



**NEW GX ENVIRO SOLUTIONS AND
LOGISTICS HOLDINGS (PTY) LTD**

**KWAGGASRAND RECYCLING FACILITY
UPGRADE – DRAFT ENVIRONMENTAL
MANAGEMENT PROGRAMME**

Locality: Pretoria

Departmental Ref No: Gaut: 002/14-15/W0015

SHANGONI
Management Services (Pty) Ltd



DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)

**New GX Enviro Solutions and
Logistics Holdings (Pty) Ltd**

**Kwaggasrand Recycling Facility Upgrade
– draft Environmental Management
Programme**

Locality: Pretoria

Departmental Ref No: Gaut: 002/14-15/W0015

Date: 1 December 2015

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PROJECT DETAILS

Gauteng Department of Agriculture and Rural Development

Reference No.: Gaut: 002/14-15/W0015

Project Title: Kwaggasrand Recycling Facility Upgrade

Project Number: NEW-KWA-14-09-11

Compiled by: Karien Venter

Date: 1 December 2015

Location: Pretoria

Technical Reviewer: Lourens de Villiers



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LIST OF ABBREVIATIONS

BID	-	Background Information Document
CRR	-	Comments and Responses Report
DWS	-	Department of Water and Sanitation
EAP	-	Environmental Assessment Practitioner
ECO	-	Environmental Control Officer
EIA	-	Environmental Impact Assessment
EIR	-	Environmental Impact Report
EMF	-	Environmental Management Framework
EMP	-	Environmental Management Programme
GDARD	-	Gauteng Department of Agriculture and Rural Development
GN	-	Government Notice
I&AP	-	Interested and Affected Party
NEMA	-	National Environmental Management Act, (Act No. 107 of 1998), as amended
R	-	Regulation



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1. INTRODUCTION

New GX Enviro Solutions Logistics Holdings (Pty) Ltd is a waste management company specialising in the provision of waste disposal and recycling solutions.

In 2011, New GX was adjudicated a tender (Tender CB124/2010) by the City of Tshwane Metropolitan Municipality (CTMM) to provide the following services in Region 3 and Region 4 of the City of Tshwane:

- Weekly waste collection;
- Litter picking;
- Illegal dumping clearance; and
- Skip removal services, as and when required.

Through the fulfilment of the above mentioned tender, New GX currently provides employment to 120 local residents and further develops local Small, Medium and Micro-sized Enterprises (SMMEs). The company is also contractually required to support community based recycling initiatives and establish a buy-back centre or centres.

1.1 Background Description

The Kwaggasrand Recycling Facility has been operational for more than 10 years. Currently, the manual sorting at the facility has been temporarily ceased, as of the 1st of December 2013. This is due to the fact that the adjacent Kwaggasrand landfill site has closed, as it had reached its disposal capacity. Waste now needs to be taken to the Onderstepoort landfill site. Phase 1A of the project, namely the installation of a Materials Recovery Facility (not part of this Waste Management Licence application) is currently being constructed onsite. A portion of the project property was also used as a temporary off-site construction camp by the CTMM. Waste dumping, soil stripping (as part of the rehabilitation phase of the adjacent landfill site) and small scale farming also occurred in the past. The remainder of the property is vacant.

1.2 Project/Activity Description

New GX Enviro Solutions and Logistics Holdings (Pty) Ltd is proposing to upgrade the Kwaggasrand Recycling Facility to a multi-purpose waste recycling facility. The proposed project arose when New GX realised that the CTMM faces a challenge with fast dwindling landfill airspace at a number of their landfill sites. The multi-purpose waste recycling facility will therefore aim to reduce the volume of waste being taken to the various landfill sites by removing the recyclable waste fraction from the waste stream intended for disposal and thereby extend the life span of the landfill sites.

The waste recycling facility is capable of sorting, screening, balling and/or crushing the following recyclables:



- Cardboard;
- Paper;
- Plastic;
- Cans; and
- Glass.

