MSUNDUZI LOCAL MUNICIPALITY

INTEGRATED WASTE MANAGEMENT PLAN

2014-2018

MSUNDUZI MUNICIPALITY VISION, MISSION AND STRATEGIC OUTCOMES

VISION

The vision of the City of Choice is to develop a city where the entire citizenry can own a financially viable and well-governed city, live peacefully, work and move about freely in a cost effective manner and lead a healthy lifestyle. To this end it is viewed as a well-serviced, accessible, connected, clean, green, friendly, safe and economically prosperous city.

STRATEGIC OUTCOMES

In terms of a specific Community Services and Waste Management strategy, by 2030, Msunduzi is a city protecting our natural environment, our native plant and animal habitats, limiting population, greening the city and using our natural resources-such as water-wisely. A clean, green city harnesses our renewable energy supply, public urban space creation, urban renewal and greening programmes.

Communities benefit from linked public open spaces, providing for a range of sporting, cultural and recreational uses. Waste Management will play an important part in ensuring that the environment is clean, therefore healthy and therefore giving rise to environmental improvements.

The Waste Management plan enhances and is integrated with the six strategic goals (as discussed in the Integrated Development Plan 2013/2014), namely: Quality infrastructure, human settlement and social services, environmental services, caring, welcome and diverse communities, flourishing business environment and a financially sound and well-governed institution.

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LIST OF ABBREVIATIONS

CBD……CENTRAL BUSINESS DISTRICT

DEA……DEPARTMENT OF ENVIRONMENTAL AFFAIRS

DMM……DEPUTY MUNICIPAL MANAGER

EPWP……EXPANDED PUBLIC WORKS PROGRAMME

IT……INFORMATION TECHNOLOGY

IWMP……INTEGRATED WASTE MANAGEMENT PLAN

KPCA……KEEP PIETERMARITZBURG CLEAN ASSOCIATION

LM……LANDFILL MANAGER

MRF……MATERIALS RECOVERY FACILITY

NELS……NEW ENGLAND LANDFILL SITE

NEMWA……NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT 59 OF 2008

OWCF……ORGANIC WASTE COMPOSTING FACILITY

PHB……PROVINCIAL HOUSING BOARD

PM……PROCESS MANAGER

UMDM……UMGUNGUNDLOVU DISTRICT MUNICIPALITY

WIS……WASTE INFORMATION SYSTEM

WMBU……WASTE MANAGEMENT BUSINESS UNIT

WMO……WASTE MANAGEMENT OFFICER

1. DEFINING THE GEOGRAPHICAL AREA

The Msunduzi Municipality is a local municipality and is located along the N3 at a junction of two corridors from Durban to Estcourt and Greytown to Richmond. The corridors and the areas are characterized by a combination of agriculture, timber, industry, education, recreation and so forth. In terms of the geographical area covered by the municipality, it is not one of the largest as compared to other local municipalities, accounting for approximately 649 km^2 of the uMgungundlovu District's 8,943 km^2. However, in terms of the 2011 census the population is estimated at 618 536 or 62% of the district's population of 1017583.

The capital of KwaZulu-Natal, Pietermaritzburg, is situated in Msunduzi and is considered to be the governmental and political hub of the KwaZulu-Natal province and the economic hub of the District and the KwaZulu-Natal midlands. Msunduzi Municipality has a varied cross section of quality and world renowned institutions such as schools, one of the major university campuses, host of the annual Duzi Canoe Marathon, the Comrades Marathon, a Premier Soccer League team, and major industries such as Hulletts Aluminium. It also has its own national airport, is the gateway to the Drakensberg Mountains and the continental African industrial hub Gauteng, and is within an hour's drive to the port city of Durban.

In the middle nineties and early 2000's the municipality more than doubled in size and population by the addition of new areas such as previously Provincial Housing Board (PHB) areas, greater Edendale, Vulindlela and Ashburton. The municipality is currently divided into 37 wards. The income, however, did not grow proportionally to its increase in size, leaving the municipality to finance the needs of a larger populace and area with less funds. This change in nature of the municipality in terms of its increased geographical size and population has placed increased demand on scarce resources in all facets of municipal service provision, the most important of which is the management of waste; as it involves various aspects such as economics, the environment, labour relations, customers, transport, engineering, land and so forth.

Map of the Msunduzi Area

2. SITUATION ANALYSIS

With reference to the map above:

The Msunduzi Municipality is characterised by distinct features in that there is a main central business district (CBD) situated adjoining the N3 freeway and a smaller business district (Raisethorpe) situated north of the main central business district, about four kilometres away.

There are three industrial areas situated south (Mkondeni), south west (Mason's Mill) and north east (Willowton) of the main central business district.

The income demographics show mainly higher income lower density populations adjoining, north and North West of the CBD, adjoining and south to south east of the CBD.

The middle income medium density population is fairly well spread across the areas adjoining west, north, east and south arc around the CBD.

The low income higher density population is spread further away from the CBDs and concentrated in areas further south west, west; further north west, further north and the further north east.

Informal settlements are mainly south east to west of the CBD and far north of the CBD. There are a few spread around the rest of the municipality.

Rural areas are mainly to the west of the CBD in a large area called Vulindlela.

The landfill site is situated about a kilometre east from the CBD. It is approximated that the landfill air space will expire within 5 to 10 years so a search for a new landfill site is currently under way, under the auspices of the UMgungundlovu District Municipality.

The municipality's refuse collection policy as approved by the municipality in the 2000's is that there will be a door to door collection to every household in the municipality. These services are planned for and provided by the municipality's Waste Management business unit (WMBU). The WMBU estimate is that there are approximately 137490 households (annual report 2013/2014), with **84600** receiving a once per week door to door service, **18400** receiving a less frequent service and **34490** receiving no service. This means that **52840** do not receive a weekly once per week door to door service. In the 2014/2015 financial year it has been approved that approximately **35000** of the approximately **52840** will begin receiving a once per week door to door service. This service has been approved for implementation via co-operatives. No households are serviced by private service providers.

There are approximately **5793** (consolidated billing April 2014) commercial and industrial customers made up of industry, commerce, schools and home businesses. Some of the businesses are serviced by private service providers, but are also regarded

as the municipality's customers because they are still charged the standard refuse collection tariff.

Table 1: DOMESTIC CUSTOMERS		
	Households	
Door to door once per week	84600	
		total
Less than once per week	18400	
no services	34490	
		52980
Approved services via co-operatives		-35000
balance		17980
Total households	137490	
Industry and commerce and schools home business	5793	
Grand total customers	143283	

Refuse collection tariffs are set by the municipality and charged to the customer's account once per month. Some customers within the municipality, such as those in previously Provincial Housing Board (PHB) housing do not receive refuse collection bills. This matter will need to be rectified once the co-operative service is implemented. The nominal rated tariff for these houses is R15.87 per month as was recently approved by the municipality.

The two CBDs are swept and the refuse bagged, transported and landfilled nightly, 364 nights per annum by the WMBU. The exception is Christmas Day. The main CBD also receives a daily cleaning service seven days per week. The main CBD is serviced mainly by the use of 240 litre bins collected by a specialised mechanical lifter compactor. In spite of the services provided the CBDs are still victims to indiscriminate littering and dumping by pedestrians, motorists, formal and informal businesses. There are various municipal business units accountable for various functions and services within the CBD which might explain the perceived non accountability and non-response to addressing litter and dumping issues: for example when pavements are dug up and left as is and the left over hole becomes a dumpsite the customer expects the WMBU to address the issue.

Suburbs receive a street cleaning service on an as and when necessary basis. This is underwhelming as demand outstrips supply due to staff and equipment shortages. Lately there has been some relief as the municipality has managed to secure temporary staff in the form of Expanded Public Works Programme (EPWP) staff. Lately most of the municipality's grass cutting and street cleaning functions have been combined under the Parks department informally to address the suburban issues.

Illegal dumping is a major problem within the municipality as can be seen in almost every ward. Dumping is indiscriminate, ranging from simple litter to truckloads in some cases. Complainants are loathe to name and shame the culprits, or if they want to have no incriminating evidence, which means, either way, that the culprits do not get punished. Regardless, the WMBU still has to clean up. Lack of security and prosecution is a negative factor encouraging culprits to dump.

The WMBU provides garden refuses services via eight garden refuse collection sites spread around the municipality in outer lying suburbs. Customers are allowed up to a bakkie load of garden refuse per day, free of charge. No one is allowed more. Some sites are plagued by poor operation, all by abuse by customers, all by lack of supervision, after-hours vandalism, and lack of proper site care and maintenance. The problems are extremely exacerbated in the summer months, spurred by heat, rain and excessive growth in gardens.

The WMBU is also responsible for the planning, provision and management of the main CBDs' 14 public toilets. The toilets are open daily 364 days per annum. The WMBU staffs, provides paper and cleaning materials to enable the public to have convenient and safe place to use. There is no charge to the public for use of the toilets.

Over the last few years legislation such as the National Environment Management: Waste Act 2008 (NEMWA) and the National Waste Management Strategy have placed tremendous pressure on the municipality's Waste Management business unit in terms of provision of services, management of the environment, production and implementation of a waste information system (WIS), recycling initiatives and so forth. The Waste Management business unit is ill equipped to handle such crucial issues, is currently not compliant and an overhaul of current structure, staff, systems, and processes is called for, urgently.

The provision of services has been restricted due to lack of equipment and staff. Over the last 15 years the staff complement has shrunk from over 500 to less than 370 mostly general workers such as refuse collectors and street cleaners, crucially supervisors and including landfill site staff. The type and number of specialised equipment such as compactors, clam grab trucks, flat bed loaders and so forth have also been reduced by not being replaced, to the extent that services are negatively compromised.

The number and calibre of key staff have has also been reduced such that key components of waste management such as waste information, productivity, reporting, forward planning, and so forth have been neglected.

It is with the above scenario in mind that the Waste Management business unit analyses the problems and seeks to present a solution and plans.

TABLE 2: POPULATION DEMOGRAPHICS. Calculated using census 2011 figures and extrapolated to reflect 2014 population using a growth rate of 1.1% per annum. The table shows low, middle, high and rural density populations

	Low density	Middle density	High density	rural	total	Total growth 2014	Total growth 2015	Total growth 2016	Total growth 2017	Total growth 2018
Base	12538	69922	399763	157330	639553	639553	646588	653701	660891	668161
Growth 1.1%	140	783	4477	1762	7162	7035	7112	7191	7270	7349
Future estimate	12678	70705	404240	159092		646588	653701	660891	668161	675511
youth	379	21116	120728	47517		189740				
Middle age	3109	17341	173541	39018		233009				
Old age	1003	5594	55981	12586		75164				
male	5168	33283	190287	74884		303622				
female	5968	33283	190287	74889		304427				
Primary educated	677	3776	21587	8496		34536				
Secondary educated	2332	13005	74356	29263		118956				
Tertiary educated	401	2238	12792	5035		20466				
employed	3010	16787	95977	39018		154792				
unemployed	1972	11000	62891	25645		101508				

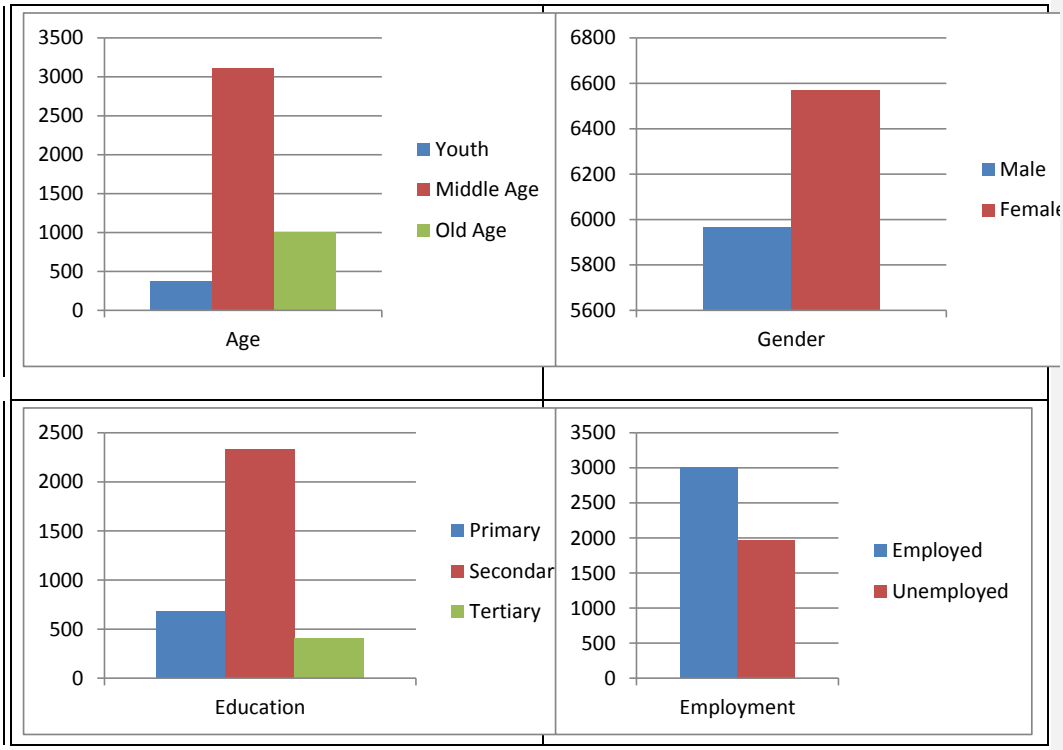
The table above is a summary of the high, medium, low income and rural population and is based on a 1.1% across the board annual incremental increase in the population which translates into a total of between 7035 and 7349 extra people to service in 2018. This further translates into 1470 households calculated on a ratio of five people per household. This means that by 2018 the municipality should need to have an extra compactor purchased, over and above its current fleet, which consists of 19 available compactors. There is more discussion on this aspect in the 5 scenarios later in this plan. In the intermittent 4 years the municipality can either purchase the extra compactor or hire one or outsource the service.

The rest of the information has been largely ignored as the population increase is so small as to only warrant one increase in the compactor complement.

The following graphs are illustrations of the various demographics as figured in table two above with comments and assumptions. They lead further to 5 scenarios to be discussed later in this IWMP.

Figure 1.

Population distribution graphs high income low density demographics.



The **age** graph shows that the middle age people outnumber the youth by almost five times and the old age by just more than three times

The **education** graph shows that there are almost four times more people with secondary education than primary education and almost five times more people with secondary education than tertiary education.

Generally, the graph shows people are educated to a minimum of primary education level.

The **employment** graph shows more people employed than unemployed, but the 60% to 40% split shows that unemployment is high.

The **gender** graph shows that male outnumber female slightly.

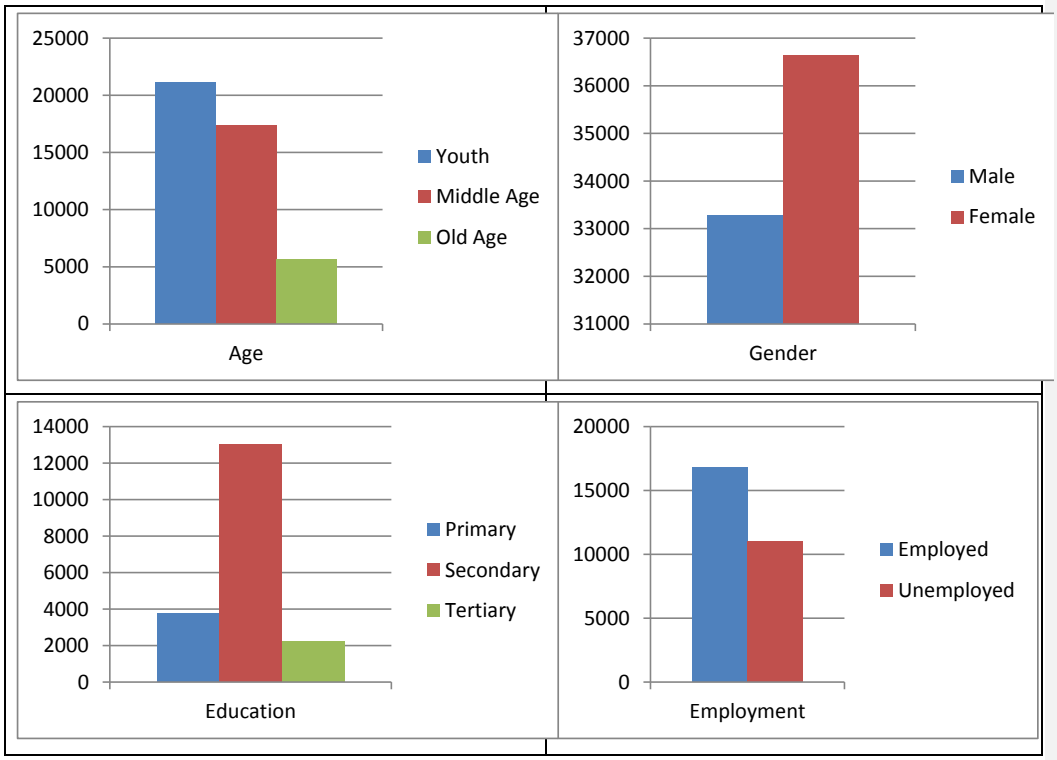
These 12500 people constitute 2% of the total of 618536.

