prices for waste removal to companies and the public for recycling efforts.
- Invest in education and training, and increase awareness.
- Invest in the installation of waste management products and technologies in businesses and homes in the GRDM.
- Use the waste from saw mills and factories as fuel to generate electricity.
- Informal recyclers (waste pickers) play an integral role in the waste minimization process and must be supported.
- No blue bags are yet available in the industrial area
- The municipality should redirect saw mills that dispose of wood chips to the compost facility or stockpile separately for private composting companies to collect.

8.3.5 Impact of COVID-19 on Waste Management

In light of the current COVID-19 pandemic business/ industry were requested to provide details of how the outbreak has affected waste minimisation, generation and recycling.

The following comments related to the impact of COVID-19 were raised:

- In the hospitality industry, no guests were allowed during the initial two months of the national lockdown and minimal waste was generated
- COVID has also decreased the willingness of people to recycle
- The demand for recycled material has declined drastically and some markets indicated that they will only continue production in September 2020 (*the survey was completed in June 2020 therefore this presented a 3 month delay for a recycler to remove certain waste types from the facility and to resell the material*)
- Due to lower production less waste is produced
- Due to poor markets, other businesses have opted to landfill their recyclables as transportation costs of the recyclables are higher than the revenue received
- Liquor stores closed down during lock down levels 4 and 5, consequently, less glass bottles were generated for recycling.

8.3.6 Other

One respondent noted there is legislation in place to address waste management and waste practices and technology in design and construction projects.

8.3.7 Survey Conclusions and Recommendations

Although only a few responses were received (15) and even fewer surveys were fully completed (13) from business/industry. The following recommendations and conclusions are from the survey:

- There is a need for the GLM to improve engagement with business and industry to ensure that they are aware of waste minimisation and recycling initiatives, programmes and facilities in the GLM
- There is a lack of municipal facilities and services that are available for business and industry to drop-off source separated recyclables or to collect these recyclables,
- Assistance is needed from the GLM to ensure the sustainability of recycling businesses.

8.4 Public Survey Results

A total of 105 responses were received to the online public survey.

Table 27: Suburbs represented in the survey

Suburb	No. responses	% of responses	Suburbs	No. responses	% of responses
Ballotsview Parkdene	1	1.0%	Heather Park	8	7.6%
Bergsig	4	3.8%	Heatherland	3	2.9%
Blanco	7	6.7%	Herolds bay	2	1.9%
Blue Mountain Estate	2	1.9%	Hoogekraal	1	1.0%

Suburb	No. responses	% of responses	Suburbs	No. responses	% of responses
Bo Dorp	4	3.8%	Kingswood	1	1.0%
Bos en dal	1	1.0%	Kleinkrantz	1	1.0%
Camphersdrift	1	1.0%	Kraaibosch	2	1.9%
CBD	1	1.0%	Langvlei Dunes	4	3.8%
Delville Park Pacaltsdorp	1	1.0%	Lavalia	1	1.0%
Denneoord	10	9.5%	Loerie Park	2	1.9%
Denver park	3	2.9%	New Dawn Park	1	1.0%
Dormehls Drift	3	2.9%	Pacaltsdorp	1	1.0%
EASTERN EXT	1	1.0%	Parkdene	1	1.0%
Eden	1	1.0%	Rondevlei	1	1.0%
Fernridge	2	1.9%	Rosemoor	1	1.0%
Geelhoutboom	2	1.9%	Thembalethu	4	3.8%
George East	1	1.0%	Twee Rivieren	2	1.9%
George South	7	6.7%	Uniondale	1	1.0%
Glen Barrie	3	2.9%	Welgelegan Estate	3	2.9%
Glenwood	2	1.9%	Wilderness	7	6.7%
Hansmoeskraal	1	1.0%	**Total**	**105**	**100.0%**

8.4.1 Waste Minimisation and Recycling Programmes

The first section of the survey aimed to determine how residents currently participate in waste minimisation and recycling initiatives and what can be done to encourage further involvement.

Table 28: Waste avoidance and minimisation efforts currently undertaken by respondents

Option	% of respondents
Use reusable shopping bags instead of plastic bags	81.0%
Use reusable coffee cups for takeaway coffee and hot drinks	33.3%
Use a reusable water bottle instead of buying bottled water/ cool drinks	80.0%
Say no to plastic or single use utensils (e.g. plastic/ cardboard	66.7%
Choose products based on packaging (e.g. choose loose fruit and vegetables instead of ones with excessive packaging	56.2%
None – my household does not participate in any waste avoidance or minimisation	5.7%
Other (please specify)	9.5%

Where respondents selected 'other' as an option they were asked to provide details. The following details were provided:

- Upcycle as much as possible.
- Buy second hand clothes and pass used clothes on to others
- Use reusable nets for fruit and vegetables where possible
- Recycling of polystyrene dishes to pack leftover food for the underprivileged
- Make use of baskets for shopping or making deliveries
- Reuse plastic bags as bin liners

8.4.2 Waste Recycling

Respondents were asked which of the following methods they would make use of for recycling if available.

Table 29: Methods which households would use to recycle if they were available

Option	% of responses
Separate waste at home (two or multi-bag system) for collection from my doorstep by the municipality or the municipalities service provider	75.2%
Separate waste at home (two or multi-bag system) for collection from my doorstep by a service provider I have appointed myself	4.8%
Separate waste at home and drop-off at a municipal recycling facility	8.6%
Separate waste at home and drop-off at a private recycling facility	3.8%
Separate waste at home and sell the materials to a private company (buy-back centre)	1.9%
Separate waste at home and exchange for products/ coupons at a swop-shop	1.0%
Place recyclables in a separate bag for informal pickers to collect (no municipal or private multi-bag system in place)	3.8%
None	13.3%
Other	7.6%

Responses to other:

- Make Ecobricks from non-recyclable waste
- Use drop-off facilities for hazardous waste

Respondents were asked to give their opinion of municipal waste recycling programmes. The responses are summarised below.

Table 30: Opinions of municipal waste recycling programmes (% of respondents)

Question	Excellent	Very good	Good	Fair	Poor	Very poor
Municipal recycling programmes	11.3%	22.7%	27.8%	20.6%	9.3%	8.2%
Municipal recycling facilities	6.6%	16.4%	31.1%	19.7%	11.5%	14.8%
Municipal waste minimisation campaigns	6.0%	8.4%	16.9%	26.5%	27.7%	14.5%
Information available on waste minimisation/ recycling	4.3%	5.4%	10.9%	26.1%	34.8%	18.5%
Knowledge of municipal staff in terms of waste minimisation needs	4.1%	4.1%	18.4%	36.7%	16.3%	20.4%

The following reasons were given for responses. The responses have been listed under the most appropriate heading. Where a response given in this section was classified as a suggestion to increase waste minimisation and recycling it has been included in the next section:

Municipal recycling programmes:

- GLM does more in the way of recycling than other municipalities.
- The municipality does not collect recycling bags from my property. I try to place my bags outside households which are serviced on their collection day. Green bags are also not collected.
- I am not convinced that the material in the blue bag is recycled, I have seen my recycling bag being collected in the same truck as my black bag on several occasions

- We are part of an excellent pilot municipal programme which should be extended across the municipality.
- Very good municipal recycling service
- Poor service delivery by the service provider
- There is no information available for the 2 bag system in Thembalethu
- There is no recycling collection in Langvlei Dunes and Hansmoeskraal
- There is lack of information on waste management.

Municipal recycling facilities:

- Make provision for HHW drop offs

Municipal waste minimisation campaigns/ information available on waste minimisation/ recycling:

- Information on what is recyclable is not readily available.
- Apart from the occasional note on recycling included with the municipal accounts I am not aware of any educational campaigns run by GLM. The local conservancies do valuable work in that regard.

Knowledge of municipal staff in terms of waste minimisation needs:

- The municipality needs to get qualified staff to administer the GLM waste department.

Respondents were asked how the municipality could increase waste minimisation and recycling. The below recommendations were provided:

- The municipality should provide more drop-off facilities for people living in flats. People living in flats do not have space to separate waste. These facilities should be in walking distance for those who do not have transport.
- Private houses, guest houses and complex which are not recycling should be fined.
- Provide different colours bags for different waste stream e.g. glass, plastic, paper.
- Educate people on waste recycling, including fishermen who leave litter on the beaches
- Involve more people in recycling.
- Fines for littering, more recycling bins, advertising boards.
- Include polystyrene, long life milk cartons and other materials into the list of accepted recyclable materials.
- Collect the blue bags from my property
- Stop scavengers from removing valuable recyclable materials such as glass and cans from bags left on the pavement for collection.
- Encourage store owners to use less packaging, use paper bags or encourage customers to use their own bags or container e.g. use their own jars or nuts, seeds and dry produce
- Incineration of waste to produce energy
- Lead by example and ensure that all public sector offices are recycling
- Granulate plastic to build roads and repair pot holes
- Retailers should have recycling bins for the products sold in their store to allow consumers to return products for recycling when old or used up
- Allow volunteers who are passionate about waste to champion campaigns

- Intensify waste awareness in low income areas and with the homeless and start a reward program for recycling
- Establish platforms for waste conscious households to assist less fortunate households with food vouchers within their community. A concept similar to swop shops
- Allow for more green bags per household
- Organize a waste fun day and bring on board business
- Stop billing residents for the recycling
- Establish swop shops
- Stop collecting the different colour bags in one truck
- Blue bags should be made available in supermarkets
- Establish safe accessible drop offs in the high income areas or centralise them
- Start charging residents for mixing waste streams
- Multiple waste bin collection points every few blocks, similar to cities in European countries. At least for glass and paper
- Recycling bins to be provided in informal areas
- All recyclables must be collected for recycling
- Business must be forced to recycle and set an example for the general public

8.4.3 Organic Waste Management

This section of the survey aimed to determine how organic waste is currently managed by residents.

Table 31: Current management method for organic waste

Option	Yes (% of responses)	No (% of responses)
Worm farm	14.7%	85.3%
Home composting bin	16.7%	83.3%
Composting heap	38.2%	61.8%
Garden waste is placed into a bag provided by the municipality/ collected loose by the municipality	54.9%	45.1%
Garden waste is collected by a private service provider	8.8%	91.2%
I transport my garden waste to a municipal facility	10.8%	89.2%
I transport my garden waste to a private facility	2.0%	98.0%
Organic waste is disposed of with other household waste	9.8%	90.2%
Other	4.9%	95.1%

The next question aimed to determine respondents willingness to participate in organic waste management programmes.

Table 32: Methods which households would use to manage organic waste if they were available

Option	Yes (% of responses)	No (% of responses)
A home composting bin or worm farm	52.0%	48.0%
A separate bin or bag for food waste (to be collected by the municipality)	56.9%	43.1%
A separate bin or bag for garden waste (to be collected by the municipality)	52.9%	47.1%
Drop-off facilities for separated food waste	10.8%	89.2%

Option	Yes (% of responses)	No (% of responses)
Drop-off facilities for separated garden waste	10.8%	89.2%
None, the municipality collects my organic waste mixed with my household waste, I am not interested in changing how I manage organic waste	3.9%	96.1%
Other	3.9%	96.1%

Suggestions to decrease organic waste disposal to landfill:

- Provide a home or neighbourhood communal compost heap where the public can pass their organic waste and also collect compost for their garden
- Each household should be provided with a composting bin and a rainwater tank
- The municipality should start community food garden scheme where vegetables and fruit trees can be planted. These facilities should have compost bins
- Provide drop-off facilities in walking distance for source separated organic waste
- Publish more articles/ information on the importance and need for composting
- Make composting courses available to residents free of charge
- Supply chipping facilities where the public can either chip their own garden waste for use as mulch or pay a small fee for the waste to be chipped
- Provide chippers at landfill sites for the public to use to chip their garden waste
- Drop-off facilities for garden waste. The chipped waste can be sold to the public for a small fee for use on their gardens
- The municipality could start selling compost to farmers and individuals
- Start municipal farms with unemployed people and teach them to plant and grow vegetables using compost
- Develop a system where food waste is given to pig farmers. The municipality could either deliver or pig farmers could collect
- Encouraging small gardens that can be started using old tyres and using organic (food) waste as compost for the gardens and then encouraging fresh food markets for people to sell fresh produce from their gardens
- Teach waste management at schools
- Provide home compost bins and encourage food gardens

8.4.4 Waste Education and Awareness

Respondents were asked if they were familiar with any waste education and awareness programmes undertaken by the municipality or private organisation and asked to provide details.