Phase 1A of the project (2.17ha): Currently, the manual sorting of waste at the existing recycling facility has been temporarily ceased, as of the 1st of December 2013. This is due to the fact that the adjacent Kwaggasrand landfill site has closed, as no airspace was remaining at the facility. A Materials Recovery Facility (MRF) is being introduced adjacent to the existing recycling building onsite to optimise the recycling facility. A MRF is a specialised plant that sorts mixed waste into separate waste streams/fractions through a combination of automated and manual processes. The processing capacity of the facility will stay the same and the installation of the MRF therefore does not form part of the Waste Management Licence application as the same processes will occur, only via a more efficient system.

A process flow for the Materials Recovery Facility is given below. From the MRF, the material will leave the site for use as raw materials in external manufacturing processes. The facility will also be open for local communities to drop off their sorted recyclable waste.

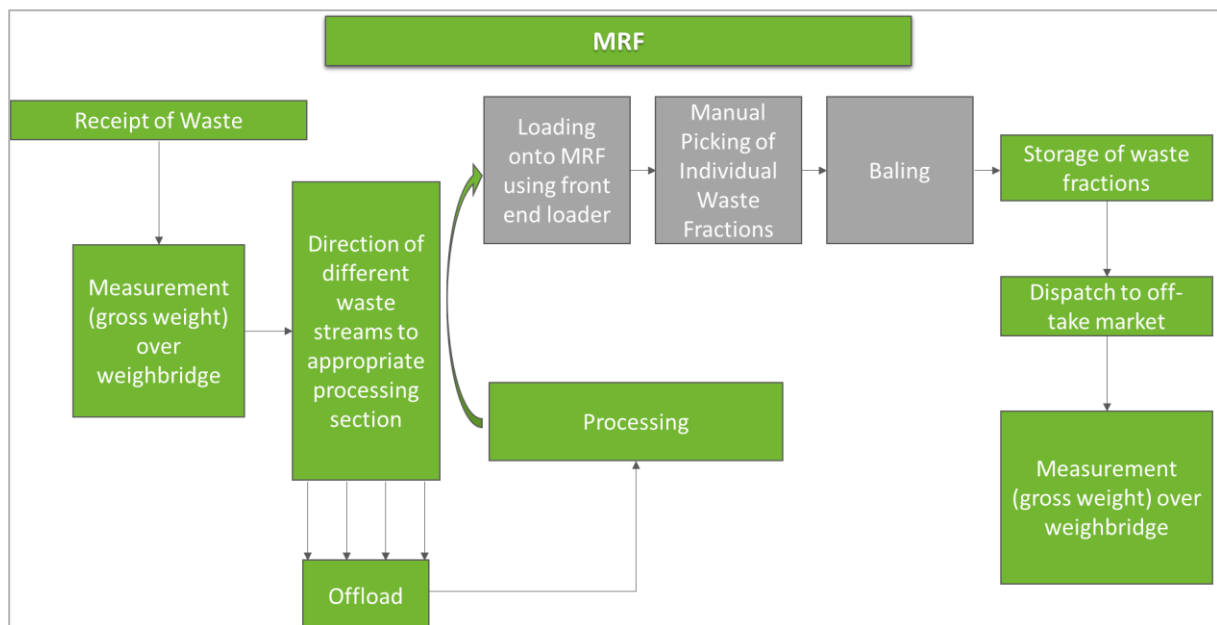


Figure 1: Flow diagram for the Materials Recovery Facility

The proposed upgrade of the waste recycling facility will commence in three phases (Phase 1B, Phase 2 and Phase 3), as shown in the figure below, and will cater for the processing of approximately 1 521.5 tons of the following waste materials per day:

- Cardboard;
- Paper;



- Plastics;
- Cans;
- Glass;
- Green waste;
- Wet waste;
- Building rubble; and
- Waste tyres.