Assumptions

- There is a fairly good level of education amongst the populace so there should be an understanding and acceptance of education and awareness campaigning with regards to waste management. If so the populace would be amenable to change.
- Due to a high level of unemployment, there should be a greater acceptance of the waste hierarchy in order to reduce costs and improve savings. The waste hierarchy is also a route to earning an income.
- The gender graph is significant in that females are generally the house keepers, and together with the children and the elderly can be used to implement the separate at source ventures.
- High levels of recyclables will result from this group and the ability to pay for services is high.
- The production of refuse will continue due to affordability levels and better quality refuse.

FIGURE 2.

Middle income, middle density.



The **age** graph shows that the youth are marginally more than the middle age and four times more than the old age.

The **education** graph shows that secondary education outnumbers primary education by more than three times and tertiary education by almost six times.

The **employment** graph shows that there are approximately 60% of people employed.

The **gender** graph shows that the female outnumber the men marginally.

This income group constitutes 69922 of 618536 or 11.2% of the total population.

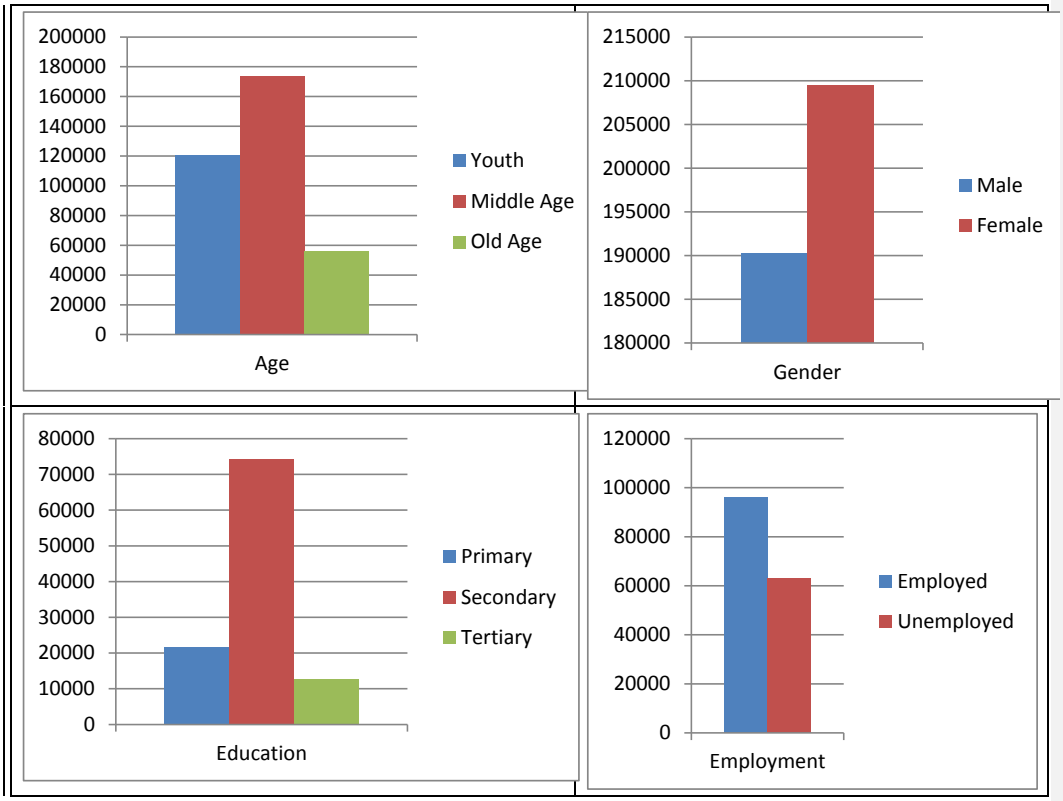
Assumptions:

- the majority have a secondary level of education and are 60% employed
- Waste management initiatives would be easily communicated to this group via the correct education and aware programmes.
- The ability to afford services is relatively high due to a higher employment ratio.
- A relatively high level of recyclables will result from this group due to their affordability.

- Due to a high level of unemployment 40%, there should be a greater acceptance of the waste hierarchy in order to reduce costs and improve savings. The waste hierarchy is also a route to earning an income.
- The production of refuse will continue due to affordability levels and better quality refuse.

Figure 3.

Low income high density



The **age** group graph shows that there are approximately 50 000 more middle aged people than youth and the middle age outnumber the old age by for times.

The **education** graph shows that secondary education outnumbers the primary education by almost four times and tertiary education by almost six times.

The **employment** graph shows that unemployment is high at 40%.

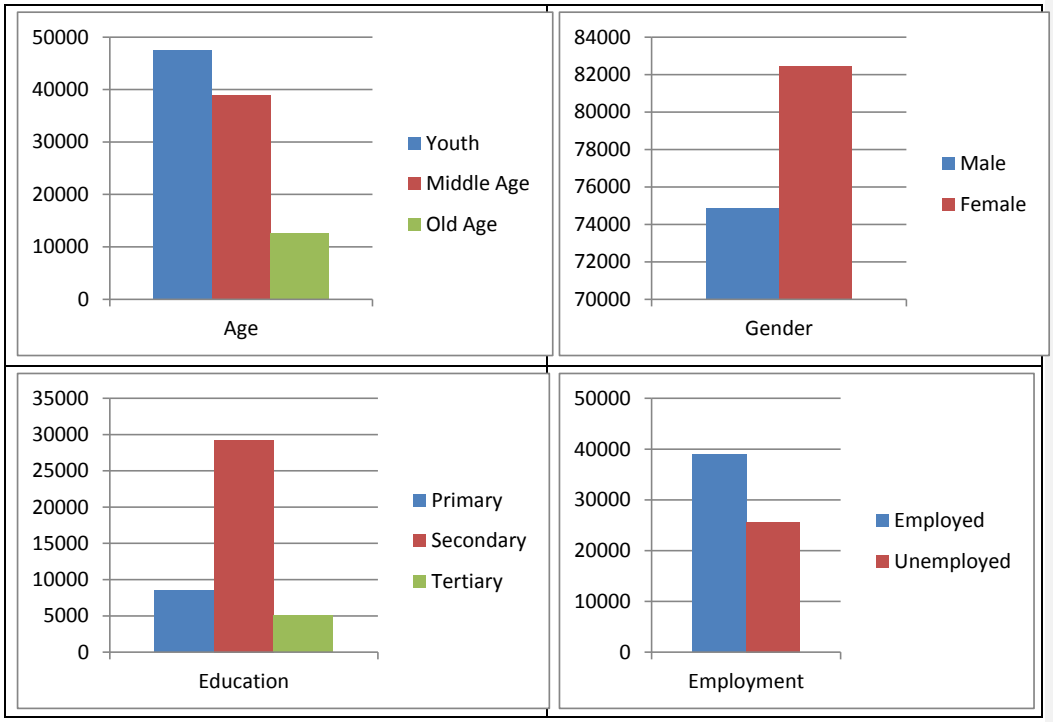
The **gender** graph shows that females outnumber men by 20000.

Assumptions:

- the majority have a secondary level of education and are 60% employed
- Because of the education levels waste management initiatives would be easily communicated to this group via the correct education and aware programmes.
- The ability to afford services is relatively high due to a higher employment ratio.
- A relatively high level of recyclables will result from this group due to their affordability.
- Due to a high level of unemployment 40%, there should be a greater acceptance of the waste hierarchy in order to reduce costs and improve savings. The waste hierarchy is also a route to earning an income.
- The production of refuse will continue due to affordability levels and better quality refuse

Figure 4

Population distribution graphs:



The **age** graph shows that a little more than there is just under 50% youth in the rural areas. There is also strong middle aged numbers. The minority are old age.

The **education** graph shows that most people are of secondary education status.

The **employment** graph shows that there are more people employed than unemployed.

The **gender** graph shows that female outnumber men by about 10000.

Assumptions:

- the majority have a secondary level of education and are 60% employed
- Because of the education levels waste management initiatives would be easily communicated to this group via the correct education and aware programmes.
- The ability to afford services is relatively high due to a higher employment ratio.
- A relatively high level of recyclables will result from this group due to their affordability.
- Due to a high level of unemployment 40%, there should be a greater acceptance of the waste hierarchy in order to reduce costs and improve savings. The waste hierarchy is also a route to earning an income.

2.1. DETERMINING CURRENT WASTE GENERATION AND ESTIMATING FUTURE WASTE GENERATION RATES AND QUANTITIES

The five tables or scenarios following are based on information from table 2 above.

The estimated waste generated per person per day is derived from information supplied by the Depart of Environmental Affairs in Pretoria. For ease of modelling the figure of 0.41 for low income is also used for rural in this municipality.

The base population was taken from the 2011 census and extrapolated at 1.1% per annum, onwards.

The compactor calculation is based on observations of the municipality's Waste Management vehicles collecting an average of 14 tons per 19m^3 compactor trips to landfill site, via the weighbridge, and assuming that the compactor mechanism is working at maximum efficiency.

It is assumed in the tables that waste generated is waste collected.

Reference is also made to table 20 and figure 10 following.

TABLE 3: SCENARIO ONE
ALL REFUSE COLLECTED BY THE MUNICIPALITY

	High income low density		Middle income middle density		Low income high density		rural		Total waste generated in tons	Calculate Number of 19m3 compactors
Base population 2013/2014		12538		69922		399763		157330		
1.1% growth rate		138		769		4397		1731		One compactor = 14 tons
Future population estimate		12676		70691		404160		159061		
Waste KG generated/person/day		1.29		0.74		0.41		0.41		
		population	**KG**	**population**	**KG**	**population**	**KG**	**population**	**tons**	**compactors**
Waste generated	2015	12815	16532	71469	52887	408606	167529	160810	398	28
	2016	12956	16714	72255	53469	413101	169371	162579	402	28
	2017	13099	16898	73050	54067	417645	171234	164368	407	29
	2018	13243	17083	73853	54651	422239	173118	166176	411	29
	2019	13389	17271	74666	55253	426884	175022	168004	416	30
	2020	13536	17461	75487	55860	431579	176948	169852	420	30
	2021	13685	17653	76317	56475	436327	178894	172720	425	30
	2022	13835	17848	77157	57096	441126	180862	173609	429	31
	2023	13897	18044	78006	57724	445979	182851	175519	434	31
	2024	14141	18242	78864	58359	450885	184863	177449	439	31

At the envisaged growth rate of 1.1%, and if the municipality has to collect all the refuse, once per week, the number of compactors required will be 29 with effect from July 2014.

However, the reality is that there are other methods of collecting refuse and the fact that in recent years recycling is increasing steadily, so the impact of these factors are considered in scenarios two three and four.

TABLE 4: SCENARIO TWO
LESS 35000 HOUSES COLLECTED BY CO-OPERATIVES

		Less 35000 houses collected by co-operatives			Calculate number of 19m3 compactors
		35000 x 5 per house = 175000			
KG /person /per day			0.41 KG	Reduced total tons when co-operatives are used	One compactor = 14 tons
		Population	KG	tons	compactors
Waste generation	2015	175789	72074	398-72.074 = 325.7	23
	2016	176582	72399	402-72.399 = 329.6	23
	2017	177378	72725	407- 73.725 = 333.3	24
	2018	178178	73053	411- 73.053 = 338	24
	2019	178982	73383	416- 73.383 = 342.6	24
	2020	179789	73714	420- 73.714 = 346.3	25
	2021	180600	74046	425- 74.046 = 351	25
	2022	181415	74380	429-74.380 = 354.62	25
	2023	182233	74715	434-74.715 = 359.29	26
	2034	183880	75052	439-75.052 = 363.95	26

Scenario two considers the implementation of refuse collection via the use of independent co-operatives. The alternative service delivery model has worked in the

municipality before in the form of SMME's. Co-operatives are a slightly different model being tried in the municipality for the first time.

The reduced tons total is derived by using total waste collected from scenario one and reducing this figure by the total waste collected from the low density population These 35000 households will reduce the amount of refuse by an amount large enough to reduce the use of compactors by 3 (or 10.34%), from 29 to 26 for service to the rest of the municipality.

This is a significant reduction in compactor and associated costs, such as drivers, refuse collectors, fuel and maintenance costs, capital costs, and so forth.

This is also going some way to satisfying the need for generation of employment and the reduction of unemployment. At the time of writing the co-ops (14 of them) were awaiting letters of appointment.

These 35000 households currently do not receive a proper once per week, door to door service. With the appointment of the co-operatives this will be rectified.

It must not be forgotten that the costs of alternative service delivery off sets the savings in collection costs.

TABLE 5: SCENARIO THREE LESS RURAL AREAS COLLECTED BY ALTERNATIVE METHODS STILL TO BE DETERMINED					
Base population		157330			Calculate number of 19m3 compactors
Growth 1.1%		1731		Reduced total tons when alternative methods used	
Total		159061			One compactor = 14 tons
KG/person/day		0.41			
		Population	KG		
Waste generation	2015	160810	65392	398-65.4 = 333.3	24
	2016	162579	66657	402-66.6 = 336.1	24
	2017	164368	67391	407-67.4 = 339.6	24
	2018	166176	68132	411-68.2 = 342.8	24
	2019	168004	68881	416-68.8 = 347.2	25
	2020	169852	69639	420-63.9 = 356.1	25
	2021	171720	70405	425-70.4 = 354.6	25
	2022	173609	71180	429-71.2 = 357.8	26

	2023	175519	71963	434-72.0 = 362.0	26
	2024	177449	72754	439-72.8 = 366.9	26

Just as in the case of the implementation of co-operatives, the reduced tons total is derived by using total waste collected from scenario one and reducing this figure by the total waste collected from the rural population. Using alternative collection will reduce the amount of refuse by an amount large enough to reduce the use of compactors by 3 (or 10.34%), from 29 to 26 for service to the rest of the municipality.

This is a significant reduction in compactor and associated costs, such as drivers, refuse collectors, fuel and maintenance costs, capital costs, and so forth.

This is also going some way to satisfying the need for generation of employment and the reduction of unemployment. This sector is currently not serviced at all and a new process of implementation will need to be embarked upon.

It must not be forgotten that the costs of alternative service delivery off sets the savings in collection costs.

TABLE 6: SCENARIO FOUR
RECYCLING AT 20% AND 40%

				Calculate number of 19m3 compactors		Calculate number of 19m3 compactors
		Total waste	Less 20% = recycled	One compactor = 14 tons	Less 40% = recycled	One compactor = 14 tons
Waste generated	2015	398	319	23	239	17
	2016	402	322	23	241	17
	2017	407	326	23	244	17
	2018	411	329	24	246	18
	2019	416	333	24	250	18
	2020	420	336	24	252	18
	2021	425	340	24	255	18
	2022	429	343	25	257	18
	2023	434	347	25	260	19
	2024	439	351	25	264	19

It can be seen from Table 6 above, that recycling can reduce the number of compactors and hence the costs of collection. Recycling also has the major advantage of reducing the amount of refuse to be landfilled thereby also saving on landfill costs.

Furthermore, the increased rate of recycling at 40% further reduces the need for compactors and its associated costs. Therefore the implementation of recycling in all its various forms should be pursued as it results in cost savings to the municipality.