Table 33: Waste education and awareness programmes which respondents are aware of

Type of programme	Yes (% of responses)	No (% of responses)	Programme details
Municipal waste education and awareness programmes	13.9%	86.1%	Facebook
Private waste education and awareness programmes	10.9%	89.1%	

Type of programme	Yes (% of responses)	No (% of responses)	Programme details
I am not aware of any waste education and awareness programmes	71.3%	28.7%	

Respondents were asked to identify their preferred method for the municipality to contact them. Respondents were requested to select all applicable responses from a pre-defined list.

Table 34: Preferred methods of communication for waste education and awareness programmes

Preferred communication method	Yes (% of responses)	No (% of responses)
Social media platforms	86.1%	13.9%
Flyers/ printed materials	16.8%	83.2%
Radio advertising	18.8%	81.2%
Workshops/ roadshows	18.8%	81.2%
Recycling competitions	36.6%	63.4%
Events such as clean-up campaigns	46.5%	53.5%
Email communication	45.5%	54.5%
Other	8.9%	91.1%

Social media was the preferred platform for the GLM to contact the public. Social media is far reaching, low cost and can be updated quickly which will enable the GLM to engage with residents regularly.

Table 35: Respondents opinion of municipal waste education and awareness programmes

Question	Excellent	Very good	Good	Fair	Poor	Very poor
Opinion of municipal waste education and awareness programme	1.4%	6.8%	9.5%	25.7%	31.1%	25.7%

The following suggestions on how municipalities can improve waste education and awareness programmes were raised:

- Programmes need to target the youth so they can educate their parents
- Educational emails
- Social media campaigns
- Execute programmes at schools
- Annual school projects/ competitions
- Hold practical courses at schools e.g. start a class wormfarm. Educate children on what types of waste the worms can and can't eat
- Monthly public workshops e.g. how to make use of old wooden pallets, father and son days, grandparents and grandchildren days. Get sponsorship from local hardware stores.
- Involve Churches and youth groups
- Educational days/ roadshows
- Educate residents in low income areas on the blue and green bag systems
- Involve children and have small incentives/ prizes
- Clear signage to indicate the location of the closest recycling drop-off facilities
- Have a flea market when strictly on recycled products can be sold

- Develop a waste and recycling mascot for use in awareness campaigns
- Encourage stores to allow residents to use their own containers for products to reduce packaging waste
- Appoint community contractors to assist in the value chain of waste minimisation
- Better awareness programs
- Regular communiques through social media and the local newspaper. Better and more frequent guidelines on what materials can be recycled.
- Information to the general public on waste management systems, e.g., monthly totals of waste recycled versus landfilled
- Run cleanest suburb competitions and award a prize
- Instead of providing links to waste information when municipal accounts are issued, the municipality should provide the actual information
- Get a waste mascot as well as banners to put up around town on clean up days
- Publish waste information in the local newspaper every week

8.4.5 Respondents were not aware of any waste minimisation awareness programmes being undertaken by private companies or NGOs. Survey Conclusions and Recommendations

The following additional comments were provided by the respondents for consideration in the development of the waste minimisation plan:

- The municipality should consider collecting waste at a designated collection point per residential area to avoid burglars and informal waste pickers tearing open the bags
- Making use of plastic bags to dispose garden waste defeats the purpose, the municipality should rather invest in bins, skips or consider using biodegradable bags
- Retailers should shy away from selling the cheaper products in pre-packed packaging like fruit and vegetables
- The municipality should have interactive games on waste to get the buy in of children
- The municipality should also involve religious organisations and partner with them

9 Alternative Waste Treatment Technology

There are various alternative waste technologies available for implementation in South Africa. The viability of such technologies is typically determined by the composition of the available waste stream and tonnages available. The 2020 NWMS acknowledges that while there are several alternative waste treatment technologies which can be used to manage plastics and other waste stream, recycling is the preferred method and this is reflected in the waste management hierarchy (DEFF, 2020).

9.1 Assessment Tools

Two tools were used to assess alternative waste technology options for the GLM

- DEA&DP Alternative Waste Management Technologies (DEA&DP AWT tool). An Excel based tool has been developed by DEA&DP to assist municipalities in planning for waste minimisation. The tool assesses various alternative waste treatment technologies based on the waste stream and volumes generated in a municipality.
- DEFF Alternative Waste Treatment Guide. An online guide to alterative waste treatment technologies (http://awtguide.environment.gov.za/)

NOTE: The levelised costs calculated by the DEA&DP model are based on capital and operational costs, including the cost for transport of waste for the development and operation of the alternative waste treatment technology. Revenue which could be generated e.g. from the sale of compost is also factored into the model. These are high level costs and based on a set of pre-determined generic costs.

9.2 Assumptions and Limitations

The following inputs were used in the model to determine potentially suitable alternative waste treatment technologies:

Table 36: Data used in the DEA&DP AWT Tool

Item	Data used
Population	217,054 persons
Waste tonnes for 2019	53,330.79 (based on waste disposal and recycling records)
Organic waste diversion	Current year – 5% 2024 target- 15% 2029 target – 25% 2034 target – 50% 2039 target – 80%
Garden/ greens diversion	Current year – 5% (estimate) 2024 target- 70% 2029 target – 80% 2034 target – 90% 2039 target – 90%
Builders rubble (C&DW)	Current year – 5% (estimate) 2024 target- 30% 2029 target – 40% 2034 target – 50% 2039 target – 60%
Dry recyclables	Current year – 15% (based on records from recycling companies) 2024 target- 40% 2029 target – 50% 2034 target – 60% 2039 target – 70%
Waste profile	Builders rubble (C&DW) – 9.8% Organics – 20.7% Green waste – 18.9% Paper – 10.6% Metal – 2.3% Glass – 6.1% Plastic –13.3% Residual waste – 18.4%

The waste tonnage for 2019 was calculated based on disposal and recycling figures. As previously mentioned, the waste disposal records for the GLM for C&DW and green waste are not accurate due to a lack of weighbridges and unrecorded waste entering the landfill sites.

The waste stream composition has been based on the results of a waste characterisation exercise and disposal records provided by GLM.

The following section provides high level guidance to the GLM when considering different alternative waste treatment technologies. A full feasibility assessment would be required prior to the GLM implementing any of the technologies.

9.3 Incineration

Incineration is the process of burning waste to reduce waste volumes. Incineration can be used to create energy.

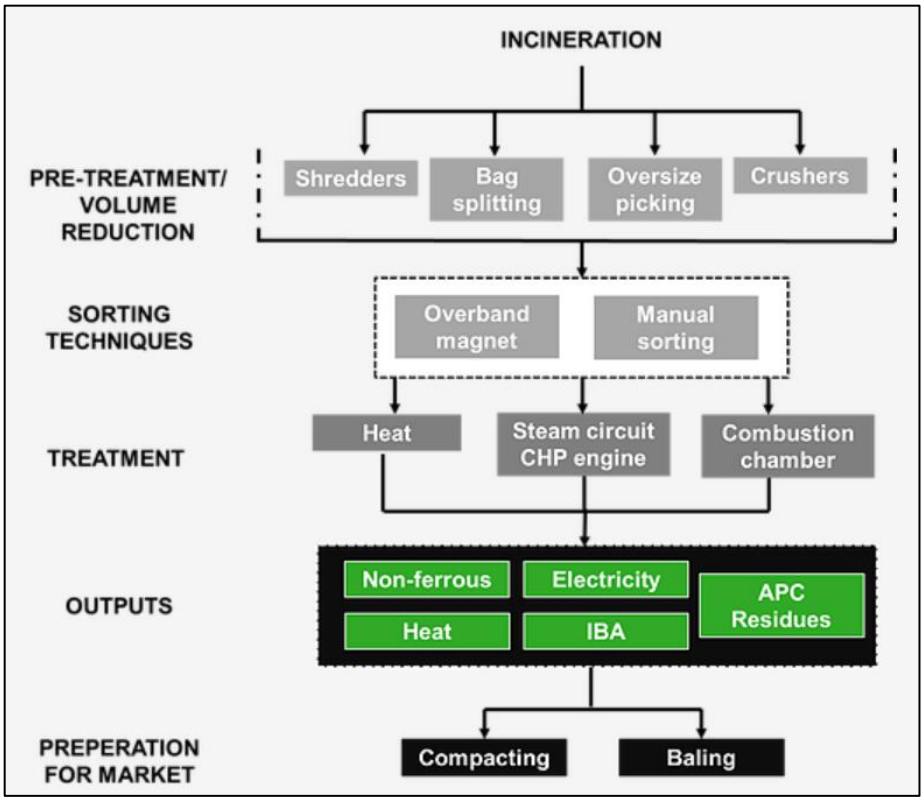


Figure 15: Incineration process flow (source, web reference 4)

Table 37: Overview of incineration (source, web reference 4, web reference 5)

Type of technology	Incineration
Brief description	Incineration is the process of burning waste to reduce its volume. Incineration can be also be used to generate energy. Waste is typically burnt at above 850˚C. Incineration can also be used to treated hazardous and HCRW.
Waste accepted	Municipal waste, commercial and industrial waste, certain components of construction and demolition waste, refuse derived fuel (RDF), hazardous waste, health care risk waste (HCRW).
Waste volumes required	Incinerators can operate on a feedstock of more than 10,000 tonnes per annum, however it is recommended that feedstock in excess of 50,000 tonnes per annum is available. Feedstock availability is key to ensure an incinerator is sustainable. During the feasibility assessment for an incinerator feedstock security need to be determined
Outputs	Electricity, heat, bottom ash, and air pollution control residue. Depending on the type of waste incinerated, bottom ash may be classified as general or hazardous.

	To avoid the generation of large volumes of hazardous ash, hazardous waste streams should be incinerated independently of general waste streams.
Job creation	Low compared to other type of waste management e.g. recycling.
Benefits	Incineration can be used as treatment method for hazardous and health care risk waste (HCRW). Revenue can be generated from an incinerator through gate fees and sale of energy/ heat generated.
Challenges	Incinerators function best when waste with a high calorific value is incinerated. These are typically waste steams (plastics, cardboard, paper, dry organic waste) which could be recycled or composted. A municipality needs to balance incineration of waste against adhering to national and provincial targets for waste recycling.
Supporting infrastructure requirements	Heat users – heat from an incinerator can be sold off to industry for use in manufacturing processes. Access to a substation or connection to the grid for energy produced.

Based on the DEA&DP model (see Table 38) there is insufficient feedstock to support an incinerator at 2019 generation rates. By 2024 sufficient feedstock would be available. Incineration is not recommended for the GLM. The domestic waste stream is 38.4% recyclable material and 39.8% organic waste. The recyclables should be diverted for recycling and the organic waste should be composted. “Incineration (create energy)” is located below “recycle and compost” in the waste management hierarchy, and hence if there is scope to increase recycling and composting incineration should be avoided. The levelised cost for incineration is high, R19,660 per tonne in 2024, but decreases as waste volumes increase.

Table 38: Results of assessment of incineration as a management option (source DEA&DP Alternative Waste Management Technologies Tool)

Year	2019	2024	2029	2034	2039
Incineration					
Waste tonnes per annum	2,968	14,859	19,909	27,703	35,956
Sufficient feedstock?	No	Yes	Yes	Yes	Yes
Actual levelised cost (R/ tonne)	-	R19,660	R17,489	R15,324	R13,806

9.4 Anaerobic Digestion

Anaerobic digestion is the process of breaking down organic waste in the absence of oxygen in controlled conditions.

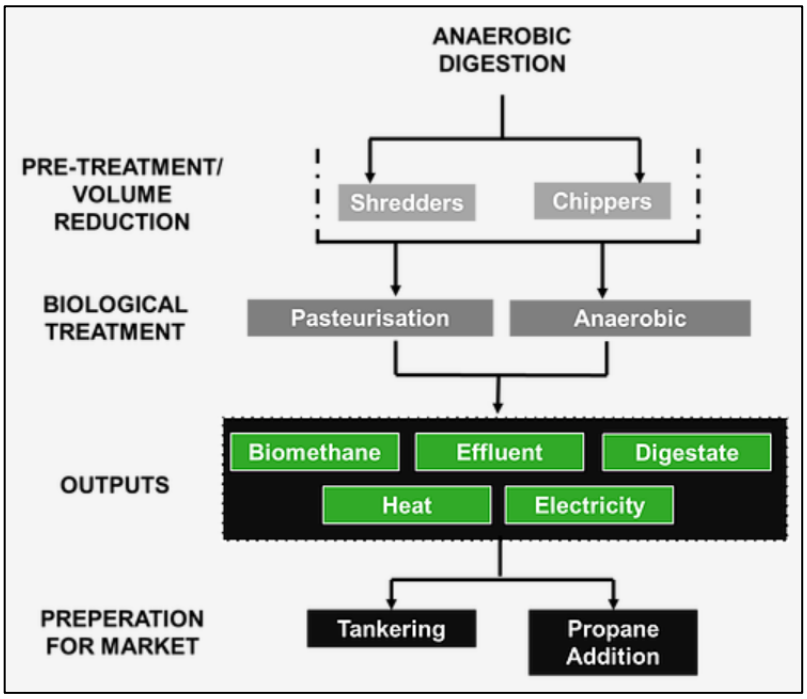


Figure 16: Anaerobic digestion process flow (source, web reference 7)

Table 39: Overview of anaerobic digestion (source, web reference 6 and web reference 7)

Type of technology	Anaerobic digestion
Brief description	Anaerobic digestion is the process of breaking down organic waste under controlled conditions to generate biogas or heat and electricity.
Waste accepted	Organic waste – food waste, garden waste, sewage sludge, energy crops
Waste volumes required	5,000 – 150,000 tonnes per annum
Outputs	Biomethane, heat, electric, digestate
Job creation	Low
Benefits	Anaerobic digestion produces energy either in the form of gas or heat and electricity.
Challenges	The digestate produced may be low quality and not suitable as a soil enhancer. Digestate can be put through a composting process in order to improve its quality.