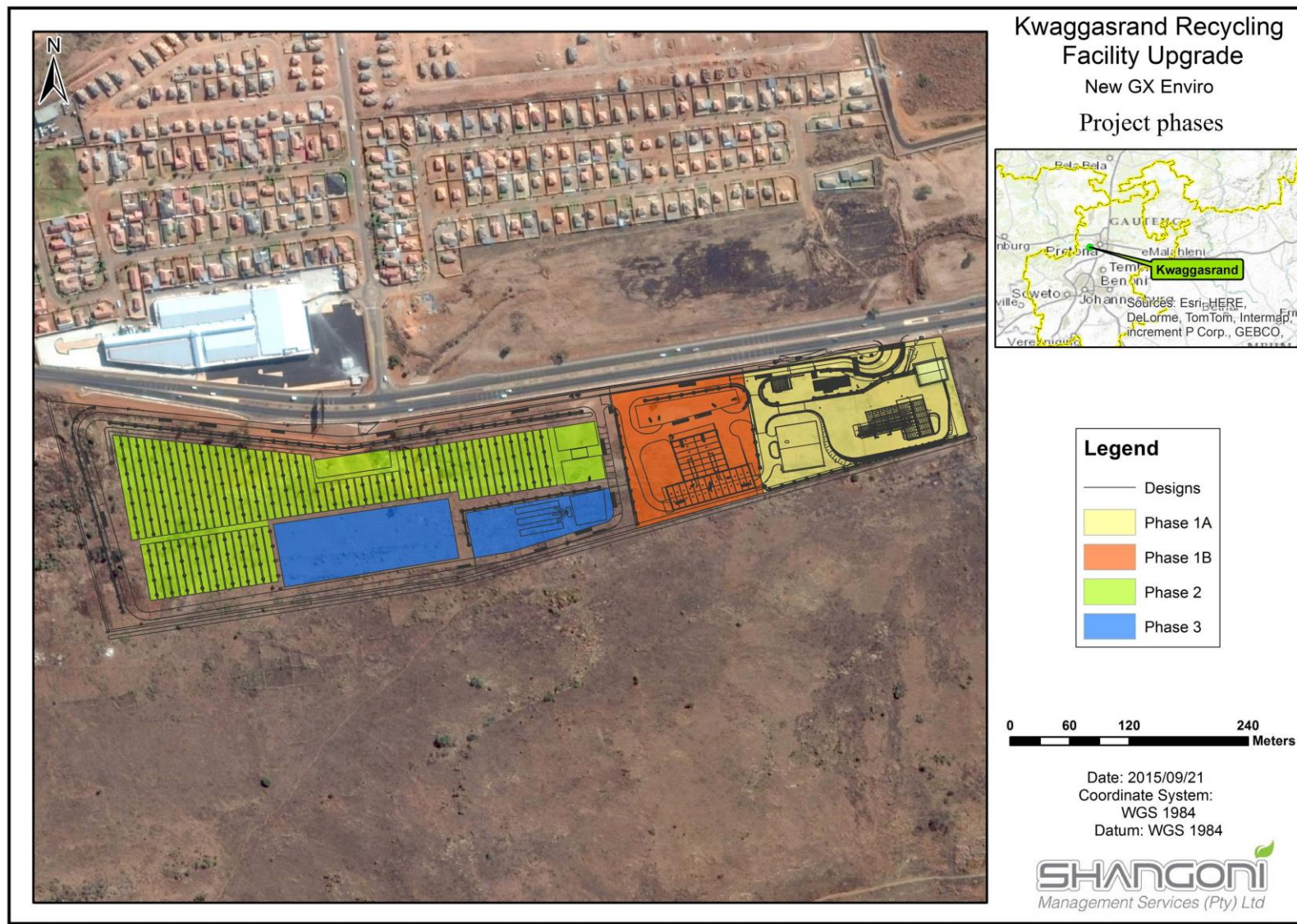


Figure 2: Project Phases

Phase 1B of the project (1.65ha): The construction of new infrastructure in support of the existing recycling facility in order to optimise and increase the throughput capacity of the facility. This phase entails the establishment of a Waste Transfer Station and the throughput capacity of the recycling facility will be increased to $\pm 783.57 - 912.9$ tons per day of dry and wet waste that hasn't been recycled by households and businesses. The infrastructure will include, for example, a docking/parking area for the dumping of waste and refuse loads, a waste and refuse storage area, parking areas, a staff canteen, offices, an education centre and ablution facilities. Designs for the upgrade of the recycling facility have been finalised and are included in Section 1.5.3 and attached under Appendix C of this report.

Wet waste will be managed in two ways at the facility. In the first process, the wet waste will be separated from the dry waste and can then be channelled towards one of two processes. The wet waste will either be loaded into open top bins and taken to a licensed, off-site bio-digester/gasifier for further processing, or it will be air dried onsite to produce Refuse Derived Fuel ('RDF'). The applicant is also proposing to install a bio-digester/gasifier at the Kwaggasrand Recycling Facility, but this technology requires authorisation from the National Department of Environmental Affairs. Once such authorisation has been received, the wet waste will be fed into the onsite bio-digester/gasifier. A flow diagram of this process is given below.

In the second process, the recyclable fractions of the wet waste will be removed and the remaining waste will be baled. The bales will then either be wrapped in plastic or loaded into static compactor bins and taken off site to landfill sites or waste-to-energy facilities. Wastewater from this process will be treated and released into the municipal sewage system. A flow diagram of this process is also given below.