TABLE 7: SCENARIO FIVE
LESS ALTERNATIVE METHODS, LESS RECYCLING

		Total tons	Less co-ops	Less rural alternatives	Less recycling 20%	New total to collect	Compactors needed
Refuse generated	2015	398	72	66	52	208	15
	2016	402	72	67	53	210	15
	2017	407	73	67	53	213	15
	2018	411	73	68	54	216	15
	2019	416	73	69	55	219	16
	2020	420	74	70	55	221	16
	2021	425	74	70	56	224	16
	2022	429	74	71	57	227	16
	2023	434	75	72	57	230	16
	2024	439	75	73	58	233	17

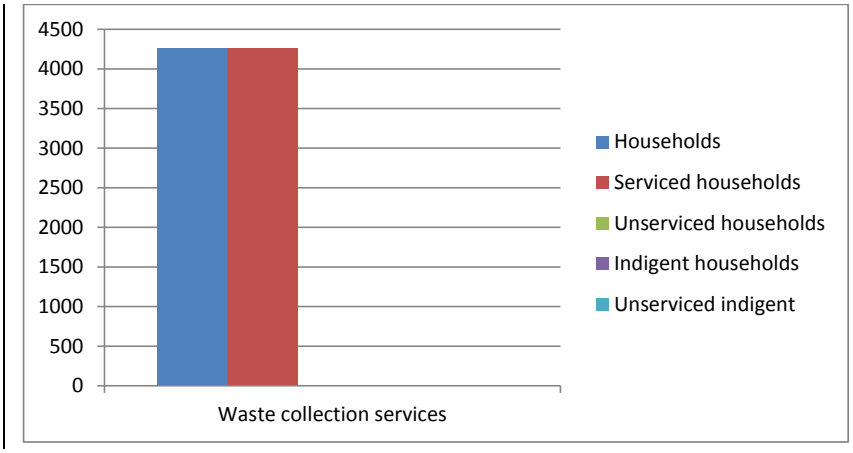
Scenario five shows the ultimate aim of combining municipal service collection, alternative method collection and enforcement in both options recycling in its various forms. This reduces the need for compactors by almost 50% from 28 in scenario one to just 15 in scenario 5.

2.2. STATUS OF WASTE COLLECTION SERVICES

In this municipality, the domestic refuse is collected on a once per week, door to door basis via a rear end loader compactor. Tariffs are levied irrespective of income class; that is say it is on a refuse generated basis. There is a set minimum tariff for a maximum of three bags per household with the facility to charge households per bag if more than three bags are put out for collection. All refuse is

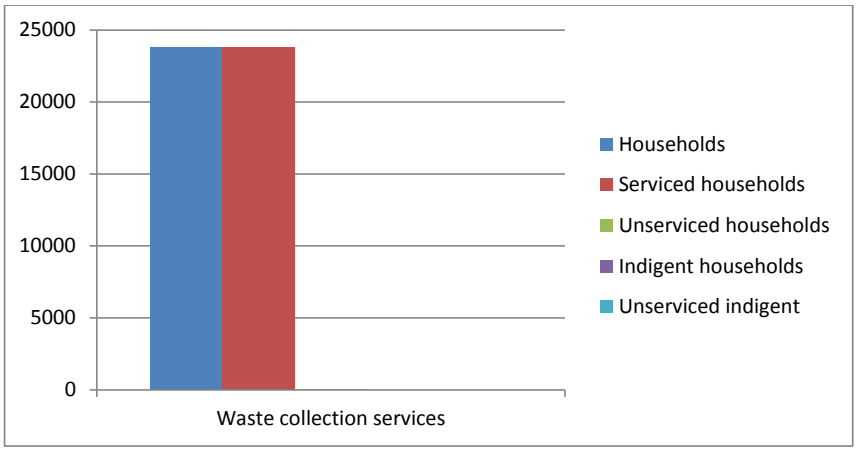
TABLE 8: WASTE COLLECTION SERVICES IN ALL AREAS				
	High Income, Low Density	**Middle Income, Middle Density**	**Low Income, High Density**	**Rural Areas**
Item	Total Number	Total Number	Total Number	Total Number
Households	4 264	23 779	90 957	44 993
Serviced Households	4 264	23 779	55 957	
Unserviced Households	0	0	35 000	44 993
Indigent Households	0	0	2 635	0
Unserviced Indigent Households	0	0	0	0

Figure 5: **Waste collection services graph**: High Income, Low Density



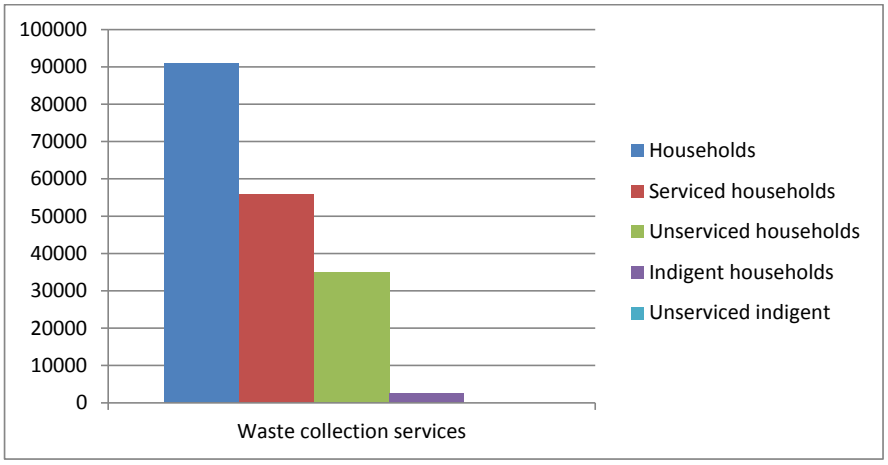
All high income households are serviced on a regular once per week basis. No households are unserviced. There are no known indigent households in the high income areas. All households are charged according to the stipulated tariffs, once per month in arrears. The high income households are geographically mixed with middle income areas, and there is no way of distinguishing for purposes of service delivery. In other words the refuse is collected in the same manner, by compactor once per week, on a door to door basis. There is also no distinction in tariffs between high income and middle income households

Figure 6. Waste collection services graph: Middle Income, Middle Density



All middle income households are serviced on a regular once per week basis. No households are unserviced. There are no known indigent households in the middle income areas. All households are charged according to the stipulated tariffs, once per month in arrears. The middle income households are geographically mixed with high income areas, and there is no way of distinguishing for purposes of service delivery. In other words the refuse is collected in the same manner, by compactor once per week, on a door to door basis. There is also no distinction in tariffs between middle income and high income households.

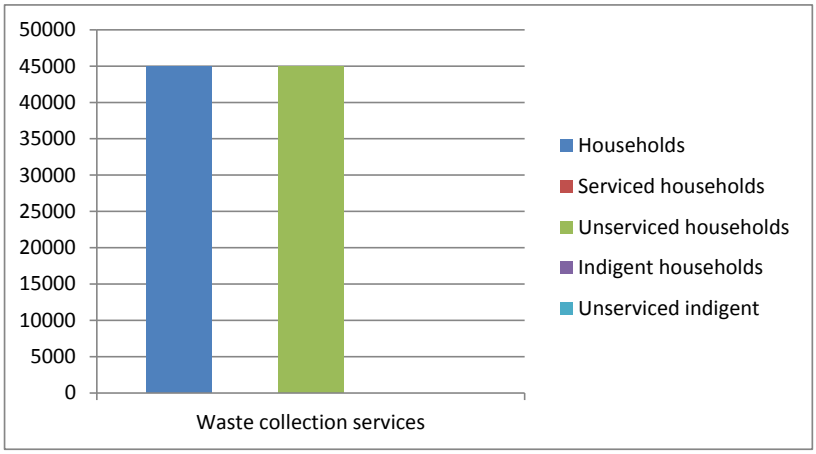
Figure 7. Waste collection services graph: Low Income, Low Density



There are 90957 low income households. 55957 are serviced on a once per week-door to door basis. 35000 households are serviced on an ad-hoc basis. 2635 are indigent households but receive the same service regardless. Some of the households are charged according to the stipulated tariffs, once per month in arrears. Some households are not charged due to the difficulty of calculating, issuing and delivering consolidated

bills. It has been resolved that those houses, currently not being billed, but due to receive the weekly door to door service via the soon to be implemented co-operatives be billed a nominal fee of R15.00 per month excluding vat.

Figure 8. Waste collection services graph: Rural Areas



Rural areas are not serviced. The current methods to take care of refuse generated are via the waste hierarchy, burning, burying or dumping. There are plans to commence collection services once the co-operatives in the low income high density areas are implemented. It is envisaged that this type of service will be supplied either via co-operatives or SMME's.

TABLE 9: REFUSE REMOVAL VEHICLES

TABLE 9: REFUSE COLLECTION FLEET					
Registration	Make & Model	Type	Purchase Date	Purchase Cost	Age of vehicle
NPC 4323	TOYOTA HINO GS23-247	COMPACTOR/12	22/03/1994	R697 224	20 YRS
NPC 4343	TOYOTA HINO FE14-143	COMPACTOR/12	22/02/1996	R450 000	18 YRS
NPC 4305	MAN LE18-220	COMPACTOR/19	06/06/2003	R935 875	11 YRS
NPC 4307	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4308	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4310	MAN LE18-	COMPACTO	06/06/2003	R935 875	11 YRS

	220	R/19			
NPC 4311	ISUZU FVZ1600	COMPACTOR 19	30/05/2012	R1 786 833.70	2 YRS
NPC 4312	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4314	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4318	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4319	ISUZU FVZ1600	COMPACTOR/19	30/05/2012	R1 786 833.70	2 YRS
NPC 4326	MAN 16-224	COMPACTOR/19	24/08/2001	R686 577	13 YRS
NPC 4341	MAN 16-224	COMPACTOR/19	31/08/2001	R686 577	13 YRS
NPC 4349	TOYOTA HINO 25-173	COMPACTOR/19	22/02/1996	R450 000	18 YRS
NPC 4357	MAN 26-252	COMPACTOR/19	01/01/1996	R614 981	18 YRS
NPC 4358	MAN 16-223	COMPACTOR/19	11/09/2000	R686 577	14 YRS
NPC 4361	MAN 16-223	COMPACTOR/19	14/09/2000	R686 577	14 YRS
NPC 4379	MAN 16-224	COMPACTOR/19	17/08/2001	R686 577	13 YRS
NPC 4950	MERC ATEGO 2628	COMPACTOR/19	08/03/2005	R1 036 021	9 YRS
NPC 4951	MERC ATEGO 2628	COMPACTOR/19	11/04/2005	R1 035 531	9 YRS
NPC 4952	MERC ATEGO 2628	COMPACTOR/19	11/04/2005	R1 035 531	9 YRS
NPC 4953	MAN 33-360	COMPACTOR/19	07/09/2005	R1 200 670.80	9 YRS
NPC 4954	MAN 33-360	COMPACTOR/19	07/09/2005	R1 221 190.80	9 YRS
NPC 4425	TOYOTA HINO FE12-133	TRUCK/DROPSIDE/5.0	13/02/1992	R168 420	22 YRS
NPC 4313	ISUZU FVZ1400T	TRUCK/SKIP LOADER/5.0	13/02/2003	R648 991	11 YRS

NPC 4322	TOYOTA HINO GS23-247	TRUCK/SKIP LOADER/5.0	19/05/1993	R460 000	21 YRS
NPC 4359	ISUZU FVZ1400T	TRUCK/SKIP LOADER/5.0	01/02/2003	R648 991	11 YRS
NPC 4360	ISUZU FVZ1400T	TRUCK/SKIP LOADER/5.0	24/02/2003	R648 991	11 YRS
NPC 4382	MAN 26-252	TRUCK/SKIP LOADER/5.0	25/06/1996	R416 000	18 YRS

Refer table 10 summary below for comment.

TABLE 10: SUMMARY OF COLLECTION FLEET			
AGE OF COMPACTOR	NUMBER		Number
2 YEARS	7	Acceptable	7
9 YEARS	5	Extremely high maintenance	5
11 YEARS	5	Unacceptable by normal operating and maintenance standards	17
13 YEARS	3		
14 YEARS	2		
18 YEARS	4		
20 YEARS	1		
21 YEARS	1		
22 YEARS	1		

Table 10 shows the summary of the precarious nature of the number of fleet and their age. The business unit needs 29 compactors to collect refuse on a once per week basis.

With reference to table 14 below: Fleet management statistics show there are only a maximum of eleven compactors available on a daily basis. This is mostly due to breakdowns and to an extent where normal repairs and maintenance must occur. The Fleet management workshop policy further hampers service delivery due to its unwillingness to be flexible with its working hours in order to repair and maintain the fleet. Everything must be done within working hours.

The WMBU manages to provide daily service delivery, by employing a platoon shift system and work over weekends. This further stresses the vehicles, being overused, hours expire quicker, more frequent maintenance and so forth.

Furthermore the summary table 13 shows how infrequently vehicles are recently being replaced. Before the last batch of seven was purchased two years ago there is a 7 year gap. 17 of the vehicles are not economically viable. 5 of the remaining eleven are of borderline viability.

There is some relief as 4 vehicles are due to arrive by November 2014.

The biggest inhibitive factor is the cost of replacing the vehicles. Therefore the alternative methods of collection in scenarios, two, three and four above take on added significance in reducing costs and ensuring collection.

TABLE 11: EXAMPLE OF DAILY FLEET AVAILABILITY					
WASTE MANAGEMENT VEHICLES					04.02.2014
Domestic refuse compactors					
	NPC	M3	Compactor make	Fleet comment	WMBU comment
1	4305	15	MAN	Engine	KZN comm
2	4310	15	MAN	Ok	ok
3	4358	15	MAN	Ok	Ok
4	4361	15	MAN	Engine	KZN comm
5	4357	19	MAN	Ok	Ok
6	4951	19	MERC	Ok	Ok
7	4952	19	MERC	Ok	Ok
8	4953	19	MAN	Cof	3rd base
9	4954	19	MAN	Ok	Ok
10	4950	19	MERC	Ok	Ok
11	4302	15	HINO	Scrapped	
12	4349	11	HINO	Ok	Ok
13	4308	19	ISUZU	Ok	Ok
14	4311	19	ISUZU	Accident	Vis
15	4312	19	ISUZU	Ok	Ok
16	4319	19	ISUZU	ok	Ok
Total available				11	11
Percentage available				11/16 * 100 = 58%	
Street sweeping					
1	4425		HINO	ok	Ok
15m3 and 25m3 bin lifters					
1	4313		ISUZU	engine	KZN comm
2	4322		HINO	Ok	Ok
3	4359		ISUZU	ok	ok

4	4360		ISUZU	propshaft	workshop
5	4323		HINO	ok	Ok
Total available				3	3
Percentage available				3/5 * 100 = 60%	
240 litre bin lifters					
1	4398	15	ISUZU	scrapped	workshop
2	4318	15	ISUZU	ok	ok
3	4314	15	ISUZU	ok	ok
Total available				2	2
Percentage available				2/3 * 100 = 67%	
1.75m3 bin lifters					
1	4341	15	MAN	engine	borains
2	4379	15	MAN	ok	Ok
3	4307	15	MAN	Ok	ok
4	4326	15	MAN	ok	Ok

2.2.1. COMMERCIAL REFUSE COLLECTION.

The commercial refuse collection is focussed on 240 litre containers, 1.75m^3 containers, and 15m^3 containers. A maximum growth of 5% has been factored in as it is wise to err on the higher side. Simultaneously the effects of recycling have also been considered, as recycling is continuously growing in strategic importance, and is one of the requirements of the National Waste Management Strategy. The municipality will have to develop a mechanism to ensure that businesses comply with recycling objectives.

Table 12: snapshot of 240 litre commercial refuse collection services supplied in August 2014

	No. of customers	Tons refuse	Growth 2014 5%	Growth 2015 5%	Growth 2016 5%	Growth 2017 5%	Growth 2018 5%
240 litre	1700	307	322	338	355	373	392
Compactors required		1.5	1.5	1.6	1.7	11.8	1.9
Less 10% recycling		276	290	304	320	336	353
Compactors required		1.3	1.4	1.5	1.5	1.6	1.7
Less 20% recycling		246	258	270	284	299	314
Compactors required		1.2	1.3	1,3	1.4	1.4	1.6

It is assumed that this month's refuse is a typical month's refuse generated. The vehicle requirements are worked out on a daily basis. 15m^3 compactors are typically used in

this service. At 664 KGS per m^3 the calculation is 10 tons per compactor. The daily vehicle requirement is total tons per month/21days/10 tons = number of compactors. The effects of recycling at 10% and 20% of refuse generated are considered. The figures show that with the 5% growth rate there are only a maximum of two compactors needed. This requirement is further endorsed with the consideration of recycling.