Based on the DEA&DP model there is insufficient feedstock to support an anaerobic digester at 2019 generation rates. By 2024 sufficient feedstock would be available. The levelised cost for anaerobic digestion decreases as tonnages increase. The rates are still however high, in 2024 the rate per tonne is R6,703.

Table 40: Results of assessment of anaerobic digestion as a management option (source DEA&DP Alternative Waste Management Technologies Tool)

Year	2019	2024	2029	2034	2039
Anaerobic digestion					
Waste tonnes per annum	1,560	9,374	12,531	18,176	23,997
Sufficient feedstock?	No	Yes	Yes	Yes	Yes
Actual levelised cost (R/ tonne)	-	R6,703	R5,969	R5,143	R4,603

Due to the high costs associated with anaerobic digestion it is recommended that the GLM investigates composting as a management option for green waste. The GLM should also encourage home composting to manage domestic food waste.

9.5 Composting

There are various methods of composting but "open-windrow composting", which occurs in an open environment, is the recommended option for the GLM. "In-vessel composting", which occurs in a closed environment, requires higher capital investment.

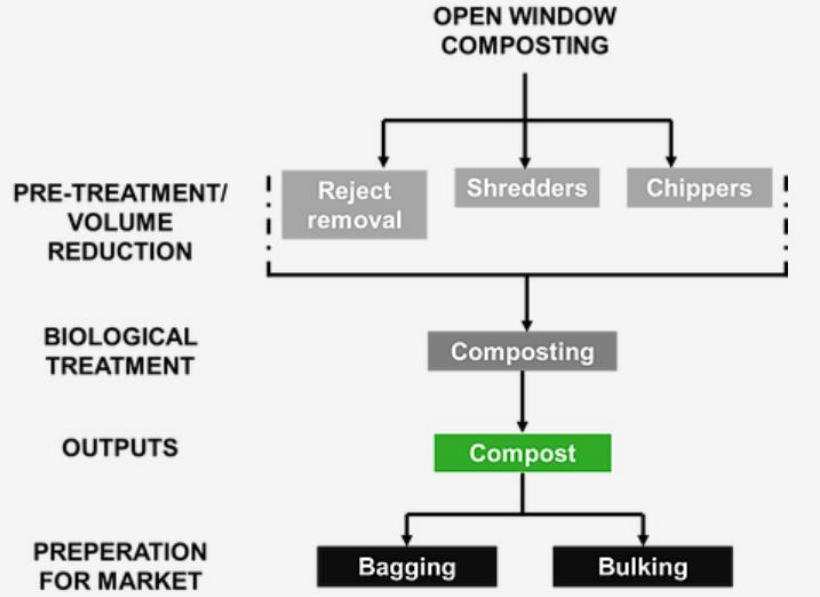


Figure 17: Composting process flow (source, web reference 9)

Table 41: Overview of open windrow composting (source, web reference 9)

Type of technology	Open windrow composting
Brief description	Placement of shredded or chipped organic waste in large windrows (piles). Water may be added if the moisture content of the waste is low. Windrows are turned regularly to aerate the waste. The composting process can take 12 – 16 weeks.
Waste accepted	Organic waste – food waste, green waste
Waste volumes required	5,000 – 500,000 tonnes per annum
Outputs	Compost which can be used to improve soil condition
Job creation	High
Challenges	The composting process can take up to 16 weeks. The process requires mechanical treatment to remove contaminations such as plastic. Turning of compost may result in odours and bio-aerosol issues, and hence a composting facility should not be located in close proximity to settlements.

Table 42: Results of assessment of composting as a management option (source DEA&DP Alternative Waste Management Technologies Tool)

Year	2019	2024	2029	2034	2039
Anaerobic digestion					
Waste tonnes per annum	1,560	9,374	12,531	18,176	23,997
Sufficient feedstock?	No	Yes	Yes	Yes	Yes
Actual levelised cost (R/ tonne)	-	R672	R599	R516	R462

Based on the DEA&DP model there is insufficient feedstock to support composting until 2024. By 2024 sufficient feedstock would be available. The model does not take into consideration the historic stockpiles of green waste which have accumulated at the landfill sites. The levelised cost for composting decreases as tonnages increase. The 2024 rate is R672 per tonne. This decreases to R462 per tonne by 2039. The levelised cost for composting is far less than anaerobic digestion. It is recommended that the GLM pursues composting as a management method for organic waste as opposed to anaerobic digestion.

9.6 Gasification

Gasification is the process of reacting waste materials at high temperatures (>700˚C) without combustion in a controlled environment. Gasification produces synthetic gas (syngas) which is typically a mixture of carbon monoxide, hydrogen and methane. Syngas can be burnt to produce steam or used to power a gas engine or turbine to create electricity. Gasification is not included in the AWT technology options in the DEA&DP model and hence has not been assessed in terms of the model.

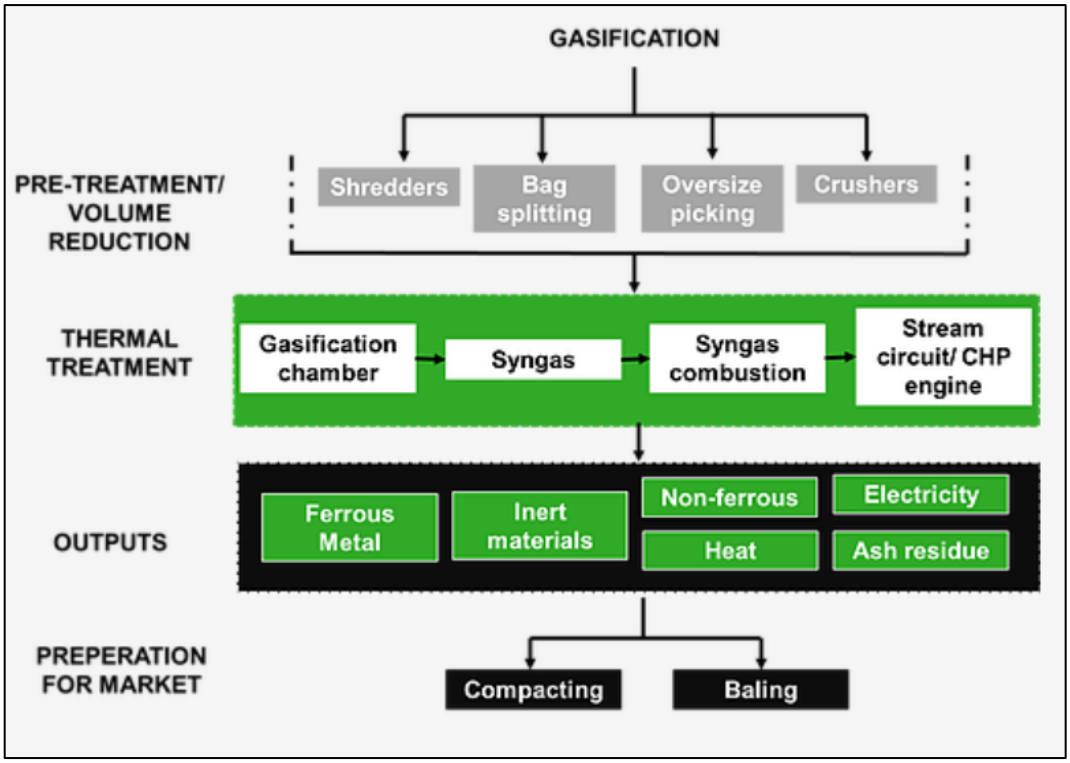


Figure 18: Gasification process flow (source, web reference 8)

Table 43: Overview of gasification (source, web reference 8)

Type of technology	Gasification
Brief description	The process of reacting waste at high temperatures without combustion.
Waste accepted	Municipal waste, commercial and industrial waste, portions of construction and demolition waste, RDF.
Waste volumes required	5,000 – 150,000 tonnes per annum
Outputs	Electricity, heat, ash
Job creation	Low
Benefits	Generation of electricity and heat. Gasification plants are modular so they can be developed to match the available volume of feedstock.
Challenges	High capital costs Destroys all non-metal recyclables. Gasification plants are sensitive to changes in the composition of feedstock. Pre-treatment of feedstock may be required.

Gasification is not recommended for the GLM. Gasification requires waste with a high calorific value such as plastic, paper and cardboard. The GLM should focus on recycling of these waste streams.

9.7 Alternative Waste Treatment Technologies Conclusions

The GLM generates sufficient organic waste (food and green waste) to meet the minimum feedstock requirements for anaerobic digestion and composting by 2024. Alternative waste treatment technologies typically require high capital investment, a large volume of feedstock and a consistent feedstock. Technologies such as incineration and gasification require waste with a high calorific value such as plastic, paper and cardboard. These technologies would be in direct competition with recycling initiatives. Recycling and composting of waste are preferred to treatment of waste in terms of the waste management hierarchy.

It is therefore recommended that GLM focuses on waste reduction, recycling and open-air composting to reduce waste volumes to landfill.

10 Gap and Needs Assessment

The aim of the gap and needs assessment is to identify shortcomings in the current waste minimisation practices in the GLM. The identified needs are the first step in the identification of actions to address the gaps.

A description of waste minimisation challenges has been included to provide context to the gap and needs assessment.

10.1 Waste Minimisation Challenges and Recommendations

10.1.1 Lack of Baseline Data

There are no accurate waste disposal records for the GLM as waste entering the Uniondale landfill site is not recorded. Even though there are several private recyclers operating in the municipal jurisdictional area, only one private recycler reports recycling data to the municipality. Therefore, there is a lack of information on the total tonnes of waste collected for recycling in the GLM. Without baseline data it is difficult to accurately determine what percentage of waste generated in the GLM is being diverted from landfill. In the short term the GLM should fence the Uniondale landfill and ensure that it is manned during operating hours by trained staff and locked outside operational hours.

The municipality should also identify major private waste management companies operating in the GLM area and request monthly records of waste collected. This information can be requested in line with the GRDM waste management by-laws.

10.1.2 Low Participation Rates in the Separation as Source Programme

There is a lack of participation in the separation at source programme. Only an estimated 10 – 20% of households in the low income areas and approximately 60% of households in the high income areas participate in the kerbside separation at source programme. The GLM needs to increase the participation rate to divert more recyclable waste from landfill.

A few comments received from the public survey state that the coloured bags are not collected in some residential areas and the different colour bags (black, blue, and green) are all collected in the same compactor truck. These perceptions from the public may result in reduced participation rates in the separation at source programme.

The following mechanism can be used to increase participation in the separation at source programme

- Education and awareness – information on the three-bag system is available on the GLM website, however it cannot be assumed that residents will check the website. The GLM should quantify participation in different suburbs and target suburbs with low participation rates with door-to-door engagements. Information on the three-bag system could also be advertised using radio campaigns and included on the newsletter which accompanies municipal rates.
- Recycling statistics should be published monthly on the GLMs social media pages
- All schools should be visited to educate learners on the 3-bag system.

A long term intervention to encourage participation in a two bag system would be limiting the number of black bags of waste which the municipality collects from houses. This intervention would force household to recycle. The waste by-laws would need to be amended to allow this to be enforced. This intervention is not recommended in the short term as uncollected black bags of waste may be illegally dumped by residents.

10.1.3 No Service Provider for the Separation at Source Programme

Since July 2020 to February 2021 the separation at source programme (S@S) was managed in-house. This was as a result of Interwaste, the S@S service provider, abruptly ending their contract with the municipality. The main challenges experienced by the municipality was ensuring that waste was separated once collected and finding a market for recyclables collected and. In the last few months of operating the S@S programme in-house, the blue bags were transported to PetroSA for disposal because of these reasons. In January 2021, the GLM appointed a new service provider to manage the separation at source programme from March 2021. Since the service provider commenced with the full scope of the S@S programme, blue bags were no longer landfilled and all separated waste was recycled.