Table 13: snapshot of 1.75m^3 container refuse collection services supplied in August 2014							
	No. of customers	Tons refuse	Growth 2014 5%	Growth 2015 5%	Growth 2016 5%	Growth 2017 5%	Growth 2018 5%
1.75m^3	108	181	191	200	210	221	232
Compactors required at 10 tons per day		1.72	1.82	1.9	2	2.1	2.2
Less 10% recycling		163	172	180	189	199	209
Compactors required		1.56	1.63	1.71	1.8	1.9	2.0
Less 20% recycling		145	153	160	168	177	186
Compactors required		1.40	1.46	1.52	1.60	1.69	1.77

Calculations.

1. Tons per 1.75m^3 container = 181 tons/4.33weeks/108 containers = 0.385 tons/container.

2.Containers serviced per day should be 108containers/5days = 21.6 containers

3. Tons collected per day = 21.6 * 0.385 = 8.25 KGS. A 15m^3 compactor can collect 10 m3 per day therefore one compactor should suffice. However taking distances between customers.

And loading operations say at 50% efficiency two trucks are necessary. Therefore load per truck should be 5 tons as opposed to 10 tons.

4. Daily tons collected = 8.25 and per truck = 5 tons therefore 181/21days=8.61 tons/5 tons = 1.72 trucks.

There are three trucks available and only a maximum of two are required.

Table 14: Snapshot of 15m^3 container refuse collection service							
	No. of customers	Tons refuse	Growth 2014 5%	Growth 2015 5%	Growth 2016 5%	Growth 2017 5%	Growth 2018 5%
15m^3	17	210160	220668	231701	255440	268212	281661
Trucks needed daily		0.49	0.51	0.54	0.6	0.63	0.66
Less 10% recycling		189144	198602	208531	229896	241390	253495
Trucks needed daily		0.44	0.47	0.49	0.54	0.56	0.59
Less 20% recycling		168120	176534	185361	204352	214569	225329
Trucks needed daily		0.40	0.41	0.43	0.48	0.5	0.53

Calculations.

1. KGS per container = 210160kgs/4.33 weeks/17 containers= 2.9 tons per container.

2. Containers per day = 17 containers/5 days = 3.4 containers per day.

3. Trucks per day based on containers per day = 210tons//21days/2.9tonsper container=3.62 containers. There are 2 trucks and each truck is capable of collecting 7 containers per day therefore truck capacity is overwhelming

Table 15 night shift refuse collection						
	Tons refuse	Growth 2014 5%	Growth 2015 5%	Growth 2016 5%	Growth 2017 5%	Growth 2018 5%
	441850	463943	487140	511497	537072	563925
Compactors needed nightly	1.43	1.50	1.57	1.65	1.73	1.82
Less 10% recycling	397665	417518	438426	460347	483365	507442
Compactors needed nightly	1.28	1.35	1.42	1.49	1.56	1.64
Less 20% recycling	353480	371154	389712	409036	429657	451140
Compactors needed nightly	1.14	1.19	1.26	1.32	1.39	1.45

Calculations:

One 15m^3 vehicle carries 10 tons.

441.840 tons/31 nights/10 tons = 1.425 vehicles every night. There are three vehicles available therefore truck capacity is overwhelmimg.

Table 16: Garden Refuse collection						
	Tons refuse	Growth 2014 5%	Growth 2015 5%	Growth 2016 5%	Growth 2017 5%	Growth 2018 5%
	441850	463942	487139	511496	537071	563925

2.3. WASTE QUANTITIES AND TYPES

TABLE 17: NEW ENGLAND LANDFILL WEIGHBRIDGE DATA FOR THE PERIOD 2003-2013 (TONNES)

Year	BUILDERS RUBBLE	DOMESTIC REFUSE	BULK FOOD WASTE	GARDEN REFUSE	ILLEGAL DUMPING	INDUSTRIAL WASTE	COVER MATERIA;L	SAW DUST	TOTAL
2003	28224	25994	482	22258	2001	51174	59790	7367	199596
2004	16343	27747	621	14707	2161	39720	61556	2178	167206
2005	10365	28435	644	16035	2257	42994	69161	420	172586
2006	12755	29476	1507	8727	2532	48161	75388	294	181896
2007	14486	28967	1085	9568	3623	50040	85323	554	196373
2008	31643	22834	696	12304	4187	41499	36118	118	149399
2009	26626	18907	284	15501	2602	45103	42137	105	151265
2010	39741	30237	639	12472	5475	43786	44813	78	177241
2011	23606	28160	428	12420	3029	40063	39230	80	147016
2012	25014	27859	322	14568	3082	34463	31245	52	136605
2013	10585	29108	431	19466	2863	3312	43317	209	109291

Average	21763	27066	649	14366	3074	40029	53462	1041	162589

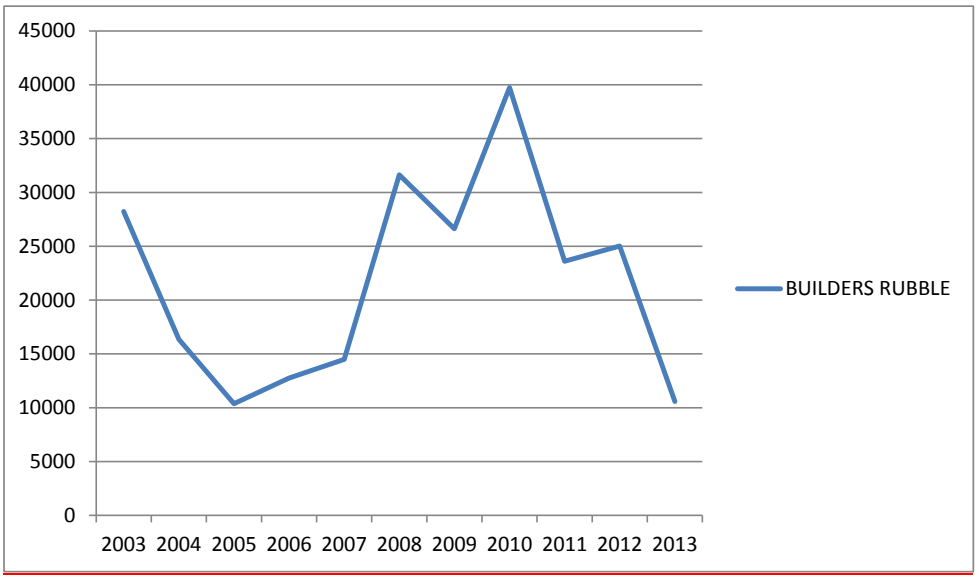


Figure 9: Builders rubble trend from 2003-2013

The graph is generated from quantities specified in table 20, which figures are derived from weighbridge measurements at the New England Road landfill site between 2003 and 2013 and termed builder's rubble.

Builder's rubble is seen to have either overall decreased slightly or remained static. However the amount of rubble is still unacceptable. There are alternatives such as pre-sorting, sifting, conversion to road or building aggregate, recycling on other building sites, sales as filler material and so forth. Landfill site management needs to implement a suitable alternative option.

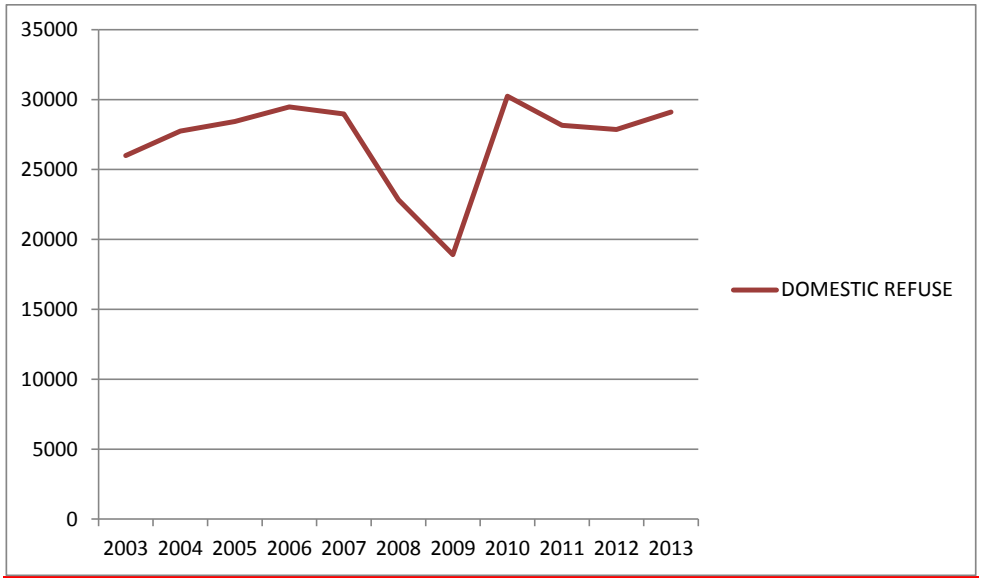


Figure 10: Domestic refuse trend from 2003-2013

Domestic refuse is still on the increase, and collection by co-operatives is foreseen to increase this even further as the currently not serviced 42 000 households have their refuse collected via these co-ops. The co-operative service plan is to enforce recycling at source, so that the actual refuse taken to landfill site is reduced. This will benefit both the co-operatives (increased income and reduced transport costs) and the landfill (saved airspace). Furthermore, initiatives are underway to increase the recycling at household)kerbside recycling) initiative further reducing the amount of refuse to landfill site and thereby saving landfill airspace and reducing transport costs. If recycling is done via private initiatives then there will be the added advantage of job creation.

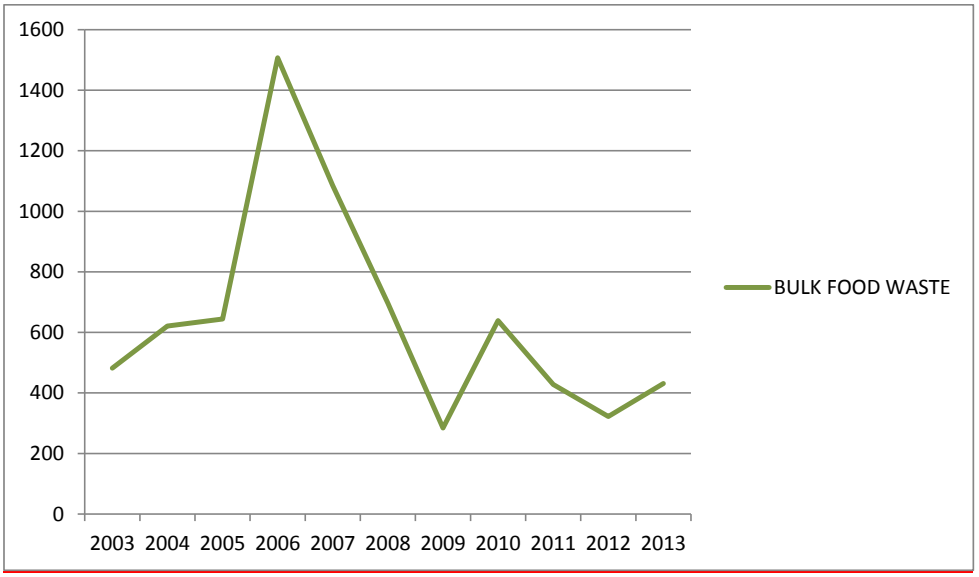


Figure 11: Bulk food waste trend from 2003-2013

Bulk food waste offers no stable trend but shows to be decreasing slowly. With recycling, recovery and minimisation techniques, as well as the rising cost of living, this type of waste is predicted to decrease even further. As this is mainly business waste there will have to be a concerted effort to communicate with businesses that produce such waste to enlist their co-operation in reducing this type of waste.

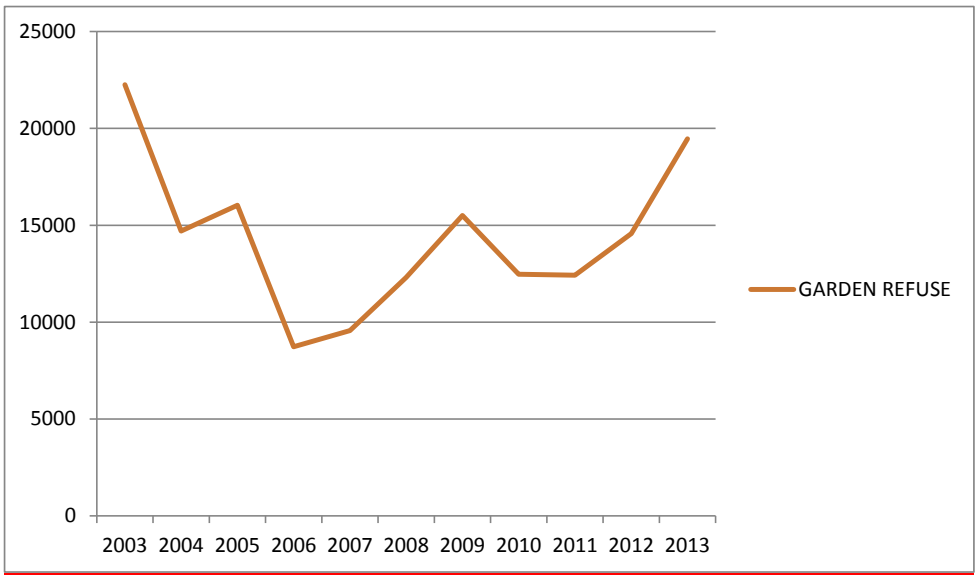


Figure 12: Garden refuse trend from 2003-2013

The amount of garden refuse being produced is rising. This does raise concern for the municipality and there are 2 minimisation options that are currently being investigated, both involving composting. The first being the outsourcing of the collection of garden refuse to already established composting operations, and the second being the planned organic waste composting facility as discussed in further detail later on.

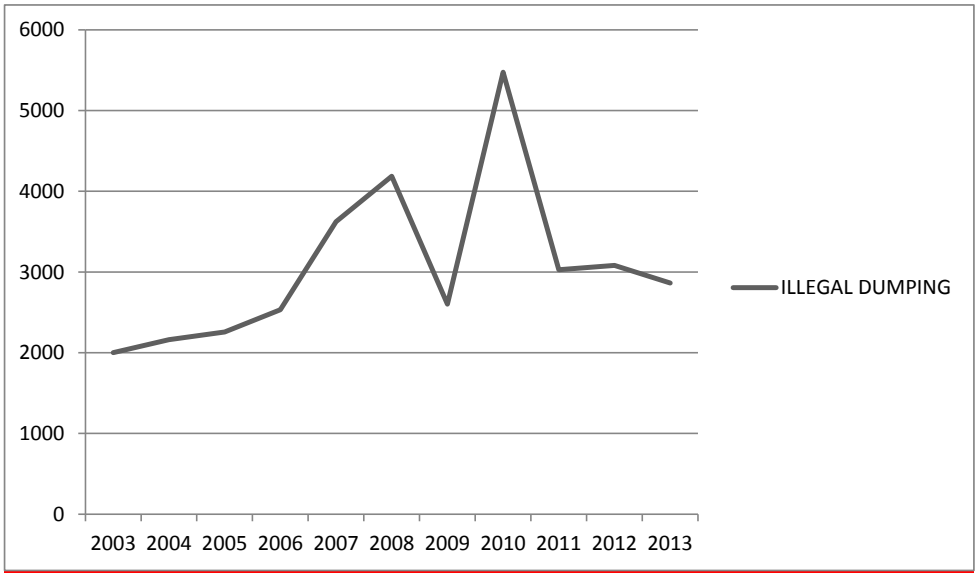


Figure 13: Illegal dumping trend from 2003-2013

The amount of illegal dumping seems to be remaining static or decreasing. However, this could also be due to a lack of reporting of dumping instances. As there are no accurate records one must investigate further. The WMBU has currently increased its equipment capacity in terms of front end loaders and tip trucks and is putting in place an information collection and processing system

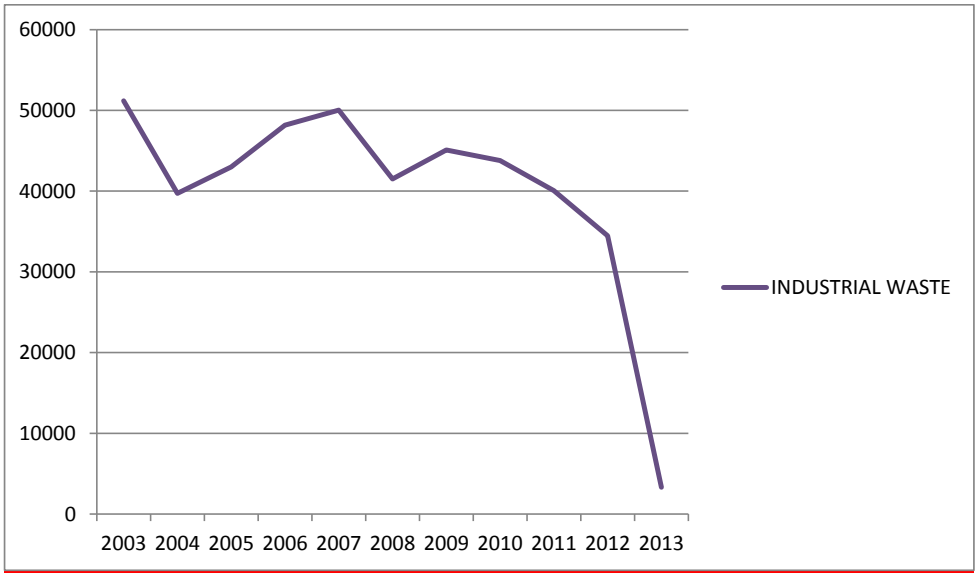


Figure 14: Industrial waste trend from 2003-2013

Industrial waste amounts are clearly declining, possibly due to the realisation of the value of waste minimisation techniques by industries and more emphasis on the productivity and profit.

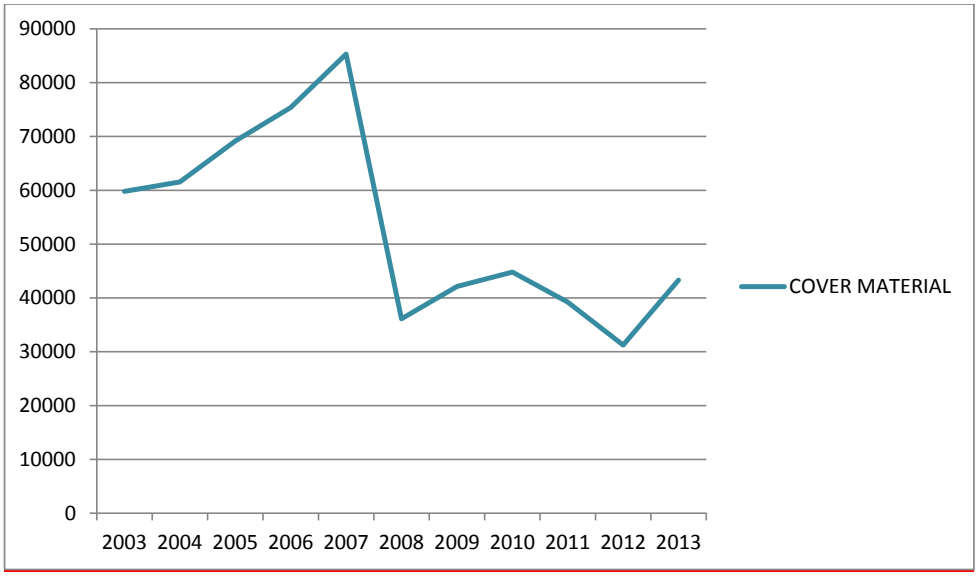


Figure 15: Cover material trend from 2003-2013

Cover material amounts have declined since 2003, possibly due to more efficient use of cover material, and this waste type has not raised issues due to the fact that it is utilized

on the landfill site itself. There will be a reduction on cover material as the benefits of recycling are realised. The building rubble should also be reprocessed to be used as cover material.

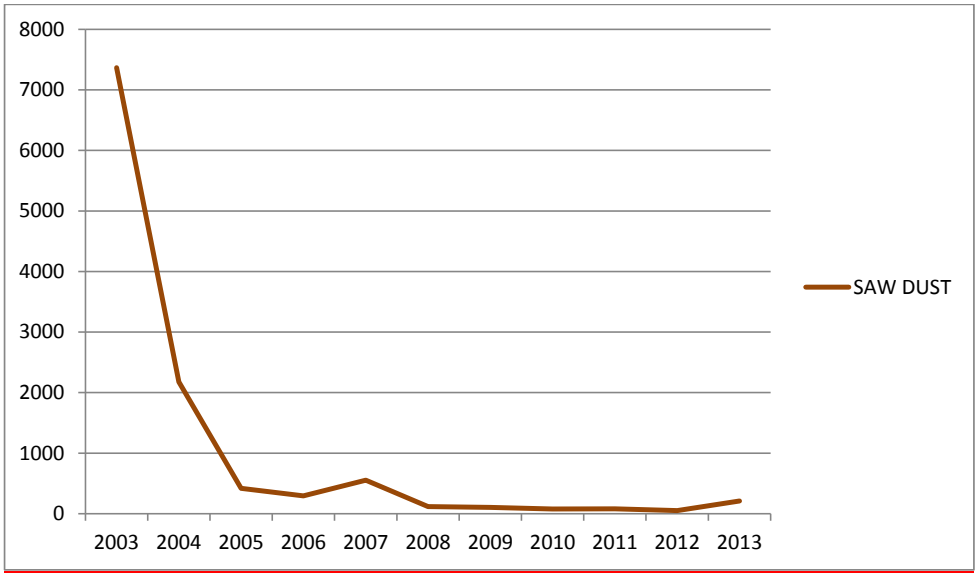


Figure 16: Wood waste trend from 2003-2013

Even though sawdust waste has been reduced there should be plans by landfill site management to ban it from the landfill totally, forcing producers to recycle the dust.

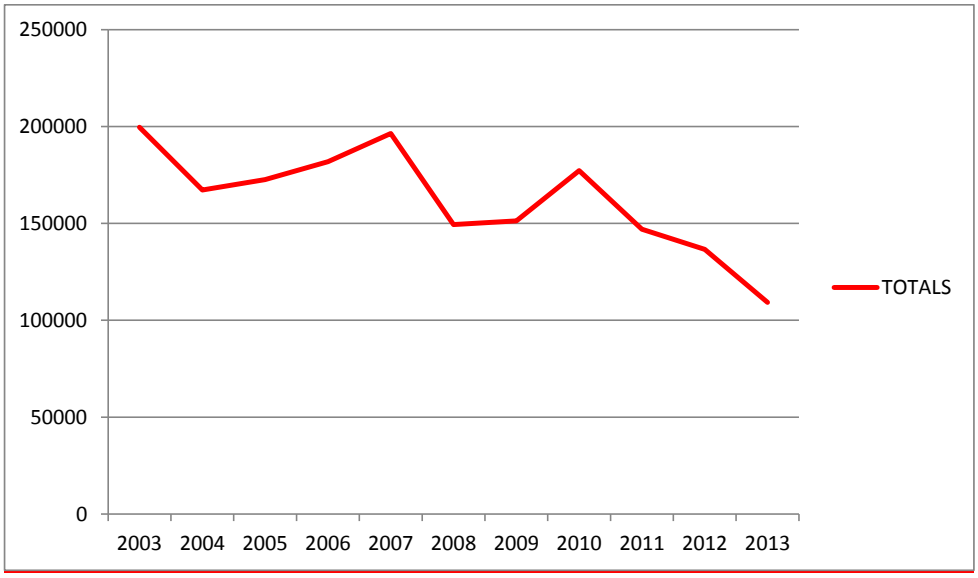


Figure 17: Total figures of all waste types from 2003-2013

The general trend of all waste types is decreasing, which helps towards extending the lifespan of the landfill site as well as benefiting the environment in general. Although there have been some anomalies, such as peaks in 2007 and 2010, the general trend is decreasing, possibly due to increased levels of reuse and recycling waste minimisation practices. The downward trend is good and noted but the figure in excess of 100 000 tonnes is still unacceptably high. The NWMS goals of separation of 50% of the recyclables is very far from being achieved as the total recyclables are estimated at around 15% due to kerbside recycling, small recyclers, and tip pick recyclers. More time, effort and resources need to be invested in the landfill site in order to minimise its use and extend its life span.

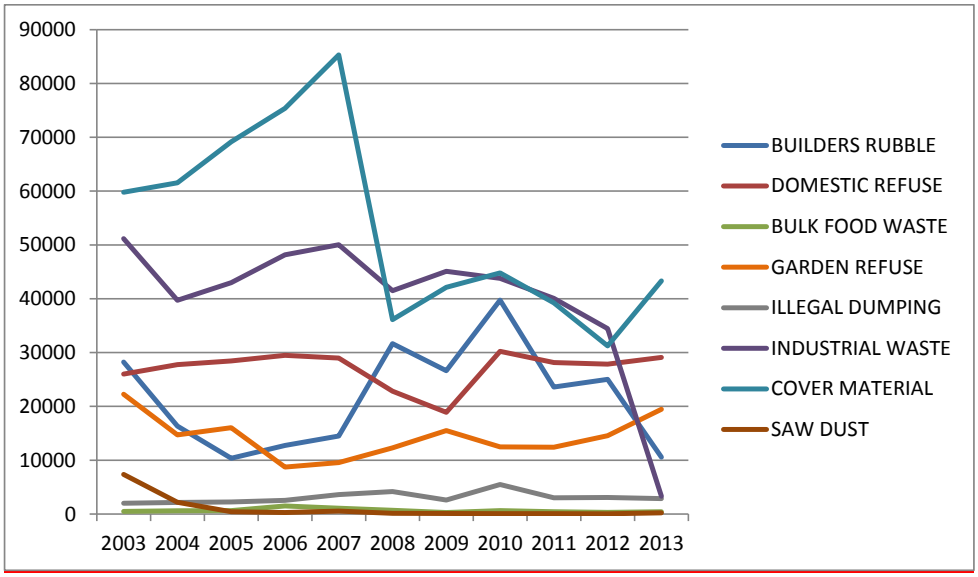


Figure 18: Different waste types and amounts from 2003-2013

The graphs above in figures 14 and 15 illustrates a general trend showing that waste going to the landfill site is being reduced.

2.4. VOLUME DENSITY ESTIMATION SYSTEM

In order to determine the airspace calculation/volume density calculation, a study was done of $15m^3$ and $19m^3$ compactors for loads collected in January 2014. The highest weight for the $15m^3$ was chosen which gave a ratio of 664kg per m^3. The highest weight for the $19m^3$ was chosen which gave a value of 647kg per m^3. The figure of 664kg was chosen as it is 2.5% more and therefore provides a margin for error of 2.5%. The figure chosen for airspace calculations would therefore be 664kg per m^3 (with reference to the tables below).

As per the Landfill Site Manager, the compaction rate for building rubble/cover material is 2000kg per m^3.

A study of various 25m garden refuse loads for January and February revealed a higher range of 9320kg to 10820kg, meaning a maximum of 10820kg is possible. That works out to 433kg/m^3.

NPC in the table 21 refers to the municipal license plate acronym Natal Pietermaritzburg Corporation.

TABLE 18: WEIGHTS OF WASTE IN 15M³ COMPACTORS									
NPC	M^3	8	9	15	16	22	23	29	30
4307	15	8460	4000	5220	-	-	-	-	8040
4314	15	-	8960	-	-	-	-	-	-
4310	15	13420	6470	7540	7420	-	-	6900	8180
4358	15	6820	9960	-	6540	-	-	-	-
4379	15	-	-	-	-	-	-	2380	4140
4326	15	-	-	-	-	-	-	-	-

TABLE 19: WEIGHTS OF WASTE IN 19M³ COMPACTORS									
NPC	M^3	8	9	15	16	22	23	29	30
4308	19	11380	8260	10180	8420	-	-	-	-
4318	19	7080	8060	-	-	-	-	-	5220
4319	19	10460	11980	11040	15780	-	-	12060	-
4951	19	-	6240	-	5280	-	-	-	6300
4954	19	7140	9380	-	-	-	-	-	-
4312	19	10180	-	-	7800	-	-	-	10160
4952	19	9660	12310	-	-	-	-	-	-
4953	19	-	-	-	3060	-	-	-	-
4950	19	-	-	-	-	-	-	4000	4560

TABLE 20: WEIGHT OF DIFFERENT TYPES OF WASTE PER M³	
DOMESTIC REFUSE	644KG/M^3
BUILDERS RUBBLE	2000KG/M^3
GARDEN REFUSE	433KG/M^3

2.5. WASTE STREAM ANALYSIS

Table 21: Waste Generation in the Msunduzi area between the period 2011-2013 (As a percentage of domestic waste)		
Waste type/streams	**Waste generated per annum (tons)**	**Total percentages**
Organic Waste	125 283.95	10.02
Cans	52 708.83	4.22
Paper	313 382.12	25.07
Glass	20 095.96	1.61
Plastic	213 935.83	17.11
Construction and demolition waste	59205.00	4.74
Tyres	0.00	0.00
Other	465 537.23	37.24

Total	**1 250 148.92**	**100.00**

Table 22: Waste Generation in the Msunduzi area between the period 2011-2013 (As a percentage of industrial waste)		
Waste type/streams	**Waste generated per annum (tons)**	**Total percentages**
Organic Waste	166 674.01	10.31
Cans	70 122.25	4.34
Paper	416 914.18	25.78
Glass	35.79	0.00
Plastic	284 613.82	17.60
Construction and demolition waste	59 205.00	3.66
Tyres	0.00	0.00
Other	619 336.79	38.30
Total	**1 616 901.84**	**100.00**

2.6. WASTE RECYCLING, TREATMENT AND DISPOSAL

STATUS QUO OF WASTE DISPOSAL FACILITIES

The Msunduzi area has one waste disposal facility, namely the New England Landfill Site. The Site is legally licensed with a Permit that was issued in 1998 from the Department of Water Affairs and Forestry.

The New England Landfill Site has a lifespan of seven years at current disposal rate. However, initiatives are being pursued to extend the lifespan of the site. This is being done as a joint venture between the Msunduzi Municipaity and the Umngungundlovo District Municipality of which the Msunduzi Municipality is a part. There is therefore, in the meantime, an obligation on the Municipality to manage the Site in a manner that ensures responsible waste disposal, safety of the staff and the public, and adherence to environmental legislation.

In this regard it is imperative that the security on Site is enhanced and the activities of the waste pickers are formalised so that there is reduced risk to users of the Site, staff on Site and the waste pickers. The staff must be able to plan and manage the operations on Site without hindrance.

The annual infrastructure upgrade, which requires the construction of waste containment berms, upgrading of access roads, leachate management, fencing, and so forth. has to be undertaken in order to increase the lifespan of the Site. Plant on Site must be maintained and services regularly so that waste disposed of on a daily basis can be spread, compacted and covered in order to eliminate any environmental nuisances. The Management staff must be provided with suitable vehicles to be able to monitor and supervise operations on Site.

LANDFILL VEHICLES AND MACHINERY

TABLE 23: LANDFILL VEHICLES AND MACHINERY

Equipment/Machinery Type	**Purpose**	**Make & Size**	**Status**	**No.**
1. Compactors	Used to spread and compact waste to reduce volume and help stabilize the Landfill	Caterpillar – 36 ton Bomag – 32 ton	Operational Operational	1 1
2. Water tanker	Stores water used for Landfill operations to suppress dust	MAN 1992 – 9000 litres	Operational	1
3. Tractor & trailer	Used to transport collected wind scatter and litter to Landfill	Massey Ferguson	Operational	1
4. Roll On/Roll Off	Transport containers to Site from recycling center	MAN 2000	Operational	1
5.Tip Trucks	Used to transport waste from the transfer	Nissan	Operational	2

	station to Site			
6. Bakkies	For purposes of supervision on Site and transport of workers	Nissan	Operational	2

2.7. STATUS QUO OF WASTE TREATMENT FACILITIES

There are currently no waste treatment facilities in the Msunduzi area. However, a short-term objective for waste treatment is to investigate the desirability and feasibility of regional waste treatment facilities. In addition to this, there is a need to control all waste treatment facilities by means of a regulatory framework to reduce the risk to the health of humans and the natural environment, to promote pollution prevention and the reduction of greenhouse gas emissions. Lastly, another short-term objective is to stabilise quantity and investigate the reduction of pollution potential and volume of waste disposed of to landfill.

A treatment facility which is proposed as a medium-term plan to aid waste recycling, recovery, reuse and energy generation initiatives is the establishment of an Organic Waste Composting Facility (OWCF). This would be used to treat organic waste from sources such as garden refuse sites and convert it into useable compost.