10.1.4 Volatile Markets for Materials

The markets for recyclable materials are heavily influenced by national and international conditions. At present there is an oversupply of (PET), plastic and paper in the local market. Recycling companies may struggle to sell these materials or to get the desired price for the materials.

The recycling markets were not performing optimally even before the national lockdown imposed as a result of the COVID-19 pandemic, but they were impacted further by it. There is very little the GLM can do to mitigate against poor markets. When recycling markets are poor

private companies try to stockpile material and wait for markets to recover. One recommendation to manage poor market conditions would be to allow sufficient storage space at recycling drop-off centres and swop-shops/ buy-back centres so recyclable materials can be stockpiled until market conditions are more favourable. An alternative arrangement would be to have an agreement in place with a service provider which requires them to purchase/ remove a minimum volume of material per month. In order to make this attractive to the private sector the GLM would need to sell the materials to the service provider below market value or give the materials free of charge to the service provider.

10.1.5 Lack of Diversion of Organic Waste from Landfill

Organic waste makes up 37.9% of the domestic waste stream. A large percentage of the domestic organic waste stream (a total of 24.7%) is food waste which is landfilled and could potentially be used for organic waste diversion projects such as composting. The GLM ran a pilot home composting programme in 2019 and from the 46 homes that participated, 7.6 tonnes of organic waste was diverted from the landfill. The GLM should roll out the home composting programme to additional homes. Schools across the GLM should be encouraged to start worm farms.

The municipality has recently completed construction on the composting facility for the diversion of bulk green waste from the landfill. The composting facility has not yet been commissioned and operation of the facility will be outsourced.

A concern raised by the respondents in the survey is that the municipality only collects three green bags per household weekly. The remaining bags of garden waste then usually stand for a week until the next collection round. Residents are reluctant to go to the landfill site to dispose of garden waste as it is deemed as dangerous due to the presence of informal waste pickers.

The GLM should commission the composting facility as soon as possible and direct all the green waste to the composting facility. Security at the George landfill should be improved so that residents will feel safe enough to go and dispose of their own garden waste or drop off facilities that accept garden waste should be established in the residential areas. The municipality should also consider using biodegradable bags for green waste as the plastic bags can also be a form of waste generation.

10.1.6 Lack of Recycling Facilities to Encourage Community Involvement

There is a lack of municipal facilities for the general public and businesses to drop off source separated recyclables. The municipality should establish safe and accessible drop offs for the public and business to drop off their recyclables. The municipality should also consider drop offs for non-mainstream recyclables such as e-waste and HHW. The GLM should pilot swop shops or buy-back centres in low income areas (Thembalethu) to encourage recycling.

The GLM should provide the infrastructure for the swop-shops and drop-off facilities but these facilities, in the short term at least should be managed by the private sector.

10.1.7 Lack of Information Available on Waste Awareness Campaigns

Waste minimisation and recycling awareness campaigns form a key part of waste education and awareness. The GLM undertakes a range of waste awareness campaigns which also cover waste recycling, however no follow up surveys are undertaken to determine the effectiveness of the waste awareness campaigns.

The majority of the respondents in both the public and business surveys indicated that they are not aware of any campaigns undertaken by the municipality and that there are no clear guidelines provided to businesses and households on what can and cannot be recycled and waste sorting in general.

Information on waste minimisation is available on the GLM's website, however, the municipality should trace the website traffic monthly as a way of measuring the effectiveness of posting information on the website. There is also a high probability that households in the low-income groups do not visit the website. Further, the municipality should provide actual waste information such as tonnage reports for the two bags system or waste minimisation hints and tips rather than links when issuing the municipal statements.

GLM should undertake regular awareness campaigns and should target areas where waste is an issue. Follow up should be undertaken subsequent to awareness campaigns to determine the level of effectiveness. GLM should also incorporate the GRDM mascot on their waste awareness campaigns.

The GLM's social media platforms should be used to provide weekly or fortnightly waste minimisation messages. The municipality should partner with local companies and NGOs who undertake awareness campaigns.

10.1.8 A Gap in the By-Laws and Enforcement of By-Laws

There is no requirement for households to separate waste at source in the by-law and there is also no requirement for private recycling businesses to report recycling data to the municipality. The GLM's municipal by-laws should be amended to make separation at source mandatory and they should require private recycling businesses to report recycling data to the municipality. The municipality should also impose strict measures on business and industry to ensure that they are recycling.

10.1.9 Lack of Waste Education and Awareness

In 2019/20 the GLM only undertook seven waste education and awareness programmes. A greater focus on waste minimisation education and awareness is needed.

The GRDM has developed a waste mascot called Rocky the Rooster. The aim of the mascot is to provide a common theme for waste management across the district. GLM is one of the municipalities in the GRDM which has not yet incorporated the mascot into waste awareness materials.

The following can be implemented to improve waste education and awareness in the GLM

- Update waste awareness materials to incorporate Rocky the Rooster.
- Regular waste minimisation updates on social media. These can be recycling tonnages reports or hints and tips on waste minimisation and recycling in the home.
- Including separation at source in litter picks and clean-up campaigns. Participants in the programmes should be given different coloured bags to allow litter to be sorted into recyclable and non-recyclable streams.
- Assess the type of events used for waste education and awareness. Practical events such as visits to recycling facilities and source separation demonstrations to be added to the awareness programme.
- GLM to encourage green events in the municipality. Recycling bins should be available at markets and sporting events. Event organisers should be required to submit waste minimisation plans to the GLM well in advance of events
- Branding of the compactor truck.

10.1.10 Lack of Waste Minimisation Budget

The GLM budget for waste management in the 2019/20 financial year was R79,363,668.00, a total of R5,220,000.00 (6.6%) is allocated for waste minimisation.

The 2020 IWMP identified the need for the GLM to undertake a full costing accounting exercise. The full costing accounting exercise would allow GLM to determine the true cost of waste management services. The cost can then be compared against income from tariffs to determine if current tariffs are sufficient to meet current costs and future costs such as maximising waste minimisation efforts.

The aim of the gap and needs assessment is to identify shortcoming in current waste minimisation practices in the GLM. The identified needs are the first step in the identification of actions to address the gaps.

Table 44: Waste management gaps and needs

Legislated Requirements/ Best Practice	Gaps	Needs
1. General Waste Recycling and Minimisation		
• 40% diversion of waste by 2025, 55% diversion by 2030 and 70% diversion by 2035 (2020 NWMS) • 50% diversion of municipal waste from landfill by 2023 (Operation Phakisa) • 20% diversion rate of recyclables by 2019 (WCIWMP) • All municipalities to include provisions for drop-off/ buy back centres/ storage centres in their IWMPs by 2023 (2020 NWMS) • Municipalities to put in place measures that seek to reduce the amount of waste generated, and where generated, measures to ensure that it is re-used, recycled and recovered, treated and disposed of (Waste Act). • Provide an enabling environment for recycling (NDWCS). • All new and landfill sites with long remaining airspace/ lifespan to include a MRF by 2021 (2020 NWMS)	• Only 10 – 20% of households in the low income areas and approximately 60% of households in the high income areas participate in the separation at source programme. • There are no swop shops or buy-back centres • A MRF has been added to the George transfer station. Drop off facilities should be accessible to the public	The quantity of waste being recycled in GLM needs to be increased through: • Increasing participation of households in the separation at source programme – increased education and awareness. The percentage of households who participate in the Separation at Source programme needs to be quantified • Establish safe and accessible drop offs for businesses and the public who do not receive kerbside collection • Increasing education and awareness efforts related to waste minimisation. • Establish drop off facilities in the high incomes area and buy back centres in the low income areas starting with a pilot in two areas (Thembalethu and Pacaltsdorp)
2. Organic Waste Management		
• 25% diversion rate of garden waste from landfill by 2018 and 50% by 2023 (The National Norms and Standards for Disposal of Waste to Landfill (GN 636 of 2013) • 50% diversion of organic waste by 2022 and 100% diversion rate by 2027 (WCIWMP)	• A large percentage of the domestic organic waste stream (24.7%) is food waste, there is no large scale diversion of food waste. • There are currently no municipal Drop off Centres for organic waste • The GLM has completed construction on the composting facility, however, the facility has not been commissioned • There are no drop-off facilities for green waste other than the Gwaing and Uniondale landfill sites.	• Food waste diversion can be increased through rolling out the home composting project to additional households. Schools across GLM should be encouraged to start worm farms • In the short term green waste should be chipped and made available for the public/ business to collect free of charge • In the medium to long term the municipality should commission the composting facility and all the garden waste should be diverted from the landfill to the composting facility • Develop easily accessible drop-off facilities for green waste
	• When the Uniondale and Gwaing landfill sites close there will be nowhere for the public to drop-off green waste	• Drop off facilities for green waste should be added at the George and Uniondale transfer stations. A small chipper may be necessary for the management of green waste at the Uniondale transfer station.

Legislated Requirements/ Best Practice	Gaps	Needs
		• Provide awareness and information to the public as to where waste can be taken to upon the closure of the landfill sites.
	• Large volumes of unchipped green waste is stockpiled at the George landfill site, dry green waste on these sites poses a fire risk	• An additional chipper should be procured and should be rotated between the sites on a weekly or monthly basis to prevent a build-up of dry garden waste
3. Hazardous Waste Recycling		
• Municipalities to provide communal collection points for non-mainstream recyclables such as batteries and fluorescent tubes for collection by a private service provider (NDWCS)	• Lack of drop-off facilities for HHW. No HHW open days since March 2020. • Lack of awareness of what HHW waste is. • Lack of information available on hazardous waste generated by business and industry.	• Provide drop-off facilities for HHW at transfer stations. • HHW awareness campaigns.
4. Waste Information Management		
Landfill sites must report data on the IPWIS based on actual records (Waste Information Regulations, GN 625 of 2012)	• No accurate waste disposal records for the Uniondale landfill site. • Only one private recycler reports data to the municipality • No records are available for in-house recycling occurring in GLM offices	• A gate controller should be stationed at the Uniondale landfill site to record incoming waste • All private recyclers operating in the municipality should report their tonnages to the municipality monthly • The service provider collecting recyclables from the municipality should report tonnages to the municipality.
5. Waste Education and Awareness, Training and Capacity Building		
• 80% of schools to be implementing waste awareness campaigns (NWMS, 2011) • The service provider/ municipality must provide guidelines to households on how to separate waste • Municipalities must implement education and awareness training regarding the basic refuse removal in relevant areas (National Domestic Waste Collection Standards, 2011)	• Only 7 awareness events in the 2019/20 financial year. No follow up surveys to determine the effectiveness of waste awareness campaigns • Waste awareness materials are not aligned with the GRDMs material and do not feature the GRDM waste mascot Rocky the Rooster. • The majority of businesses and the public who responded to the survey indicated that they are unaware of any awareness campaigns undertaken by the municipality • Businesses and the public indicated that there are no clear guidelines provided on	• Increase the number of awareness campaigns undertaken. All schools should be visited at least twice per annum • Full public perception survey to determine current levels of knowledge with regard to waste management and to determine if awareness campaigns have been effective. • Details of all awareness campaigns to be re being recorded • Incorporate the GRDM waste awareness mascot on materials going forward • Align waste awareness campaigns with national/ international environmental days • Brand the compactor trucks with waste minimisation messages and use the GRDM mascot • Information on waste minimisation and recycling should be made available on the monthly municipal bill (instead of providing links)

Legislated Requirements/ Best Practice	Gaps	Needs
	what can and cannot be recycled	
6. By-Laws and Enforcement of By-Laws		
	• There GLM 2014 Integrated Waste Management by-laws are not aligned with the GRDM waste management by-laws • There is no fine schedule in the by-laws • There is no requirement for households to separate waste at source in the by-laws • There are no dedicated waste rangers to enforce waste management by-laws • There is no requirement for private recycling businesses to report recycling data to the municipality • Businesses should be required to recycle.	• Develop a comprehensive set of by-laws. The by-laws should be aligned with the GRDMs waste management by-laws and include a schedule of fines • Waste rangers should be appointed to enforce the by-laws, particularly around litter, illegal dumping and waste minimisation • Enforce waste by-laws, by identifying peace officers • Private recycling companies should be required to report recycling records to the municipality • Businesses should be required to recycle.

11 Objective, Targets and Actions

The following set of objectives and targets will guide the GLM in waste minimisation efforts. The objectives and targets translate into implementable action plans.

Three objectives, each with a target of targets have been identified for the GLM.