2.8. STATUS QUO OF WASTE RECYCLERS

There is currently an Msunduzi municipality initiated kerb-side recycling program involving approximately 8000 households. (Refer to Table 16). In addition, there are numerous small and large private recycling companies, both formal and informal and another study needs to be done to determine the extent of the recycling. The municipality is currently in the process of establishing a recycling committee to oversee all municipal recycling activities.

Waste salvaging done at the Landfill Site is informal and needs to be transformed into a more regularized, formalized arrangement to ensure decent work and give recognition to the role played by informal waste pickers.

The establishment of a Materials Recovery Facility will allow these waste pickers to form an association with the MRF, which will be headed by a plant manager with necessary experience. This operation is still underway and the Economic Development unit of Council is responsible for the hiring of a plant manager, as well as the formalization of waste pickers and establishment of a waste recycling collection system.

TABLE 24: RECYCLING POTENTIAL OF MIDDLE/HIGH INCOME HOUSEHOLDS (TONNES) (CENTRAL WASTE 2011-2012)													
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
8000 HOUSEHOLDS	62	45	40	39	46	39	43	43	40	54	45	46	542
28043 HOUSEHOLDS	217	158	140	137	161	137	151	151	140	189	158	161	1900
POTENTIAL RECYCLING ABILITY													7%

2.9. STATUS QUO OF OTHER TYPES OF FACILITIES

Another type of facility which is still in the pipeline is the establishment of a Gas-to-Energy project which is discussed in further detail later on. This project aims to convert gas generated from the anaerobic digestion of organic waste (methane gas) into a useable form of energy. This project will not only create energy for electricity for use during high demand, but serves to decrease the amount of greenhouse gases in the atmosphere which would otherwise contribute to global warming mitigation

2.10. FINANCING OF WASTE MANAGEMENT

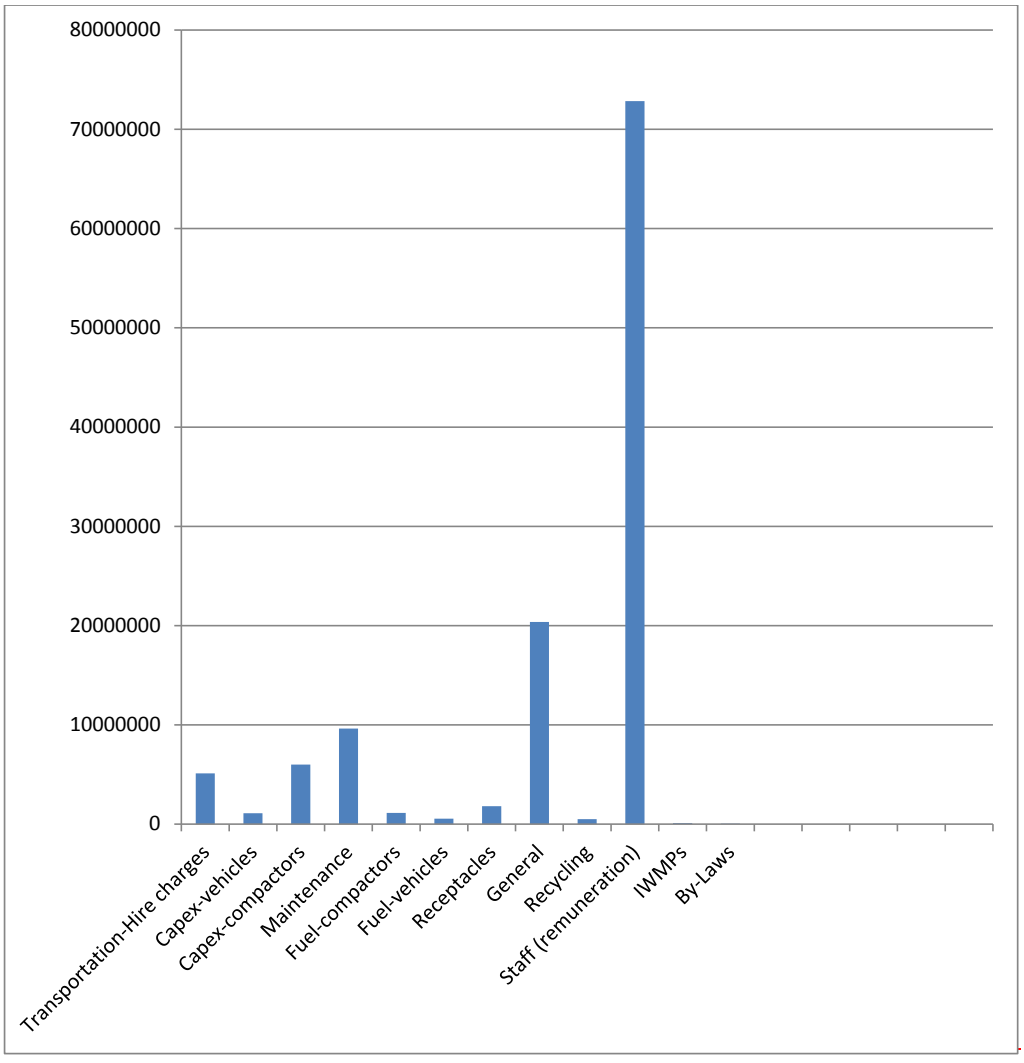
2.10.1. BUDGET: INCOME AND EXPENDITURE

TABLE 25: WASTE MANAGEMENT BUDGET	
Item	**Amount**
Collection	
Transportation-Hire charges	R 5 109 259.00
Capex-purchase (vehicles)	R 1 100 000.00
Capex-purchase (compactors)	R 6 000 000.00
Maintenance	R 9 620 000.00
Fuel (30 x 50kms/300lpd - R14.50 pl)	R 1 131 000.00
Fuel (12 vehicles – 720 lt pw – R14.50 p/l)	R 542 880.00
Receptacles	R 1 800 000.00
General	
SMMEs	R 3 500 000.00
Printing & Stationery	R 81 964.00
Stores & Uniforms	R 2 024 762.00
Other (Ins, Rebates, Telephones etc.)	R 14 768 491.00
Recycling	R500 000
Subtotal	**R 46 178 356.00**
Governance	
Staff (remuneration)	R 72 834 025.00
Education and awareness	R 200 000.00
IWMPS	R 100 000.00
By-laws	R 50 000.00
Subtotal	**R 73 184 025.00**
Total	**R 119 362 381.00**

The WMBU is funded mostly by the municipality and that by the tariffs, Equitable Share and the balance of the shortfall made up from rates. The WMBU raised approximately R86m, (see table 27), in the corresponding financial year, so the balance was funded by the municipality presumably out of the rates. There is therefore a need to look at factors which can help reduce expenditure and increase revenue. The potential for increased revenue is huge if the 35000 houses to be serviced by the co-operatives can be charged a tariff and that collected. 30000 at R30 per household per month will

realise an extra R12.6 m per annum. Increasing recycling can also reduce transport and labour costs considerably. In addition Cogta and he Dept of Public Works (KZN) are part funding labour intensive waste management work. A proper study into productivity, performance improvements, effects of recycling and so forth needs to be done. The municipality has recently, via the Umngungundlovo District engaged with outside service providers to address some of these issues.

FIGURE 19: BUDGET GRAPH



Wit reference to figure 19 above, by far the largest cost is labour and this is being addressed with the advent of co-operatives. This type of service delivery option needs to be expanded and may well be in the decision to provide services to Vulindlela as well.

TABLE 26: LANDFILL BUDGET 2013-2014

Dept	Item	Vote	Description	2013/2014 Annual Budget	201/2015 Annual Budget	2015/2016 Annual Budget
185	010	0226	SALARIES - ACTING ALLOWANCE	5,784	6,160	6,560
185	010	0029	SALARIES - BASIC	2,257,913	2,404,677	2,560,981
185	020	0109	SALARIES - BONUS	198,507	211,409	225,151
185	030	0149	SALARIES - SUPER FUND	160,915	171,375	182,514
185	035	0169	SALARIES - RETIREMENT FUND	244,626	260,527	277,461
185	037	0189	SALARIES - PROVIDENT FUND - NJMPF	200,541	213,576	227,458
185	040	0339	SALARIES - OVERTIME	698,457	732,682	776,642
185	055	0399	SALARIES - MEDICAL AID	192,647	205,169	218,505
185	060	0569	SALARIES - HOUSING SUBSIDY	12,716	13,543	14,423
185	065	0589	SALARIES - LONG SERVICE	78,048	83,121	88,524
185	070	0631	SALARIES - STANDBY ALLOWANCE	45,000	47,205	50,037
			Salaries - Overtime & Allowances	**4,095,154**	**4,349,444**	**4,628,256**
185	100	1000	ADVERTISING	20,000	20,980	22,239
185	100	1002	AIR MONITORING - LANDFILL SITE	250,000	262,250	277,985
185	100	1095	CONFERENCES	10,000	10,490	11,119
185	100	1100	CONSULTANT FEES	2,000,000	0	0
185	100	1195	EXTERNAL SERVICES	150,000	157,350	166,791
185	100	1235	HIRE CHARGES	3,972,969	4,167,644	4,417,703
185	100	1325	LONG SERVICE AWARDS	68,316	0	0
185	100	1538	SALGBC LEVY	1,527	1,627	1,732
185	100	1541	AD- HOC SECURITY	1,000,000	1,049,000	1,111,940
185	100	1560	STORES & MATERIALS	1,676,700	1,758,858	1,864,390
185	100	1570	SUBSISTENCE AND TRAVELING ALLOWANCE	6,318	6,628	7,025
185	120	1270	INSURANCE - UIF	27,406	29,188	31,085

185	120	1275	INSURANCE - WCA	22,212	23,656	25,194
185	130	1635	UNIFORMS	28,431	29,824	31,614
185	135	1450	PRINTING & STATIONERY	9,995	10,485	11,114
185	150	1595	TELEPHONES - OFFICIAL	8,400	8,400	8,400
			General Expenses	**9,252,274**	**7,536,380**	**7,988,331**
185	200	3005	BUILDINGS	24,219	25,406	26,930
185	210	3115	REPAIRS & MAINTENANCE -PLANT & EQUIP	15,000	15,735	16,679
185	215	3200	VEHICLES	1,384,868	1,452,726	1,523,910
185	240	3090	REPAIRS & MAINTENANCE -MTCE AGREEMENT	230,000	241,270	255,746
185	310	4025	INTEREST - LONG TERM - RMB / INCA	912,806	903,678	903,678
185	310	4026	INTEREST - LONG TERM - DBSA	1,928,690	1,909,403	1,909,403
			Repairs & Maintenance	**4,495,583**	**4,548,218**	**4,636,346**
185	350	4060	DEPRECIATION	500,448	0	0
185	360	5018	DISTRIBUTION - PLANT HIRE	200	200	212
185	360	5037	DISTRIBUTION - WAGES	38,961	40,870	43,322
185	469	8556	TARIFF INCOME - TRADE WASTE CONTROL	-6,328,294	-6,676,350	-7,043,549
				-5,788,685	**-6,635,280**	**-7,000,015**
185	642	1301	MIG LANDFILL UPGRADE	8,090,850		
			Capital Project	**8,090,850**		

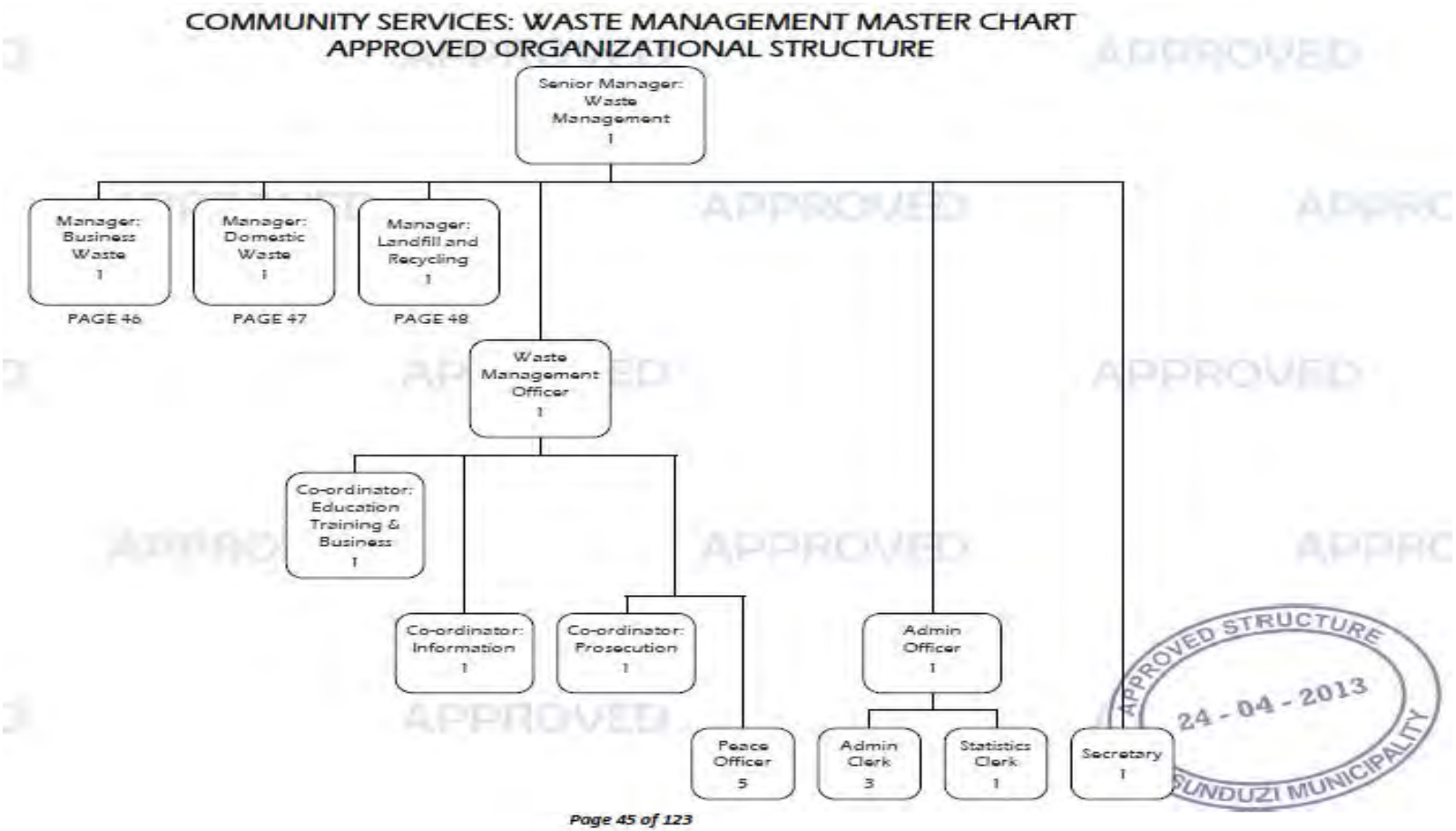
2.10.2. REVENUE SOURCES

TABLE 27: REVENUE SOURCES	
Source	**Amount**
MIG Funding	R 8090850.00
Equitable share funding	R 9 398 542.00
Revenue from waste disposal fees	R 6328290.00
Rates & Tariffs	R62 419 565.00
Total	**R 86 237 247.00**