Table 45: Objectives and targets

Objective	Target	Actions
1. Improved waste minimisation data management	1.1 Accurate baseline data for waste generation and diversion from landfill to be determined by 2025	1.1.1 All recycling companies to be registered and report on GRWMIS by 2022 1.1.2 Encourage registration and reporting of private waste generators (companies from industry) on the GRWMIS 1.1.3 Quantify waste collected through the in-house recycling programme
2. Improved waste minimisation education and awareness	2.1 Waste minimisation education and awareness programmes to be well planned and executed. All awareness campaigns undertaken to be specific in addressing gaps in waste education and awareness 2.2 All school learners to be educated on waste minimisation 2.3 The public and business to be informed of the importance of waste minimisation and how they can participate in waste minimisation	2.1.1 Calendar of events to be planned at the beginning of each year 2.2.1 Bi-annual engagement at all schools 2.3.1 Fortnightly waste minimisation messages/ information published via social media and communicated on a local radio station 2.3.2 Update waste minimisation message/ information on the municipal website 2.3.3 Door-to-door visits to households not participating in the S@S programme 2.3.4 Include home composting and diversion of organic waste in education and awareness campaigns 2.3.5 A standard template to record information from waste education and awareness campaigns should be developed. Information to be recorded includes date of event, topics covered or discussed, audience engaged, lessons learnt and maintaining an attendance register for all awareness campaigns where applicable
3. Increase the diversion of waste from landfill	3.1 Meet the following targets: WCIWMP targets: • 20% diversion rate of recyclables by 2019 (WCIWMP) NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035	**3.1** **<u>Recyclables</u>** 3.1.1 The separation at source programme contract should set performance targets for participation, tonnage of waste collected and education and awareness 3.1.2 Quantify participation rates in the 2-bag system per suburb 3.1.3 Develop a plan to increase participation rates in the S@S programme with annual targets 3.1.4 Assess the feasibility of establishing safe and accessible drop offs starting with one in the most preferred high-income area and buy back centres in the low income

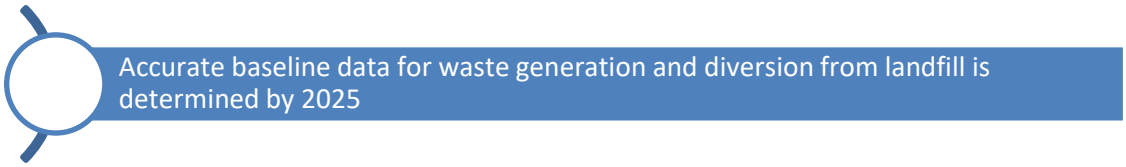
Objective	Target	Actions
		areas starting with a pilot in two areas (Thembalethu and Pacaltsdorp) 3.1.5 All events to have a waste minimisation plan and submit to the relevant municipal officers for approval prior to the event 3.1.6 Revise waste management by-laws to: a) Align GLM by-laws to GRDM by-laws b) Make participation in S@S programme compulsory c) Require business and industry to report waste data to GRWMIS d) Require malls and shopping complexes to have an approved waste management plan in place and monitor compliance e) Require all events to be conducted according to a waste minimisation plan f) Large producers of organic waste to prepare organic waste diversion plans g) All construction projects to have an approved waste minimisation plan in place prior to commencement h) Fining schedule for non-compliance and peace officers or waste rangers for enforcement of by-laws 3.1.7 Develop a sustainable public procurement procedure for the municipality
	3.2 Meet the following targets from the WCIWMP Organic waste diversion targets • 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027	**3.2 <u>Organic waste</u>** 3.2.1 Roll out home composting bins to an additional 100 households per annum. Households to apply to participate in the programme 3.2.2 Home composting workshops to encourage the use of compost heaps 3.2.3 Roll out on-site composting or worm farms to all schools before 2028 3.2.4 Short-term, chip green waste at the landfill sites and chips to be made available for farmers or the public to collect 3.2.5 Medium to long term, the municipality should commission the George composting facility 3.2.6 Pilot a 4-bag system with a fourth bag for kitchen waste and make use of biodegradable bags which can also be composted 3.2.7 Develop drop-off facilities for green waste 3.2.8 Large producers of organic waste to prepare organic waste diversion plans which adhere to national targets.
	3.3 Meet the following targets from the NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035 • C&DW to only be disposed as cover material by 2021	**3.3 <u>Construction and demolition waste</u>** 3.3.1 All municipal or large-scale construction projects to have an approved waste minimisation plan in place prior to commencement 3.3.2 Engage with the GLM engineering department to identify projects e.g. road

Objective	Target	Actions
		construction or upgrades where crushed clean C&DW can be used 3.3.3 Engage with GRDM to determine if C&DW can be used as cover material at landfills
	3.4 Meet the following targets from the NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035	**3.4 <u>Household hazardous waste (HHW)</u>** 3.4.1 Establish drop off facilities for HHW at the George transfer station and accessible municipal offices 3.4.2 Host annual HHW open days.

12 Implementation Plan

Action plans have been developed to assist the GLM to implement projects identified in the WMP.

12.1 Objective 1. Improved Waste Minimisation Data Management



Action 1.1.1. All recycling companies to be registered and reporting on GRWMIS by 2022

Target	1.1 Accurate baseline data for waste generation and diversion from landfill is determined by 2025
Action	1.1.1 All recycling companies to be registered and reporting on GRWMIS by 2022
Priority	High
Dependencies	None. A requirement for recycling companies to register and report can be added to the waste management by-laws. Note: this is already covered by the GRDM by-law.
Timeframe	1. Existing recycling companies registered and reporting by 2022. New recycling companies should register to GRWMIS once established and operating in the GLM. Reporting of recyclers to be an ongoing task.
Budget required	Nil
Responsibility	GLM and GRDM
Implementation guide	**Registration** 1. GRDM to export a list of recycling companies registered in the GLM from the GRWMIS 2. GLM to provide details of other known recycling companies operating in the GLM 3. GLM to engage with existing recycling companies to determine if they are aware of any other recyclers operating in the GLM 4. GLM to make a regular announcement on Eden FM during their bi-monthly radio slots requesting all recycling companies to register on GRWMIS as well as post a notice on social media **Reporting** 1. GRDM to monitor reporting of data by recycling companies on a monthly basis 2. Where there are anomalies in the data, the GLM to visit or contact the recycler to verify the data 3. The S@S service provider to report directly to GLM
Key performance indicator	Increased number of recycling companies registered and reporting on the GRWMIS.

Action 1.1.2. Encourage registration and reporting of private waste generators (companies from industry) on the GRWMIS

Target	1.1 Accurate baseline data for waste generation and diversion from landfill is determined by 2025
Action	1.1.2 Encourage registration and reporting of private waste generators (companies from industry) on the GRWMIS
Priority	Medium
Dependencies	None. A requirement for companies and industry to register and report can be added to the waste management by-laws. Note: this is already covered by the GRDM by-law.
Timeframe	Companies from industry registered and reporting by 2024. New companies should register to GRWMIS once operating in the GLM. Reporting of companies to be an ongoing task.
Budget required	Nil
Responsibility	GLM and GRDM

Implementation guide	**Registration** 1. GRDM to export a list of companies registered in the GLM from the GRWMIS 2. GLM to provide details of other known companies operating in the GLM 3. GLM to develop a database of all industrial companies and encourage companies that are not registered on the GRWMIS to register and report waste generation tonnages on the GRWIS 4. GLM to post a notice on social media requesting companies to register on the GRWMIS **Reporting** 1. GRDM to monitor reporting of data by business and industry on a monthly basis 2. Where there are anomalies in the data GLM to visit or contact the company to verify the data 3. Industrial company to report directly to the GRWMIS
Key performance indicator	Number of businesses registered and reporting on the GRWMIS

Action 1.1.3 Quantify waste collected through the in-house recycling programme

Target	1.1 Accurate baseline data for waste generation and diversion from landfill is determined by 2025
Action	1.1.3 Quantify waste collected through the in-house recycling programme
Priority	Low
Dependencies	Ensure that accurate reporting on quantities is included in the contract for the S@S service provider
Timeframe	2021 – ongoing
Budget required	Nil if collection of recyclable waste already forms part of the SOW for the service provider.
Responsibility	GLM
Implementation guide	1. Ensure all municipal offices have recycling bins 2. Ensure the service provider's contract extends to all municipal offices for the collection of recyclables 3. Designate a recycling champion per office and a recycling co-ordinator 4. Train employees on how to recycle and why recycling is important 5. Obtain records of waste collected for recycling per office from the service provider 6. Records of waste recycled per office to be sent to the recycling co-ordinator on a monthly basis
Key performance indicator	Records of in-house recycling available on a monthly basis.

12.2 Objective 2. Improved Waste Minimisation Education and Awareness

Action 2.1.1 Calendar of events to be planned at the beginning of each year

Target	2.1 Waste education and awareness programmes are well planned and executed
Action	2.1.1 Calendar of events to be planned at the beginning of each year
Priority	High
Dependencies	None
Timeframe	2021 – ongoing

Budget required	Nil
Responsibility	GLM
Implementation guide	1. Develop a template for the awareness calendar, as a minimum the following would be needed • Event date • Venue/ location • Event title/ theme • Audience to be engaged • Budget required • Equipment/ resources required e.g. GRDM recycling banners, flyers, projector and screen for presentations, a microphone with speakers • Responsible person/ department/ organisation 2. Type of event/ method of engagement will be determined by the outcomes of the district waste management survey (refer to GRDM district WMP) which will determine the preferred method of engagement for different communities and society groups e.g. schools, taxi ranks, high income areas, low income areas. 3. Engage with GRDM, DEA&DP, DFFE and the recycling service provider to determine what events they have planned and incorporate these into the calendar where relevant 4. Events to be included in the calendar: • Social media posts, newsletters, e-mail notifications • Schools visits • Launch of new programmes e.g. expansion of home composting programme • Clean-ups, using a 2-bag system • Monthly updates on the progress of the separation at source programme • Visits to waste minimisation facilities, composting sites or recycling depots • HHW open days • Community engagements e.g. roadshows 5. Events to be planned at the beginning of each calendar year, all stakeholders involved to sign off on the calendar as a commitment to undertake the events 6. A close out report should be developed for all events including a portfolio of evidence such as photographs and attendance registers 7. All of the above should be stored in the municipal server and the waste awareness calendar should be publicized in the municipal website
Key performance indicator	Development of a waste awareness calendar.

Action 2.2.1 Bi-annual engagement at all schools

Target	2.2 All school learners to be educated on waste minimisation
Action	2.2.1 Bi-annual engagement at all schools
Priority	High
Dependencies	Action 2.1.1 Calendar of events to be planned at the beginning of each year
Timeframe	2022 – ongoing
Budget required	TBC
Responsibility	GLM, GRDM
Implementation guide	The same methodology should be used to plan school events as to develop the waste awareness calendar (action 2.1.1). In addition, the following are needed: 1. Compile a database of all the schools in GLM. Included in the database should be school name, location, age range of learners, home language of the majority of students 2. Develop a calendar for engagement with schools – refer to action 2.1.1. 3. Ensure the event planned is appropriate for the age of learners 4. Ensure the awareness teams are fluent in the home or preferred language of the learners 5. Arrange with GRDM to use the GRDM mascot costume and banners when needed to ensure they are available 6. Ideas for school visits: a) Puppet shows

	b) Delivery of recycling bins and an interactive presentation on how they work c) Delivery of worm farms and an interactive presentation on how to care for the worms d) Schools recycling competitions – competition between classes to collect material e.g. bottle caps, arts and crafts from waste e) Presentations to environmental clubs f) Clean up events using a two-bag system g) Visits to recycling facilities or composting sites 7. Events to be planned at the beginning of each calendar year, all stakeholder involved to sign off on the calendar as a commitment to undertake the events
Key performance indicator	Number of schools visited per quarter, to be measured through documented records.