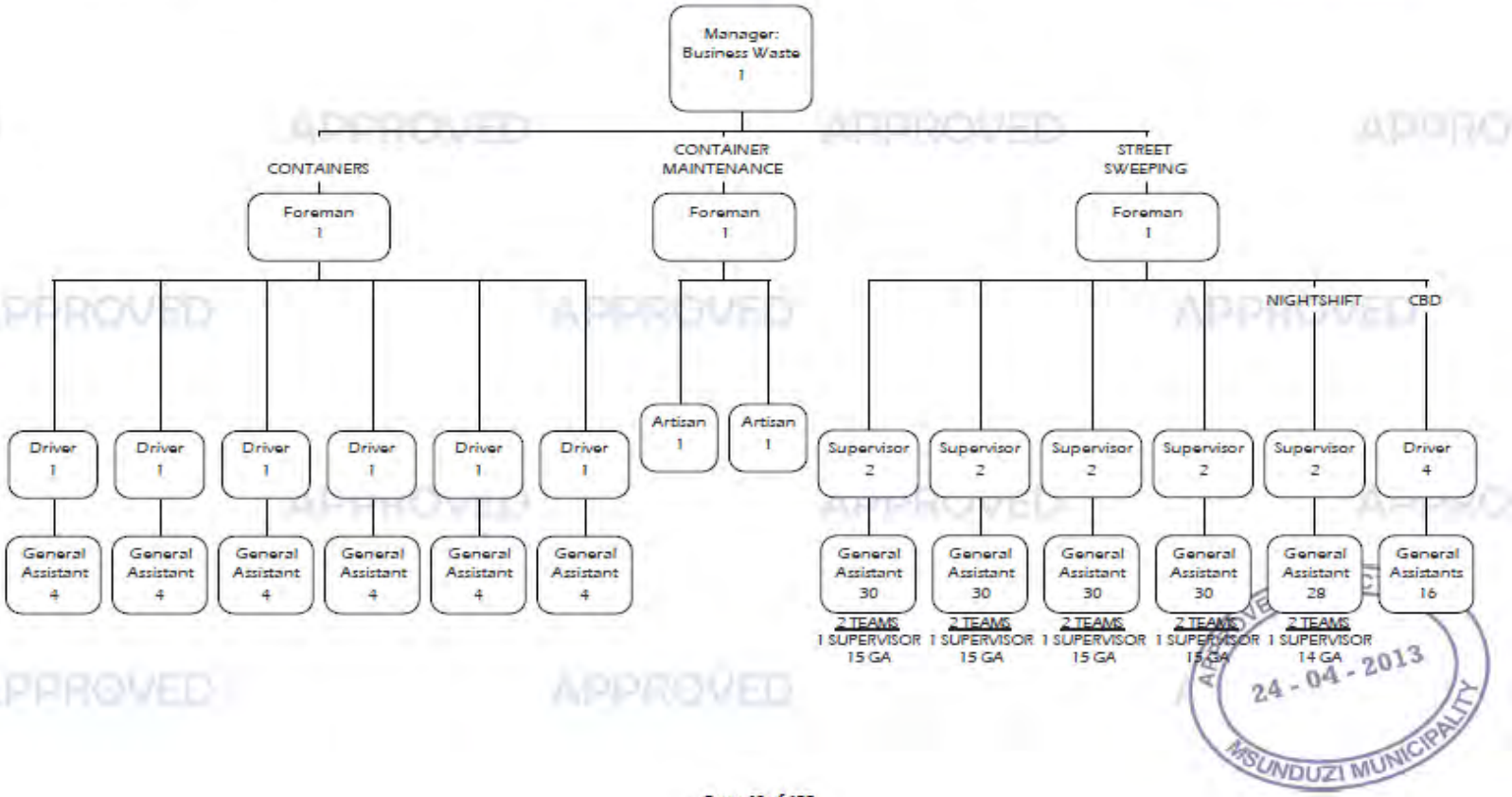
ORGANISATIONAL AND INSTITUTIONAL MATTERS

Below is the official current approved but not yet implemented Waste Management business unit organisational structure. the figure below deals with the top structure. In practise only the posts of Senior Manager, Landfill Manager Education Co-ordinator, Admin officer and are filled. There are three acting clerks. The rest of the structure (11) posts are vacant, placing tremendous stress on the remaining 9 staff to deal with legislative and administrative matters. The rest of the structure is severely short of key staff such as foremen, supervisors, and ground staff such as sweepers and refuse collectors. As a result the business unit is always trying to catch up on backlogs and service delivery quality standards are declining. The business unit is in the process of outsourcing 35000 households to co-operatives which will be implemented in this financial year.

Figure 25: Organisational structure for waste management



COMMUNITY SERVICES: WASTE MANAGEMENT : BUSINESS WASTE
APPROVED ORGANIZATIONAL STRUCTURE



The above Business Waste structure was approved in order to run the business waste along professional, world class standards, introduce waste information standards, improve productivity and cut costs. To date the structured posts have not been filled with the foremen containers and container maintenance vacant. There is therefore lack on imperatives such as information gathering, processing and analysing, resulting in no proactive planning, organising and controlling.

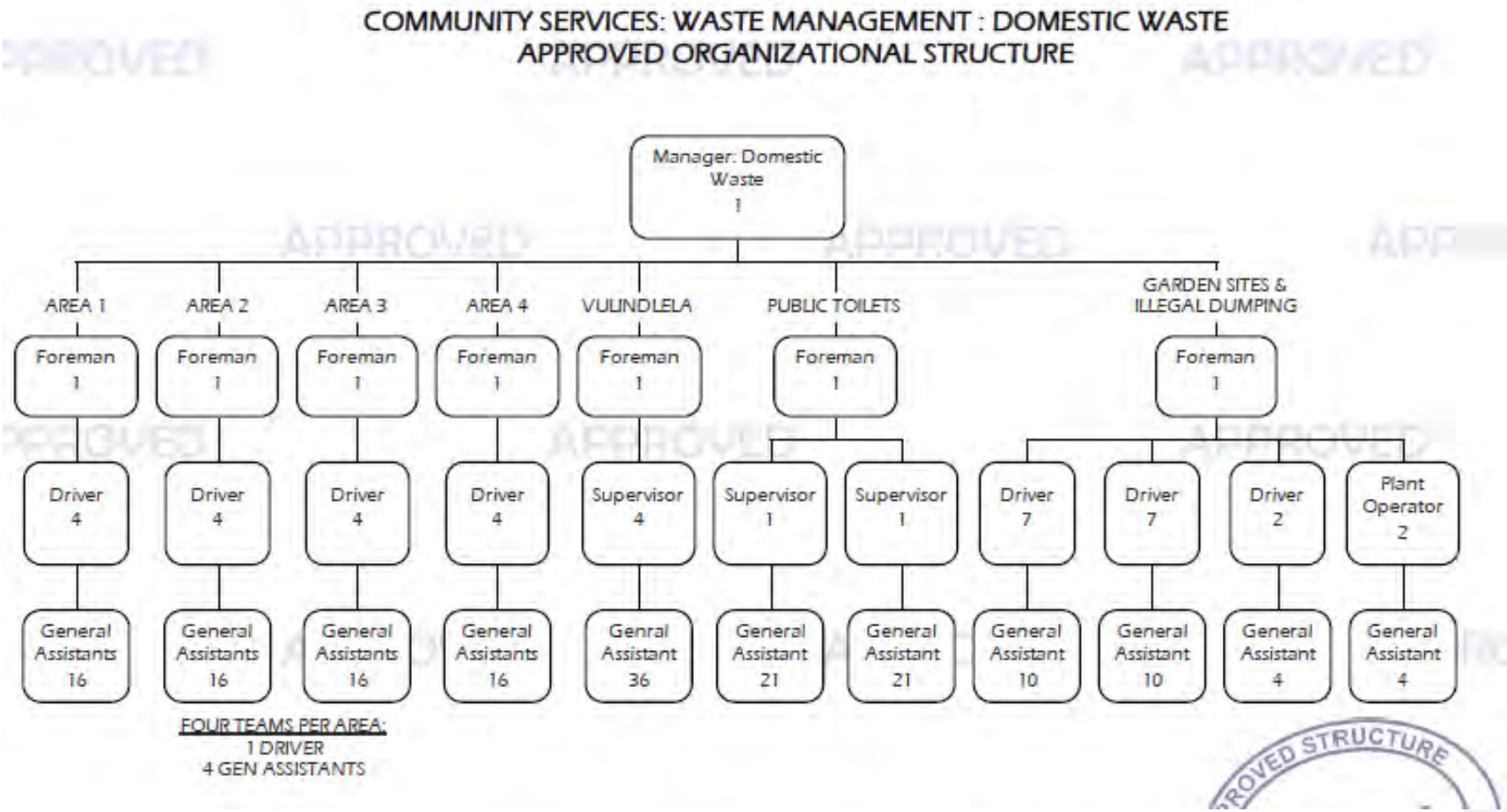
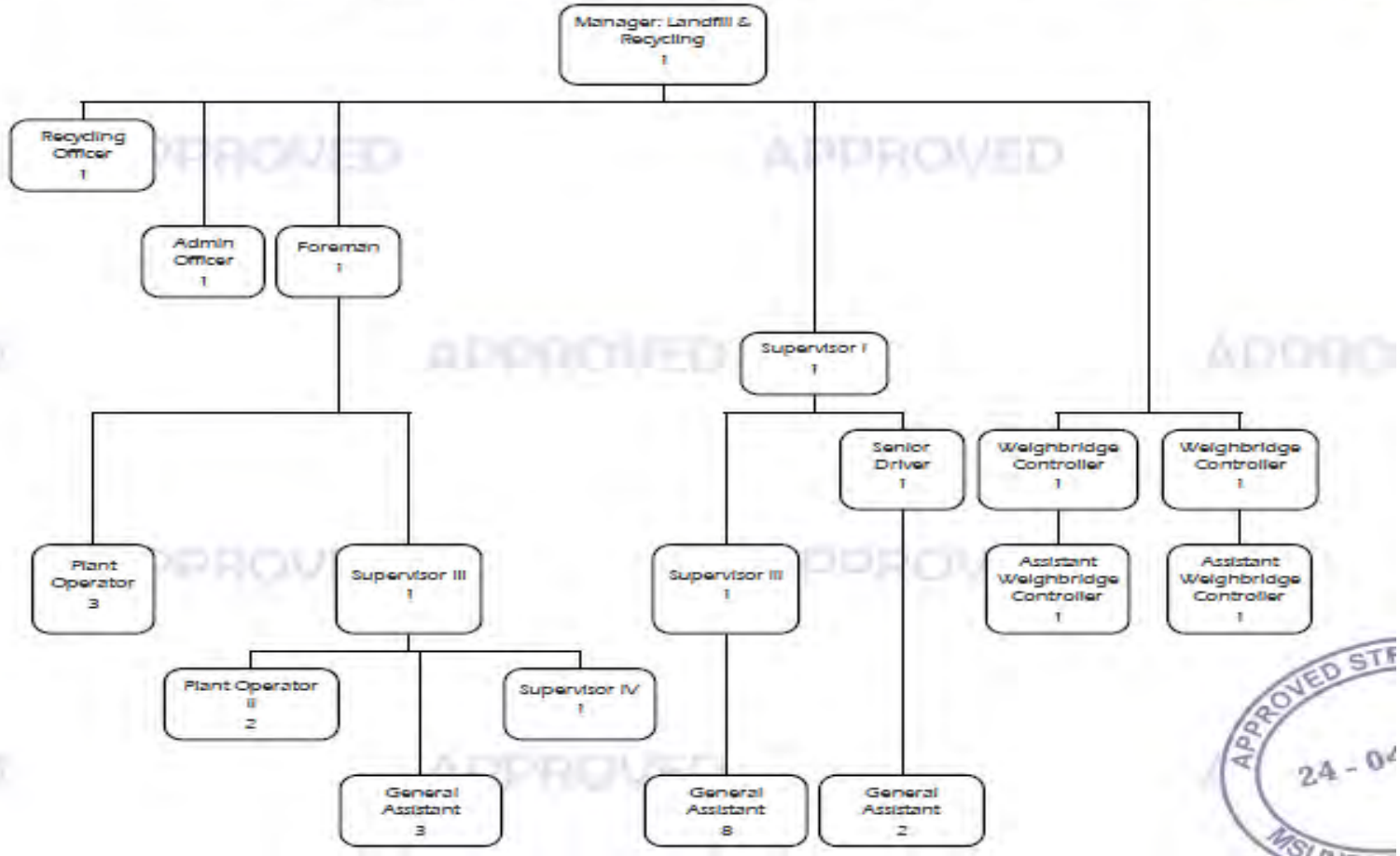


Figure 27: Organisational structure for domestic waste

The above Business Waste structure was approved in order to also run the domestic waste along professional, world class standards, introduce waste information standards, improve productivity and cut costs. The above domestic waste strucure has not been implemented as yet. The area based foreman posts are still vacant there is therefore lack on imperatives such as information gathering, processing and analysing, resulting in no proactive planning, organising and controlling. The foreman posts are critical as the implementation of the co-operatives are imminent. The illegal dumping structure is also problematic as the posts of drivers are vacant as well as the shortage of suitable collection vehicles. The business unit faces huge backlogs in the collection and eradication of illegal dumping, especially when these vacant posts are considered in conjunction with the vacant peace officer and admin posts in figure 25 above.

COMMUNITY SERVICES: WASTE MANAGEMENT : LANDFILL AND RECYCLING
APPROVED ORGANIZATIONAL STRUCTURE



3. DESIRED END STATE

3.1. SETTING STRATEGIC GOALS, TARGETS AND INDICATORS

TABLE 28: Goal 1: Promote recycling and recovery of waste			
Objectives	**Targets**	**Activities**	**Timeframe**
Reduce the quantity of recyclable material going to landfill by systematically increasing recycling rates within council-collected households and business	10% p.a.	Implement sorting and collection of recyclables at source, e.g. kerbside recycling programmes. Via by- law amendment institute recycling Invite and facilitate small recyclers into program. Measure as a percentage of household waste: tonnes	Already commenced expand by June 2016
The municipality to facilitate the establishment of Material Recovery Facilities (MRFs) where appropriate	Establish at least 8 buy back centres by partial conversion with the current garden refuse sites	Collect, sort, and process onwards to major recyclers/manufacturers. Convert 8 existing Garden sites.	First build by June 2016
Investigate waste-to-energy options	Gas-to-Energy Plant	Investigate feasibility and implement measures to build gas-to-energy facility. Current investigations on pyrolysis at Landfill Site.	By June 2015
Extend recycling programme by law to non- council collected business	10% pa	Enforce recycling by businesses with the aid of by-laws, tariffs and collections methods. Program of data collection from business	By June 2016

Recycle all garden waste	100%	Compost or make available waste for compost. Stop acceptance of garden refuse at landfill site. Current plans with UMDM and DEA. Zero garden refuse waste to Landfill site.	By June 2016
Facilitate the establishment of electronic (e-waste) recycling	10% p.a.	Via council or the private sector or a partnership commence e-waste recycling.	With effect from June 2016

With reference to Table 28: The implementation of recycling at source or kerb side recycling is practical and achievable as evidenced by the current kerb side programmes within the municipality and also as evidenced by Ethekwini Maunicipality and Johannesburg's recent decision to expand their programme by another 580000 households. As mentioned earlier business refuse to landfill is declining probably due to much greater awareness of recycling and the adverse effects of waste on business. Waste management by-laws enforcing recycling at source for households and businesses are being investigated and written. Plans are afoot to construct an organic composting facility within the municipality with capacity to receive all garden waste generated.

TABLE 29: Goal 2: Ensure the effective and efficient delivery of waste services

Objectives	Targets	Activities	Timeframe
Increase door-to-door collection from 84000 to 119000 households	119000 households	Facilitate co-operatives to perform collection and recycling door-to-door once a week.	December 2014 (Done)
Increase door-to-door collection to total households of 163993	163993 households	Facilitate co-operatives to perform collection and recycling door-to-door in Vulindlela	June 2016

TABLE 30: Goal 3: Ensure that legislative tools are developed to deliver on the Waste Act and other applicable legislation			
Objectives	**Targets**	**Activities**	**Timeframe**
Report effectively onto SAW information system	By June 2015	Collect, sort, collate, analyse, interpret and report waste management knowledge system	June 2015
Review waste management by-laws	Ensure understanding of by-laws by all concerned	Ensure each customer has a printed copy of by-laws. Proposed amendments commenced January 2015.	December 2015

With reference to table 30 above:

As commented in the organisational structure above the WMBU is currently understaffed to do this currently. Some effort is being made with the employment of an intern such that most daily collection figures are collected, sorted, recorded and presented. Once the practise is refined, compliant and reliable the information can be fed into the SAWIS.

THE Waste Management by laws were recently gazetted in 2012. Changes need to be made in lieu of new recycling laws. This IS currently receiving attention by the WMBU.

TABLE 31: Goal 4: Sound budgeting and financing of waste management services			
Objectives	**Targets**	**Activities**	**Timeframe**
Develop and implement with DEA tariff model, one applicable to the municipality	Cost reflective and volumetric tariffs	develop tariff model	December 2015
Enhanced revenue collection	Ensure adequate and sustainable financing of waste services including cost recovery for waste services from user groups that are able to pay	Budget and financing model for waste management	June 2016
Maximize other sources of funding such as DBSA, COGTA, etc.	Increase alternative funding year on year	Set up appropriate fund raising mechanisms	June 2015

With reference to table 31 above:
It is agreed that the current tariff model needs urgent attention and needs to be developed and implemented as per the DEA model.
Enhanced revenue collection is being looked at as per the comment under table 25 above. Council has approved the implementation of a R15 per month per household tariff on formerly disadvantaged areas, in order to finance or part finance the implementation of service provider co-operatives.