Action 2.3.1 Fortnightly waste minimisation messages/ information published via social media and communicated on a local radio station

Target	2.3 The public and business to be informed of the importance of waste minimisation and how they can participate in waste minimisation
Action	2.3.1 Fortnightly waste minimisation messages/ information published via social media and communicated on a local radio station
Priority	High
Dependencies	Action 2.1.1 Calendar of events to be planned at the beginning of each year
Timeframe	August 2021 – onwards
Budget required	Nil, internal project
Responsibility	GLM Waste Management and Communications Department
Implementation guide	1. Engage with Communications Department to confirm the procedure for posting information on social media 2. Develop a template for the waste minimisation posts. The template should include the GRDM waste mascot, Rocky the Rooster. Template to be approved by communications department 3. Plan a calendar of social media posts e.g. 1st week of month update on tonnages collected through S@S programme and ranking of suburbs in terms of participation rate (use a star rating system from 1 to 5), 3rd week of month information of waste recycling and diversion programmes and initiatives (S@S programmes, chipping facilities, composting programmes, private initiatives such as green tourist and restaurant ratings), once a quarter a recycling fact, once a quarter an article on municipal waste minimisation programmes or events 4. Waste topics on a local radio station should be paralleled with the social media posts to target the audience who are not necessarily on any digital media platforms. Recommended topics for social media and local radio station 1. How to recycle? 2. What happens to my recycled waste? 3. Interview with the service provider 4. Performance of different suburbs (star rating system) 5. Video/ photo tour of municipal/ service provider waste facilities (only on digital media) 6. Do you know where to take your recycled waste? Details of recycling drop-off facilities per area. 7. Invitations to attend waste minimisation events e.g. HHW drop-off days 8. Home composting programmes and initiatives, and diversion of domestic organic waste from landfill 9. Invitation to collect chipped green waste from landfill sites 10. Notification of the requirement for event waste minimisation plans and construction project waste minimisation plans
Key performance indicator	Number of waste minimisation messages posted or emailed per annum Number of times the public were addressed on a local radio station regarding waste management per annum.

2.3.2 Update waste minimisation messages/ information published on the municipal website

Target	2.3 The public and business to be informed of the importance of waste minimisation and how they can participate and waste minimisation
Action	2.3.2 Update waste minimisation messages/ information published on the municipal website
Priority	High
Dependencies	2.1.1 Calendar of events to be planned at the beginning of each year
Timeframe	2022
Budget required	Nil, internal project
Responsibility	GLM Waste Management and Communications Department
Implementation guide	1. GLM to compile information to be added to the website, including: a) Calendar or planned waste awareness events b) Information on why waste minimisation is important c) Hints and tips on waste minimisation d) How to guide for recycling e.g. materials which are accepted, rinsing of food containers etc. e) A home composting guide f) A list of areas covered by the kerbside separation at source programme g) A map showing the location of recycling drop-off facilities h) Contact details for GLM waste managers and supervisors i) A library of articles, posts or video released on social media or via email j) A copy of this waste minimisation plan (once finalised) k) The template for event waste minimisation plan l) The template for construction project waste minimisation plan m) Educational resources for schools to use n) Schedule of the local radio station waste awareness and discussion slots
Key performance indicator	Amount of information available on GLM website.

Action 2.3.3 Door-to-door visits to households not participating in separation at source programme and follow up to determine success

Target	2.3 The public and business to be informed of the importance of waste minimisation and how they can participate and waste minimisation
Action	2.3.3 Door-to-door visits to households not participating in separation at source programme and follow up to determine success
Priority	Medium
Dependencies	None. This action is included in scope of works for the S@S service provider
Timeframe	2022 onwards
Budget required	Part of scope of works for recycling service provider
Responsibility	GLM, S@S service provider
Implementation guide	1. Service provider to provide a plan of how households would be engaged and how follow up will be done
Key performance indicator	1. Increase in participation rates of households in separation at source. 2. Lessons learnt – understanding of factors which prevent households from recycling.

Action 2.3.4 Include home composting and diversion of organic waste in education and awareness campaigns

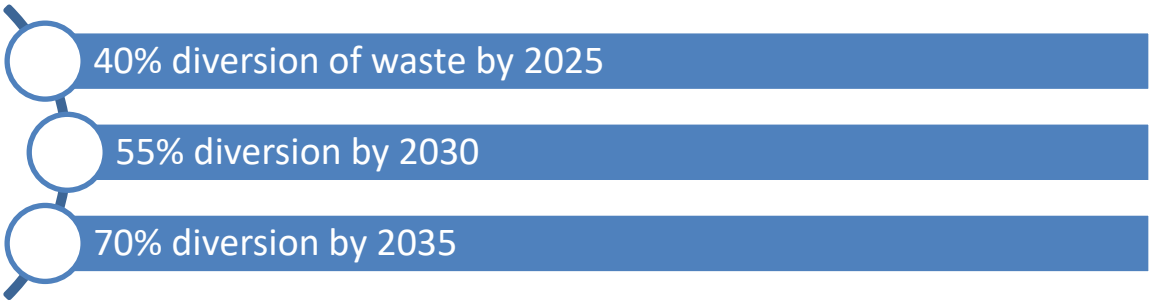
Target	2.3 The public and business to be informed of the importance of waste minimisation and how they can participate and waste minimisation
Action	2.3.4 Include home composting and diversion of organic waste in education and awareness campaigns
Priority	Medium
Dependencies	2.1.1 Calendar of education and awareness events to be planned at the beginning of each year 3.2.1 Roll out home composting bins to an additional 100 households per annum for a period of 10 years
Timeframe	2022 – ongoing

Budget required	Nil
Responsibility	GLM
Implementation guide	1. Develop a how to guide for home composting. The training manual should cover: • Why home composting is important • What food/ garden waste is suitable for home composting/ worm farms and what should be avoided • How to set up home composting or a worm farm • Maintenance • Timeframes 2. Launch a social media campaign on the importance of home composting and how to manage organic waste at home 3. Upload the how to guide to the municipal website and make it available through a link on social media 4. Arrange home composting workshops/ demonstration sessions. To be advertised via social media, emails and loud hailing. 5. Workshops to be held with households who are provided with home composting bins/ worm farms (action 3.2.1)
Key performance indicator	1. Home composting how to guide developed 2. Number of households attending workshops 3. Number of households doing home composting

Action 2.3.5 A standard template to record information from waste education and awareness campaigns

Target	2.3 The public and business to be informed of the importance of waste minimisation and how they can participate and waste minimisation
Action	2.3.5 A standard template to record information from waste education and awareness campaigns
Priority	High
Dependencies	None
Timeframe	2021 – ongoing
Budget required	Nil
Responsibility	GLM
Implementation guide	1. Develop a template to record information from the waste education and awareness campaigns, as a minimum the following should be recorded and included in the template: • Event date • Venue/ location • Event title/ theme • Audience engaged • Responsible person/ department/ organisation • Topics discussed • Details and record of audience. For example use an attendance register for smaller, older audiences (municipal staff, businesses, organisations) and provide a description of audience engaged for larger, younger audience (e.g. grade 3 classes, approximately 133 learners of Holy Cross primary school) 2. A report should be developed for all events including a portfolio of evidence such as photographs and attendance registers
Key performance indicator	1. Development of a waste awareness and education standard template 2. Using the waste awareness and education standard template to record information of all awareness and education campaigns/events 3. All the information available in the municipal server.

12.3 Objective 3.1 Increase the Diversion of Recyclable Waste from Landfill



12.3.1 Recyclables

3.1.1 The separation at source programme should set performance targets for participation, tonnage of waste collected and education and awareness

Objective	Increase the Diversion of Waste from Landfill
Target	NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	3.1.1 The separation at source programme should set performance targets for participation, tonnage of waste collected and education and awareness
Priority	High
Dependencies	None
Timeframe	2021 onwards
Budget required	As determined by the municipality for the outsourcing of the S@S service
Responsibility	GLM Waste Management, Supply Chain Management
Implementation guide	1. Request lessons learnt from other local municipalities in terms of recycling service providers and implementing the S@S programme 2. Ensure the contract includes the following: • Quantifiable performance criteria for tonnages collected, number of awareness events, reporting, etc. • A requirement to increase participation in low income area. This can be achieved through swop shops or buy-back centres or directly involving the community e.g. recycling ambassadors or organisations already involved in local recycling programmes • Service provider to quantify participation rates across at GLM at a suburb level • Local residents, organisations or community groups and SMME's to be utilised • Prepare and implement a plan to increase participation rates • Prepare and implement a recycling waste education and awareness programme • Extend the S@S kerbside collection service to unserviced areas • Compliance of service provider facility with legislation – cleanliness, litter, registrations
Key performance indicator	Contract revised and service provider is fulfilling the requirements of the contract

3.1.2 Quantify participation rates in the two-bag system per suburb

3.1.3 Develop a plan to increase participation rates in the two-bag system with targets per annum

3.1.4 Assess the feasibility of establishing safe and accessible drop offs and buy back centres in the high- and low-income areas respectively

Objective	Increase the Diversion of Waste from Landfill
Target	NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030

	• 70% diversion of waste from landfill by 2035
Action	3.1.2 Quantify participation rates in the two-bag system per suburb 3.1.3 Develop a plan to increase participation rates in the two-bag system with targets per annum 3.1.4 Assess the feasibility of establishing safe and accessible drop offs and buy back centres in the high- and low-income areas respectively
Priority	High
Dependencies	3.1 The separation at source programme should be outsourced to a service provider and the contract should set performance targets for participation, tonnage of waste collected and education and awareness
Timeframe	3.1.3 2021 – 2023 Determine the participation rates of the two-bag system per suburb 3.1.4 2021 – 2023: Develop the plan to increase participation rates in the S@S programme. 2023 onwards - implement the plan and revise plan and targets annually 3.1.5 2021 – 2023: Assess the feasibility of establishing safe and accessible drop offs and buy back centres in the high- and low-income areas respectively. 2023 onwards: Implement recommendations of feasibility assessment.
Budget required	Nil, to form part of the scope of work for the appointed recycling service provider and part of the municipality's waste department duties
Responsibility	GLM, recycling service provider
Implementation guide	3.1.3 and 3.1.4 to form part of the scope of works for the recycling service provider. The recycling service provider should submit a plan to GLM on how the actions will be implemented. 3.1.5 the GLM to undertake a high-level feasibility study for drop-offs and buy back centre site selection Ensure the following for these facilities: • Easy access for the public • Suitable containers for different types of recyclable waste e.g., a plastic igloo may be suitable for glass • Sufficient space and containers to store recyclable material • During the feasibility study, the GLM to consider a mobile buy back centre that can travel between communities and collect recycled material.
Key performance indicator	1. S@S participation rates per suburb determined 2. A plan to increase participation rates is developed and approved by GLM 3. S@S participation rates increase in line with the plan 4. At least one drop-off facility and a swop shop in the high income and low-income areas respectively. These should be areas that are not serviced by the S@S programme.

3.1.5 All events to have a waste minimisation plan

Objective	Increase the Diversion of Waste from Landfill
Target	NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	3.1.5 All events to have a waste management plan
Priority	High
Dependencies	3.1.6 Revise the waste management by-law
Timeframe	2022 – events on municipal property, 2024 – events on private property
Budget required	Nil
Responsibility	GLM, GRDM
Implementation guide	1. Develop a template for the event waste minimisation plan in consultation with the GRDM. Template to include the following information • Event time, date and location • Type of event • Methods used to advertise the event • How waste minimisation will be advertised by the event • Expected types and volumes of waste which would be generated by the event • Waste service provider to be used or planned method of management of waste • Details of how waste will be minimised, recycled or reused

	• Details of how single use items e.g. plastic bottles, take away boxes, plastic cutlery will be avoided • Details of the number of type of bins to be provided for the event as well as the location of the bins • A reporting format, to be completed once the event is concluded to detail how much waste was generated, how much was recycled and how much was disposed of • A declaration which the event organiser as well as businesses/ individuals who are participating in the event e.g. exhibitors or caterers, have to sign which binds them to the event waste minimisation plan 2. Designate an existing employee to review event waste minimisation plans 3. Train the designated employee on what an event waste minimisation plan should cover 4. Undertake spot checks of events to ensure the waste minimisation plans are being implemented
Key performance indicator	All public events to have a waste minimisation plan in place

Action 3.1.6 Revise waste management by-law

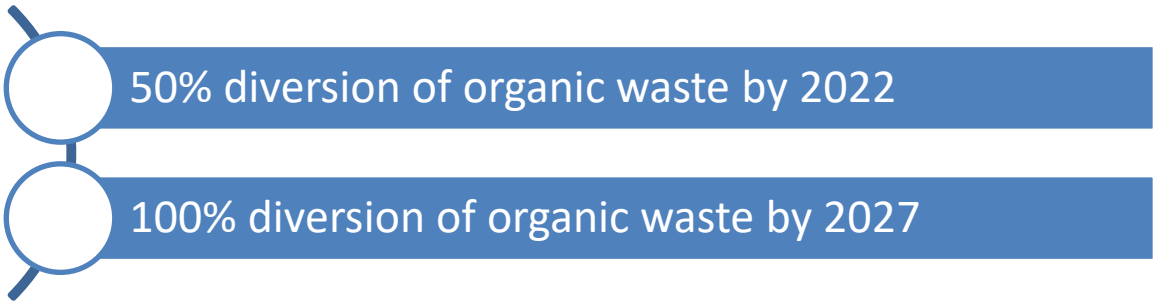
Objective	Increase the Diversion of Waste from Landfill
Target	NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	Revise the waste management by-law
Priority	High
Dependencies	None
Timeframe	2022
Budget required	Nil, if undertaken internally
Responsibility	GLM
Implementation guide	1. Source GRDM generic waste management by-law 2. Review gaps between GRDM generic waste by-law and existing GLM by-law 3. Revise the waste management by-law, can be undertaken in-house or outsourced 4. Revise by-law to ensure it: a) Align GLM by-laws with GRDM by-laws b) Makes participation in the kerbside S@S programme mandatory for households c) Makes separation at source mandatory for all businesses d) Require business and industry to report waste data on the GRWMIS e) Requires all public events to have an event waste minimisation plan f) All large or municipal construction projects to have an approved waste minimisation plan in place g) Large organic waste generators to prepare and have organic waste diversion plans in place h) A fining schedule for non-compliance i) Ban certain waste streams from landfill e.g. offcuts from plank manufacture, saw dust j) Specify which landfill sites accept which waste types e.g. C&DW and green waste k) Make it mandatory for malls and shopping complexes to have an approved waste management plan in place and monitor compliance
Key performance indicator	Revised waste management by-law

Action 3.1.7 Develop a sustainable public procurement procedure for the municipality

Objective	Increase the Diversion of Waste from Landfill
Target	NWMS targets: • 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	3.1.9 Develop a sustainable public procurement procedure for the municipality
Priority	Low

Dependencies	None
Timeframe	2024
Budget required	Nil, if undertaken internally
Responsibility	GLM
Implementation guide	1. Undertake a literature review of national and internal sustainable public procurement procedure for the municipality 2. Develop a sustainable public procurement procedure which considers the following: • Procurement of products/ services which use recycled materials e.g. furniture made from recycled wood or plastic • Procurement from companies which practice S@S and recycling or reuse of waste • Use of companies or suppliers which participate in waste minimisation
Key performance indicator	Sustainable public procurement procedure which focuses on waste minimisation and recycling is developed.