Unfortunately, the WMBU does not have the necessary human resources to maximise or fundraise from other sources at the moment. The filling of vacant posts in terms of the new structure will go some way to addressing this problem

TABLE 32: Goal 5: Ensure the safe and proper disposal of waste			
Objectives	**Targets**	**Activities**	**Timeframe**
Stabilize quantity and investigate the reduction of pollution potential of waste disposed of to landfill and reduce this volume	1 gas-to-energy plant by 2015 1 OWCF by end of 2015 1 MRF by 2015	Gas-to-energy Composting facility MRFs	2014-2018
Investigate the conversion of waste to energy and clean development mechanisms.	Gas-to-Energy Plant	Investigate feasibility and implement gas-to-energy options	2015

TABLE 33: Goal 6: Education and awareness			
Objectives	**Targets**	**Activities**	**Timeframe**
Conduct household awareness and education campaign on waste management	Every household to be advised on waste management matters.	Door-to-door education and awareness commencing Jan 2015 By-law distributions Pamphlet with waste information in every household	Commence Jan 2015

With reference to Table 33 above:

The conducting of education and awareness campaigning on waste management plays a very important part in reducing waste. The WMBU was denied the requisite number of staff in the structure to make this have a meaningful impact on the community. The WMBU does not have the high level resources it seeks but efforts are being made by using interns, and other short term contracted organisations such as Khabokedi via the DEA to supplement efforts. During 2014 the two central business districts in their entirety were dealt with. This type of approach needs to be strengthened and expanded in terms of depth and breadth of coverage. A lot in terms of implementation hinges on the implementation of the new structure.

TABLE 34: Goal 7: Compliance and enforcement			
Objectives	**Targets**	**Activities**	**Timeframe**
Reduce the level of dumping and littering	Reduction in illegal dumping and littering. Increase in numbers of prosecution for littering and dumping	Review the by-laws and enforce the By-laws Put signs at the open spaces with fine and toll free number for illegal dumping. Implement fining procedures. Use of designated whistle blowing facilities.	Continuous

With reference to Table 34 above:

Education an awareness campaigning is minimised if there is monitoring of compliance and enforcement. This was the basic reasoning behind the staff required in the new structure. Nevertheless efforts are being made by combining with or referring to the Environmental Health business unit whenever possible. A lot in terms of implementation hinges on the implementation of the new structure.

4. COMMUNICATION AND STAKEHOLDER PARTICIPATION

4.1. CONSULTATION PROCESS SUMMARY

TABLE 35: STAKEHOLDER ISSUES AND MUNICIPAL RESPONSES			
Stakeholder	**Issues raised/ Concerns**	**Municipality's response**	**General comments**
DEA	Second draft provisionally approved	Redrafted	
IDP Manager	Linkage to IDP raised	Linked to IDP vision and strategic outcomes	
Consultation via media advertisement (15 January 2015)			

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5. IMPLEMENTATION INSTRUMENTS

5.1. PARTNERSHIPS

5.1.1. PUBLIC-PUBLIC PARTNERSHIP

The construction of an MRF at the New England Landfill Site is proposed where separation of the recyclables will take place. An amendment to the license conditions to accommodate this facility has been submitted to DEA. The project is being spearheaded by the uMgungundlovu District Municipality in conjunction with the Msunduzi Local Municipality as the main role player, and smaller municipalities under the District's jurisdiction. The District has received funding in the amount of R21 million from the Department of Co-operative Governance and Traditional Affairs. Specialist consultants have been appointed to undertake the design and engineering concepts which have been approved by DEA, and a specialized contractor has been appointed to construct the facility.

Expected results from the MRF include:

- Increased recycling rates and reduced waste amounts for disposal
- Improved working conditions and better income for waste pickers
- Improved landfill operations and avoidance of health and accident risks

It is foreseen that the waste pickers, presently working on the landfill, will establish an association and operate the MRF with additional assistance by an experienced plant manager. The formalisation of the waste pickers, establishment of a waste recycling collection system and appointment of an MRF operator is being dealt with by the Economic Development Unit of Council.

Figure 29: Example of Clean Materials Recovery Facility

The establishment of an Organic Waste Composting Facility also uses a public-public partnership.

According to the results of the waste analysis organic waste makes up for about 36% of the municipal waste. In addition a considerable amount of garden and wood waste which makes up 23% of the total deliveries is delivered to the New England Road Landfill. On the Landfill this organic waste, besides consuming available airspace, causes generation of leachate and landfill gas. The District Municipality is in the process of conducting environmental studies on a site that has been identified on the outskirts of Pietermaritzburg.

It is intended to develop this facility so that all organic waste can be diverted from garden sites and households and be treated to produce good quality compost for resale. The appointment of an experienced operator qualified in the production of good quality compost is critical to the success of this project.

5.1.2. PUBLIC-PRIVATE PARTNERSHIP

Landfill Site

The Gas-to-Energy project has utilized a public-private partnership.

A project has been initiated to harness the methane gas that is produced from decomposing waste and to convert this gas into an energy source that can be fed into the electricity grid as a source of power during peak demand. A company specialising in the conversion to energy field has been appointed to develop this project on the New England Landfill Site. Tests have been conducted on Site to establish the quantity and quality of gas contained within the Site, and the results have shown a reliable supply of gas for at least up to fifteen years and at the energy production rate of 1.5 megawatts.

The company has submitted an application to the National Energy Regulator of South Africa to be appointed as an Independent Power Producer. As soon as this process is complete, the project will be initiated. The project is at no cost and no risk to Council and the Council will receive royalties from the sale of the electricity.

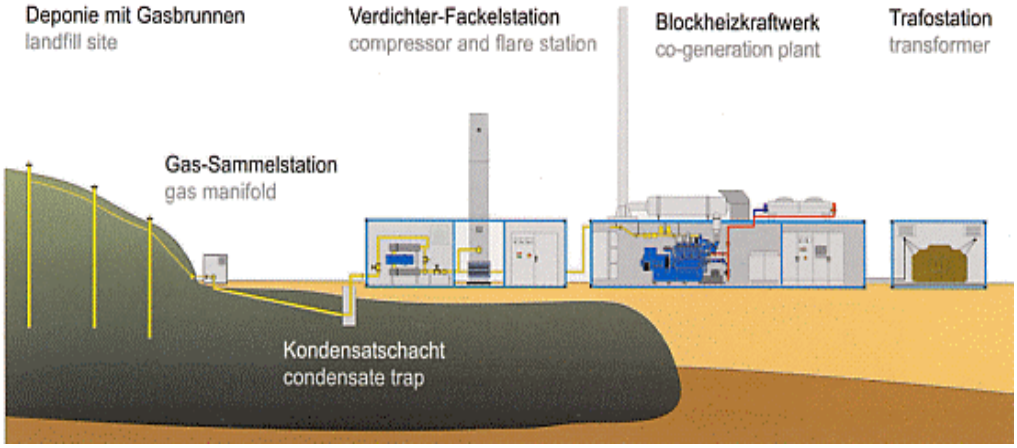

Figure 31: Typical example of Gas-to-Energy project (Supplied by Ener-G Systems, Durban)

Refuse Collection

Co-operatives:
Co-operatives are in the process of being employed in order to aid with refuse collection in those areas that are not being currently serviced.

Wildlands Conservation Trust recycling:
A memorandum of agreement has been reached with a local NGO called Wildlands Conservation Trust to collect recyclables in a few suburbs in order to aid the Msunduzi municipality with its recycling initiatives. Another public-private partnership with regard to recycling is in collaboration with small, independent recyclers who are performing the same functions as Wildlands, but on a smaller scale.

Sakhumnotho Street cleaning:
Sakhumnotho is a private company which has been employed by the municipality in order to perform street cleaning duties within the Pietermaritzburg CBD.

Public private partnerships in composting to be investigated:
Investigations are still underway with regard to a public-private partnership regarding an organic waste composting facility. This facility will need an experienced operator once opened. The WMBU has been approached by a private composting operation for the use of its organic waste collected at its garden refuse sites. This has not materialised as the cost of transporting the waste to the site was inhibitive.

KPCA public private partnership: The Keep Pietermaritzburg Clean Association in collaboration with the Msunduzi Local municipality is another example of a public-private partnership. This partnership includes members of the public and council employees together in one body in order to create education and awareness.

5.2. LEGISLATIVE INSTRUMENTS

5.2.2. THE IWMP

The IWMP is the designated and legislated waste management planning tool. This plan has to identify and accommodate interested and affected parties with regards to waste management issues. Some of these parties are, but are not limited to: ward councillors

and committees, business, recyclers, environmental institutions, and municipal officials. The plan looks at waste management with an integrated point of view.

5.2.2.1. The designated WMO for the municipality is the Process Manager for Community Development, who oversees all things waste management related.

5.2.2.2. The monitoring is being done, in the absence of appointments in terms of the structure by a foreman in the WMBU aided by three staff especially in terms of illegal dumping. The Environmental Health business unit assists in their own right by monitoring and prosecuting where necessary.

5,2.2.3. Business compliance is monitored by a staff of the WMBU as well by Environmental Health business unit.

5.2.3. INFORMATION

The NEMWA via its South African Waste Information System (SAWIS) (www.sawis.org.za) compels municipalities to establish waste information systems for the recording, collection, management and analysis of waste information. The main objectives of the WIS is to store, analyze, verify information with a view to planning, educating the public as well as assessing the status of waste generation, collection, recycling, transportation, treatment and disposal of waste. The information will also be used to assess the impact of the Waste Act in minimizing waste.

This issue of waste information is taken seriously enough by the municipality judging by the appointment of support staff. This enhanced structure that will comply with the WIS as well as the enhancement of revenue.

5.2.4. WASTE MANAGEMENT MEASURES

The NEMWA requires in chapter 4 that certain waste management measures be given consideration and acted upon. As discussed earlier the WMBU has overcome this problem somewhat by taking temporary steps to partial compliance.

5.2.5. WASTE MANAGEMENT PLANS

This IWMP covers this aspect.

5.2.6. THE PROHIBITION OF THE GENERATION OF PRIORITY WASTE

Priority waste is defined as waste types which by nature, quantity, quality, toxicity, risk or interaction with other elements of the environment are very dangerous to humans, poses a threat to the environment and are persistent or difficult to manage. The handling of this issue will be done in conjunction with the minister or with the aid of the Provincial authority on waste.

5.2.7. GENERAL DUTY IN RESPECT OF WASTE

This section involves the duty or obligation of anyone who generates waste to take steps within his or her power to avoid the generation of waste, reduce, recycle, and only treat and dispose of waste as a last resort. The municipality is playing its part by implementing this IWMP. This means that the implementation of the waste hierarchy becomes paramount. This matter is covered by a resolution as explained on page 24 of this IWMP.

5.2.8. EXTENDED PRODUCER RESPONSIBILITY (EPR)

The minister can identify products where the extended producer responsibility can apply. This means that customers can hold the manufacturer or source of the product responsible for its recycling or disposable, e.g. tyres, cans and electronic equipment, amongst other products. The municipality needs to be aware of such avenues and create communication channels to help solve problems within the municipality. This would be one of the duties of the WMO.

5.2.9. WASTE MANAGEMENT BYLAWS

The major weakness of the by-laws is the lack of resources to enforce them. Environmental officers and traffic and security officers will play major roles in the communication and application of the by-laws to a logical conclusion: viz, prosecution of the perpetrators and the eradication of waste management offences

5.2.10. COMPLIANCE AND ENFORCEMENT

Powers have been given to the environment management inspector (green scorpions) as well as the WMO to act if they have reason to believe that any provisions of the NEMWA were contravened or violated.

The NEMWA provides for a maximum penalty of R10 000 or 10 years imprisonment or both.

5.3. FUNDING MECHANISMS

Funding for the waste management department can take the form of numerous options, all of which will serve to facilitate the effective and efficient operation of the department.

5.3.1. CURRENT FUNDING MECHANISMS

5.3.1.1. BUDGET ALLOCATED BY COUNCIL

Firstly, the budget allocated by council to the waste management department forms a large part of its funding sources. Tariffs (such as those charged by the landfill site in order to use its facility for dumping) form the basis of the council-allocated budget. Where a tariff shortfall is experienced, rates are then fed into the department. These rates come from some of the customers of the Msunduzi municipality who benefit from its service.

5.3.1.2. EQUITABLE SHARE

Equitable share funding is that which comes from government to municipalities in a district and is shared among these municipalities. This funding originates from taxes paid by working citizens in South Africa. This type of funding, as reflected in the budget, reaches the WMBU via the municipality Treasury

5.3.1.3. OTHER GOVERNMENT FUNDING

The provincial departments of Public Works co-funds Sakhumnotho and COGTA funds the EPWP programme. Some funding of the landfill site is via MIG

6. IMPLEMENTATION PLAN

TABLE 36: IMPLEMENTATION PLAN FOR THE NEW ENGLAND LANDFILL SITE

Quarters			2014				2015				2016				2017				2018			
Item	**Task**	**Responsible**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
	Short Term Implementation Plan																					
	Short Term Plan – Waste Information System																					
1	Liaise with IT specialist and link to National SAWIS	LM; IT;WMO																				
2	Link weighbridge data to billing system that facilitates cost recovery for waste disposal service	LM; IT;PM In																				
3	Link to Provincial Administration vehicle database via vehicle registration numbers	LM; IT																				
	Short Term Plan - Waste Recycling, Recovery, Reuse and Energy Generation Initiatives																					
4	Formalise waste pickers at NELFS – establishment of co-operatives	PM ED&G; WMO																				

5	Establishment of waste recycling collection system in wards by promoting SMMEs and job creation	PM ED&G; WMO																					
	Short Term Plan – Environmental Compliance																						
6	Facilitate appointment of environmental consultant to undertake sampling of ground/surface water, leachate and gas emission and submit report on findings	P.M Landfill																					
7	Plan and undertake internal bi-annual Landfill compliance audits in liaison with Mon. Comm.	LM																					
	Short Term Plan – Institutional Arrangements																						
8	Appoint/designate a Waste Management Officer as required by NEM Waste Act	DMM, HR																					
9	Develop administrative capacity to ensure achievement of efficiencies	DMM; HR																					
10	Training and refresher courses for staff with focus on management and compliance	LM; HRD																					
	Short Term Plan – Responsible Disposal of Waste																						

11	Optimise airspace utilisation by undertaking annual infrastructure upgrade	P.M Landfill; LM																					
12	Plant /vehicles to be replaced as per Fleet replacement program. Additional plant/vehicles to be purchased	LM; Fleet Manager																					
	Medium Term Plan – Waste Recycling, Recovery, Reuse and Energy Generation Initiatives																						
13	Establish low-tech mixed waste MRF	P.M. Landfill; WMO																					
14	Establish OWCF for the treatment of organic waste	P.M. Landfill; WMO																					
15	Enter into PPP for the management and operation of MRF and OWCF	PM ED&G; WMO																					
16	Upgrade existing garden sites for storage and transport of organic waste to OWCF	P. M Landfill; WMO																					
17	Implementation of Gas-to-Energy project	P.M Landfill; WMO																					
	Medium Term Plan – Environmental Compliance																						
18	Plan and undertake external annual Landfill compliance audit	P.M. Landfill																					

TABLE 37: IMPLEMENTATION PLAN FOR WASTE MANAGEMENT																						
Quarters			**2014**				**2015**				**2016**				**2017**				**2018**			
Item	**Task**	**Responsible**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
	Short term Plan																					
1	Develop budget and financing model for waste management	DMM; WMO																				
2	Increase recycling rates by 10% p.a.	WMO																				
3	Service 119000 households with door-to-door collection	WMO																				

TABLE 38: IMPLEMENTATION PLAN FOR WASTE MANAGEMENT																						
Quarters			**2014**				**2015**				**2016**				**2017**				**2018**			
Item	**Task**	**Responsible**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
	Medium Term Plan																					
4	Service 163993 households with door-to-door collection	WMO																				
5	Develop an effective waste information system	DMM; WMO																				
6	Review waste management by-laws	DMM																				
7	Make every household aware of waste management services	WMO																				
8	Show evidence that we have prosecuted transgressors	DMM; WMO																				
9	Recycle all garden waste																					
10	Extend recycling programme by law to non- council collected business																					