12.4 Objective 3.2 Increase the Diversion of Organic Waste from Landfill



Action 3.2.1 Roll out home composting bins to an additional 100 households per annum for a period of 10 years

Objective	Increase the Diversion of Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.1 Roll out home composting bins to an additional 100 households per annum for a period of 10 years
Priority	Medium
Dependencies	3.9 Develop a sustainable public procurement procedure for the municipality
Timeframe	2022 – 2032
Budget required	R850/ bins (2022), Y1 – R85,000
Responsibility	GLM Waste Management, Supply Chain Management
Implementation guide	1. Source funding for home composting bins 2. Issue a request for quotation for the supply of home composting bins. Home composting bins to be procured in line with the sustainable public procurement procedure 3. Place an advert inviting the public to register for a home composting bin. Note in the advert that spot checks will be done to ensure households are using the bin. If they are not using the bin the GLM reserves the right to remove the bin. Bins to remain the property of GLM 4. Develop a database of households who registered for the home composting bins. First 100 households to be given bins 5. Develop a training course and training materials on how to use a home composting bin 6. Hold a workshop with the households who registered for the bins to explain how to use the bins correctly 7. Undertake spot checks of 30% of the households each year to ensure bins are being used 8. If bins are not being used correctly, bin to be collected by the GLM and given to another household who requested a bin
Key performance indicator	1. 100 home composting bins issued per year 2. Spot checks on 30 households which bins were issued to per annum

Action 3.2.2 Home composting workshops to encourage the use of compost heaps

Objective	Increase the Diversion of Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.2 Home composting workshops to encourage the use of compost heaps
Priority	Medium
Dependencies	2.1.1 Calendar of education and awareness events to be planned at the beginning of each year 2.3.2 Update waste minimisation information on the municipal website 2.3.5 Include home composting and diversion of organic waste in education and awareness campaigns
Timeframe	2022 ongoing
Budget required	Nil
Responsibility	GLM Waste Management, Supply Chain Management
Implementation guide	1. Information to the public regarding the diversion of organic waste and the use of home compost heaps can be provided to the public by: • Developing organic waste education and awareness material that can be uploaded onto the municipality's website and Facebook page • Include home composting as a topic during education and awareness campaigns in the community, with businesses and at schools • Align the home compost heat programme with the home compost bin programme and have households keep record of waste diverted from landfill. The success of each programme can be provided on the municipality's website and Facebook page. • Education and awareness 2. Develop a database of households who participate in the home composting heap programme. 3. Develop a training course and training materials on how to use a home composting heap. This can be provided on the municipality's website and Facebook page 4. Visit 10% of households who participate in the home compost heap programme and determine the lessons learnt of using the household compost heap to divert organic waste from landfill. The GLM can do short write-up of households using the home compost heaps and upload this onto their website and their Facebook to create awareness on the use of the home compost heaps.
Key performance indicator	1. Number of home compost workshops or times that home composting was included in education and awareness campaigns 2. Develop a database of households that participate in home composting and record tonnages of organic waste diverted from landfill through home compost heaps 3. Information uploaded onto municipality's website or made available on the municipality's Facebook page.

Action 3.2.3 Roll out on-site composting or worm farms to all schools before 2028

Objective	Increase the Diversion of Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.3 Roll out on-site composting or worm farms to all schools before 2028
Priority	Medium
Dependencies	None
Timeframe	2028
Budget required	R1,600/school for equipment
Responsibility	GLM
Implementation guide	1. Develop a database of all schools in GLM. Information to be captured to include: • School name • Location • Contact details • Grades • Number of pupils 2. Prioritise schools for the provision of bins starting with the largest 3. Determine whether the school should be provided with a worm farm or compost bin. Worm

	farms are better suited for food waste and compost bin can be used for green waste e.g. grass cuttings from sports fields 4. Visit the school to deliver the worm farm or home compost bin 5. Appoint a project co-ordinator from the school to manage the project 6. On-site practical training with the project co-ordinator 7. Provide educational materials to the project co-ordinator 8. Undertake an interactive session with pupils on how to use the compost bins or worm farms 9. Undertake a follow up visit after 6 weeks to ensure the worm farm or compost bin is being used correctly 10. Document successes and challenges and use these to update guidelines used for subsequent schools
Key performance indicator	The number of schools that worm farms or compost bins are rolled out to and are being used correctly.

Action 3.2.4 Short-term: chip green waste at the landfill sites and chips to be made available for farmers or the public to collect

Action 3.2.5 Medium to long term, the municipality should commission the George composting facility

Objective	Increase the Diversion of Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.4 Short-term: chip green waste at the landfill sites and chips to be made available for farmers or the public to collect 3.2.5 Medium to long term, the municipality should commission the George composting facility
Priority	High
Dependencies	Complete construction of the George composting facility
Timeframe	2021 – 2023: Chip green waste and make it available for farmers and the public to collect 2022 – 2023: Commission the composting facility and divert all green waste to the composting facility
Budget required	3.2.4 Procure a chipper (R700,000.00) 3.2.5 As determined by the municipality for the outsourcing of the composting at the composting facility
Responsibility	GLM and GLM SCM
Implementation guide	Action 3.2.4 1. Inform the public via social media, the GLM website, local radio station (e.g. Eden FM) and through ward councillors that chipped green waste is available for collection 2. Ensure budget for a chipper is included in the waste management budget 3. Prepare a specification for chippers 4. Publish a request for quotation (RFQ) for the provision of a chipper. The RFQ should cover supply of chippers, training of GLM employees on use and maintenance of the chipper 5. Develop a list of farmers in the GLM 6. Engage with each farmer to understand whether they conduct composting or soil conditioning on their farms and whether they could possibly use chipped green waste for this 7. If yes, determine the volume of green waste needed by interested farmers Action 3.2.5 1. Complete construction on the composting facility, procure all necessary equipment 2. Commission the composting facility 3. The service provider to develop standard operating procedures for compositing. The operating procedure to determine the source of organic material for the compost, e.g. chipped green waste, food waste, wood waste, sewage sludge 4. Municipality to determine how compost will be distributed or sold once produced 5. GLM to create awareness that composting facility is operational, and that public should dispose of green waste at the transfer station 6. GLM to keep tonnage records of organic waste diverted from landfill through composting.
Key	• The volume of green waste diverted from landfill and being used by farmers

performance indicator	• Commissioning and operation of the George composting facility

Action 3.2.6 Pilot a 4-bag system with a fourth bag for kitchen waste

Objective	Increase the Diversion of Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.6 Pilot a 4-bag system with a fourth bag for kitchen waste
Priority	Medium
Dependencies	3.2.5 Commissioning and operation of the composting facility Engage with local composters that would utilise food waste for composting
Timeframe	2026 – 2027
Budget required	TBC
Responsibility	GLM
Implementation guide	1. Determine a suburb where a 4-bag for kitchen (food) waste can be implemented for the separation of food waste at source 2. Develop a plan for the implementation of the 4-bag system for kitchen (food) waste. Things to consider by the municipality include: 2.1 How often will food waste be collected 2.2 How will it be collected 2.3 Alternative for households if they miss the collection time, e.g. a communal drop off point 3. Municipality to conduct door-to-door education and awareness campaign with households in the suburb that is selected for the 4-bag system 4. Determine with residents on the use of suitable containers or bags (biodegradable bags) to households into which food waste should be disposed 5. Provide the preferred option (containers or biodegradable bags) to households
Key performance indicator	• Pilot a 4-bag collection system in one suburb in the municipality

Action 3.2.7 Develop Green Waste Drop-Off Facilities

Objective	Increase the Diversion of Organic Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.7 Develop green waste drop-off facilities
Priority	Medium
Dependencies	None
Timeframe	Facility 1 – 2023 Facility 2 – 2025 Facility 3 - 2027
Budget required	R800,000 for a small chipper R3 million for a small drop-off facility
Responsibility	GLM
Implementation guide	1. Identify sites for the development of green waste drop-off and chipping facilities 2. The following should be considered during site selection: • Land ownership • Zoning • Available space • Topography • Proximity to houses (noise impacts from chipping) • Available services e.g. electricity 3. Prioritise the sites in terms of development 4. Appoint an engineer to design the sites and appoint and manage a contractor to construct the sites 5. Register the site in terms of the National Norms and Standards for the Storage of Waste GN 926 of 2013 and National Norms and Standards for Sorting, Shredding, Grinding, Crushing, Screening or Baling of General Waste (GN 1093 of 2017)

Key performance indicator	• Number of organic waste drop-off facilities developed

Action 3.2.8 Large producers of organic waste to prepare organic waste diversion plans

Objective	Increase the Diversion of Organic Waste from Landfill
Target	• 50% diversion of organic waste by 2022 • 100% diversion of organic waste by 2027
Action	3.2.8 Large producers of organic waste to prepare organic waste diversion plans
Priority	Medium
Dependencies	None
Timeframe	2023
Budget required	Nil, if manged in-house
Responsibility	GLM with support for GRDM
Implementation guide	6. Review companies registered with GRWMIS 7. Develop a list of large producers of organic waste in the municipality including sawmills, farmers, supermarkets, restaurants 8. Develop a template for the organic waste diversion plans in conjunction with GRDM 9. Amend by-law to require large waste generators to prepare organic waste diversion plans 10. Notify business and industry of the requirement to prepare plans – emails, posts of social media, direct engagement 11. Set a deadline for business/ industry to submit plans 12. Review plans internally 13. Request annual reports from business/ industry on the implementation of plan 14. Spot checks on compliance with plans
Key performance indicator	• Number of organic waste diversion plans prepared • Level of compliance with diversion plans

12.4.1 Annual Diversion Targets for Organic Waste

Annual diversion targets for organic waste have been set to assist the GLM to move towards compliance with the Western Cape diversion targets.

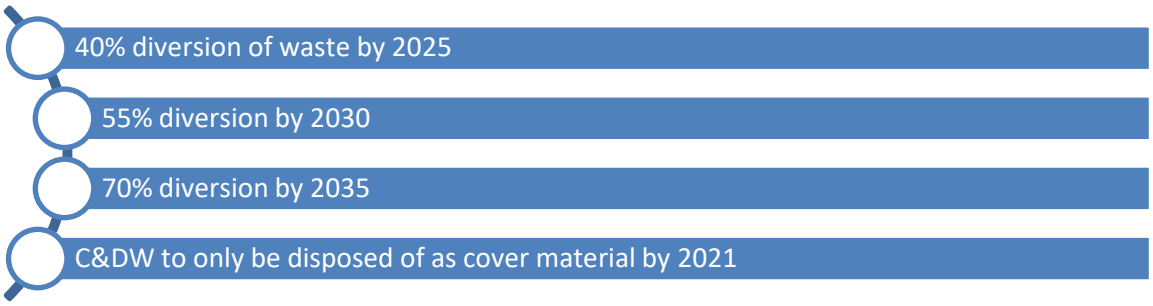
Table 46: Annual green waste diversion targets

Year	Green waste		Food waste	
	Diversion target	Mechanism to divert waste	Diversion target	Mechanism to divert waste
2021	15%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility **New mechanisms** Chipping of waste at George compost facility	5%	**Continued mechanisms** Pilot home composting programme at 46 households **New mechanisms** Home composting bins provided to an additional 100 households
2022	30%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility **New mechanisms** • Operation of the George compost facility • Revise waste management by-laws – contractors/ garden services to chip green waste and households to use green bags for collection of household garden waste	6.5%	**Continued mechanisms** Home composting programme at 146 households **New mechanisms** • Home composting bins provided to an additional 100 households • Revise waste management by-laws to include events waste minimisation plans – to address food waste • Events to be conducted according to events waste minimisation plans
2023	50%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility • Operation of the George compost facility **New mechanisms** • Large producers of organic waste to develop and implement organic waste diversion plans	8.5%	**Continued mechanisms** • Home composting programme at 246 households • Events to be conducted according to events waste minimisation plans **New mechanisms** • Home composting bins provided to an additional 100 households • Large producers of organic (food) waste to develop and implement organic waste diversion plans • Roll out worm farms and composting at schools (10% of schools)
2024	70%	**Continued mechanisms** • Green bag system (garden waste) diversion	10%	**Continued mechanisms** • Home composting programme at 346 households

		• Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility • Operation of the George compost facility • Large producers of organic waste to develop and implement organic waste diversion plans **New mechanisms** • None proposed at present		• Large producers of organic (food) waste to develop and implement organic waste diversion plans • Events to be conducted according to events waste minimisation plans • Worm farms and composting at schools (10% of schools) **New mechanisms** • Home composting bins provided to an additional 100 households • Roll out worm farms and composting at schools (further 5% of schools)
2025	80%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility • Operation of the George compost facility • Large producers of organic waste to develop and implement organic waste diversion plans **New mechanisms** • None proposed at present	11%	**Continued mechanisms** • Home composting programme at 436 households • Large producers of organic (food) waste to develop and implement organic waste diversion plans • Events to be conducted according to events waste minimisation plans • Worm farms and composting at schools (15% of schools) **New mechanisms** • Home composting bins provided to an additional 100 households • Roll out worm farms and composting at schools (further 10% of schools)
2026	85%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility • Operation of the George compost facility • Large producers of organic waste to develop and implement organic waste diversion plans **New mechanisms** • None proposed at present	12%	**Continued mechanisms** • Home composting programme at 546 households • Large producers of organic (food) waste to develop and implement organic waste diversion plans • Events to be conducted according to events waste minimisation plans • Worms farms and composting at schools (25%) of schools **New mechanisms** • Home composting bins provided to an additional 100 households • Roll out worm farms and composting at additional schools (further 25% of schools) • Pilot use of a 4-bag system in one suburb for the collection of food waste from households
2027	85%	**Continued mechanisms** • Green bag system (garden waste) diversion • Green waste drop-off facility at the George compost facility • Chipping of waste at George compost facility • Operation of the George compost facility	12.5%	**Continued mechanisms** • Home composting programme at 646 households • Large producers of organic (food) waste to develop and implement organic waste diversion plans • Events to be conducted according to events waste minimisation plans • Worms farms and composting at schools (50%) of schools

		• Large producers of organic waste to develop and implement organic waste diversion plans **New mechanisms** • None proposed at present		• The use of a 4-bag system in one suburb for the collection of food waste from households **New mechanisms** • Home composting bins provided to an additional 100 households • Roll out worm farms and composting at additional schools (remaining 50% of schools) • Pilot use of a 4-bag system in a new suburb for the collection of food waste from households
	Education and awareness	To undertake regularly – • Details of the location of green waste drop-off facilities • Importance and the success of the composting facility • Home composting programme – to encourage the use of compost bins or compost heaps • How to guide for home composting – podcasts, user guides, hints and tips etc.	Education and awareness	• Home composting workshops/ training • How to guide for home composting – podcasts, user guides, hints and tips etc. • Tips on how to manage food at home to avoid wastage, e.g. only buy what is needed (meal planning), correct storage of food, tips for using leftovers etc.

12.5 Objective 3.3 Increase the Diversion of Construction and Demolition Waste from Landfill



Action 3.3.1 All municipal or large-scale construction projects to have an approved waste minimisation plan in place prior to commencement

Objective	Increase the Diversion of Waste from Landfill
Target	• 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035 • C&DW to only be disposed of or used as cover material by 2021
Action	3.3.1 All municipal or large-scale construction projects to have an approved waste minimisation plan in place prior to commencement
Priority	Medium
Dependencies	3.1.6 Revise waste management by-law 3.1.7 Develop a sustainable public procurement procedure for the municipality
Timeframe	2024
Budget required	Nil
Responsibility	GLM, GRDM

Implementation guide	1. Develop a template for the construction waste minimisation plans in consultation with the GRDM. Template to include the following information
	  • Project type
	  • Project location
	  • Project duration
	  • Expected types and volumes of waste which would be generated by the project
	  • Waste service provider/planned method of management of waste
	  • Details of how waste will be stored on site – e.g. kept free on contamination
	  • Management method for C&DW, disposal, reuse, recycling (note, the plan need to consider that Uniondale and George landfills will both be closing)
	  • Details of how waste will be minimised, recycled or reused
	  • Details of the person responsible for waste management
	  • A declaration for the engineer and contractor to sign which binds them to the construction project waste minimisation plan
	2. Designate an existing employee to review the construction waste minimisation plans
	3. Train the designated employee on what the construction waste minimisation plan should cover
	4. Undertake spot checks of construction projects to ensure the waste minimisation plans are being implemented

Key performance indicator	• All municipal and large construction projects to have a construction waste minimisation plan • Volume of construction and demolition waste disposed at landfill sites is reduced

Action 3.3.2 Engage with Engineering Department and identify projects for the use of crushed C&DW
Action 3.3.3 Engage with GRDM to determine if C&DW can be used as cover material at regional landfill site

Objective	Increase the Diversion of Waste from Landfill
Target	• 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035 • C&DW to only be disposed of or used as cover material by 2021
Action	Action 3.3.2 Engage with Engineering Department and identify projects for the use of crushed C&DW Action 3.3.3 Engage with GRDM to determine if C&DW can be used as cover material at regional landfill site
Priority	Medium
Dependencies	None
Timeframe	2022-2023
Budget required	Nil
Responsibility	GLM
Implementation guide	1. Engage with municipal Engineering Department and identify projects for the use of crushed uncontaminated C&DW 2. Once projects are identified determine how this will be implemented. The municipality will need to consider: a. Engineering standards and quality control of the crushed C&DW i. which types of C&DW will be accepted at crushing facility for reuse b. Different classes of crushed C&DW and their respective uses c. Appointing a service provider to crush the C&DW or purchasing a crusher and crushing the C&DW d. Identifying municipal projects where the crushed C&DW must be used. 3. Engage with GRDM to determine if C&DW can be used as cover material at regional landfill site
Key performance indicator	• C&DW is diverted from landfill and reused.

12.6 Objective 3.4 Increase the Diversion of HHW from Landfill

Action 3.4.1 Establish drop off facilities for HHW at the George transfer station and accessible municipal offices

Objective	Increase the Diversion of Waste from Landfill
Target	• 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	3.4.1 Establish drop off facilities for HHW at the George transfer station and accessible municipal offices
Priority	High
Dependencies	None. Ensure compliance with licence requirements for the George transfer station
Timeframe	2022 onwards
Budget required	TBC
Responsibility	GLM
Implementation guide	1. Determine where the HHW drop off facilities should be placed and what types of HHW will be allowed at each drop-off facility. The types of HHW allowed to be dropped off will be dependent on the number of containers available at the drop off facilities 2. Determine the feasibility of placing containers for HHW at the George transfer station based on possible vandalism of containers that could occur 3. Ensure the drop-off facility for HHW complies with the WML conditions for the storage and handling of hazardous waste at the transfer station 4. Procure a suitable container for the temporary storage of HHW 5. Appoint a service provider to manage the recycling or safe disposal of HHW. Monthly tonnage or

	volume reports to be provided. 6. Train staff at the drop-off facility on what types of HHW are accepted, how to store HHW and how to report HHW dropped off. 7. Inform the public of HHW drop-off facilities through municipal website, social media posts and email correspondence.
Key performance indicator	• Number of drop-off facilities for HHW • Tonnage of HHW collected per month

Action 3.4.2 Host open days for HHW

Objective	Increase the Diversion of Waste from Landfill
Target	• 40% diversion of waste from landfill by 2025 • 55% diversion of waste from landfill by 2030 • 70% diversion of waste from landfill by 2035
Action	3.4.3. Host open days for HHW
Priority	Low
Dependencies	None
Timeframe	2023 onwards
Budget required	TBC
Responsibility	GLM
Implementation guide	1. Set dates for HHW open days 2. Communicate details of open days 2 weeks in advance to the communities 3. Ensure staff are on hand at the drop-off facilities to manage volumes of HHW
Key performance indicator	• Number of open days held • Tonnage of HHW collected during open days

13 Monitoring and Review

The WMP planning cycle includes a monitoring and review phase.

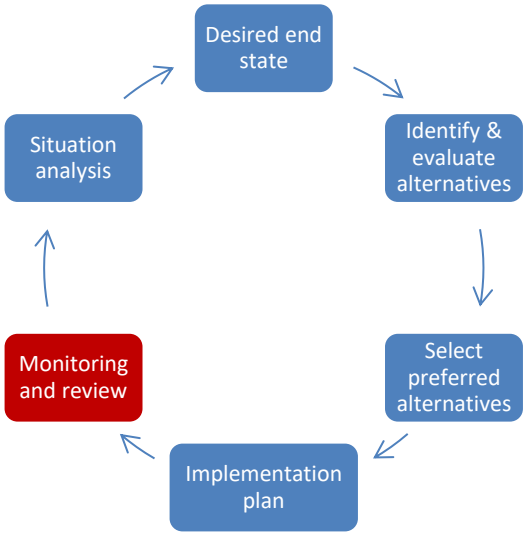


Figure 19: WMP planning phases as per the Guideline for the Development of Integrated Waste Management Plans (DEA)

The WMP should be treated as a live document and updated as and when required. Updates which may be needed include but are not limited to:

- Significant change to the status quo –e.g. construction of new waste minimisation infrastructure
- Changes to legislation
- New guideline documents
- Changes to municipal budgets
- Update to align the plan with the new version of the WCIWMP. The current WCIWMP covers the period 2017 – 2022 and will shortly be revised.

A bi-annual progress review of the WMP should be undertaken to determine the implementation of the plan. Where projects have not been implemented within the given timeframes reasons must be provided. Successes and lessons learnt from the implementation of action plans must also be recorded in the bi-annual review. Sharing of this information across the GRDM should be encouraged to assist other local municipalities to successfully implement similar projects.

The bi-annual progress report should also provide estimates for the diversion rates of different waste streams. The progress report should be submitted to GRDM.

14 References

Department of Environmental Affairs (2019) National Waste Management Strategy 2019 Revised and Updated National Waste Management Strategy

Department of Environmental Affairs (2017) National norms and Standards for Sorting, Shredding, Grinding, Crushing, Screening and Bailing of General Waste (GN 1093 of 2017)

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Department of Environmental Affairs (2011b) National Domestic Waste Collection Standards (GN 21 of 2011)

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Department of Environmental Affairs and Development Planning (2016) Assessment of the Municipal Integrated Waste Management Infrastructure: Eden District

Garden Route District Municipality (2020) Garden Route District Municipality Integrated Waste Management Plan 2020 – 2025

George Local Municipality (undated) Third Review of the Fourth Generation Integrated Development Plan (IDP) 2020/ 2021

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George Local Municipality (2019) Waste Infrastructure Masterplan

Stellenbosch Local Municipality (2017). Utter Rubbish, Newspaper of the Solid Waste Management Department, June 2017

WRAP (undateda) Bulky Waste Guidance: Case Study 3 – Norfolk. Reuse Shops on Site Run by a Contractor: Norfolk

Web reference 1. Notpla technology (accessed on 30/06/2020) https://www.notpla.com/technology/

Web reference 2. Visit George Events Calendar (accessed on 30/07/2020)
https://www.visitmosselbay.co.za/events/

Web reference 5. Department of Environmental Affairs – Incineration (accessed on 20/04/2020)
http://awtguide.environment.gov.za/content/technologies-overview-incineration

Web reference 6. Department of Environmental Affairs – Anaerobic digestion (accessed on 20/04/2020)
http://awtguide.environment.gov.za/content/technologies-overview-anaerobic-digestion

Web reference 7. Department of Environmental Affairs – Gasification (accessed on 20/04/2020)
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Document Control and Disclaimer

FORM IP180_B

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