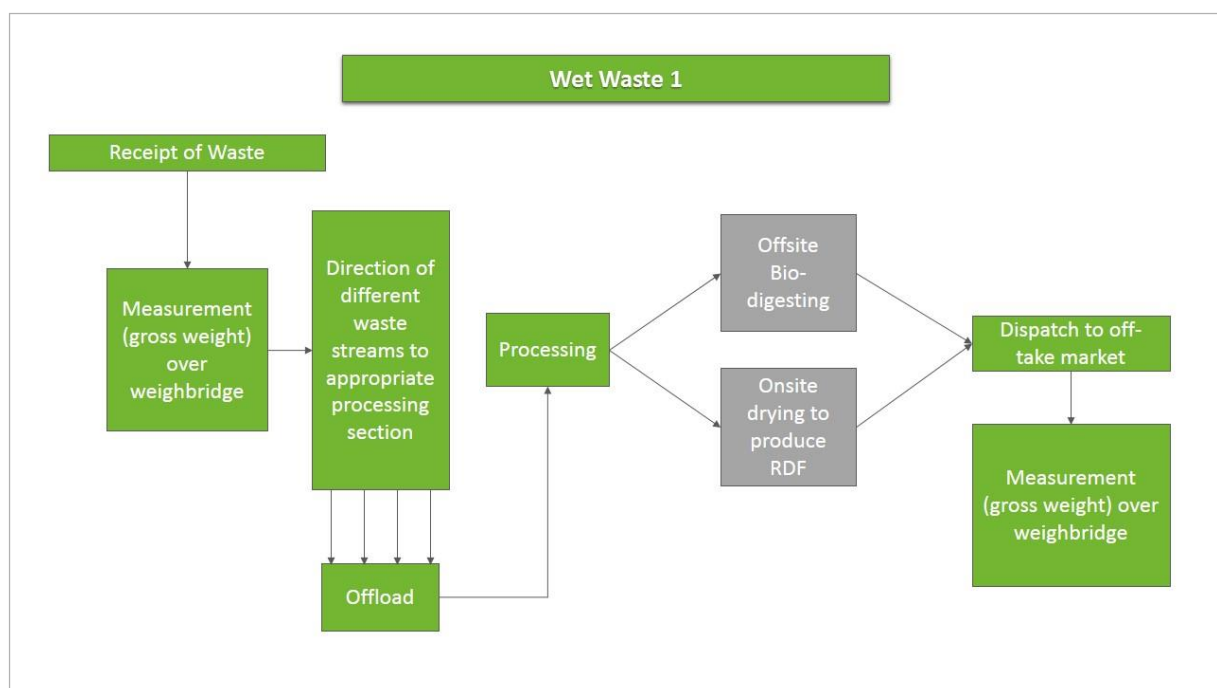


Figure 3: Flow diagram for wet waste (1) – Bio-digester/gasifier/air drying



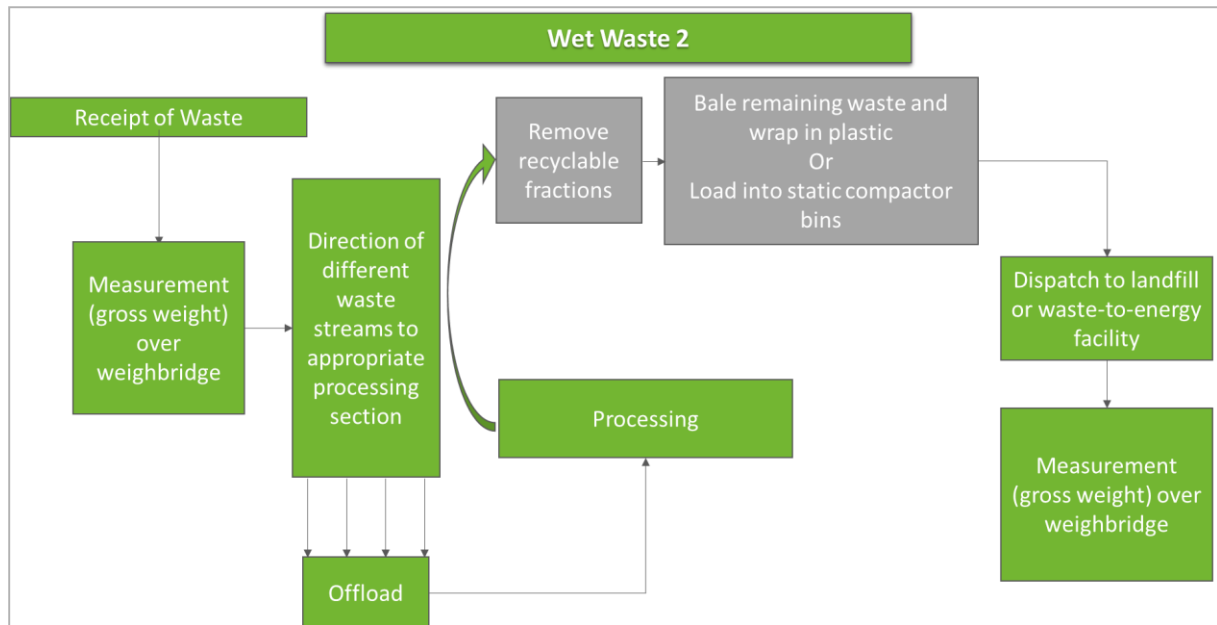


Figure 4: Flow diagram for wet waste (2) - Wet waste baler

Phase 1B will only make provision for the recycling of the new, “wet waste” waste stream. This phase will not increase the capacity or change the nature of waste that will be recycled as part of Phase 1A of the project (MRF).

A Waste Storage Facility will also be constructed for the storage of baled and plastic wrapped general waste from the Waste Transfer Station. As more than 100m³ of general waste will be stored at the facility, the facility will be registered on the Gauteng Waste Information System and will comply with the National Norms and Standards for the Storage of Waste (GN. 926 of 29 November 2013).

Phase 2 of the project (7.12ha):

Green waste: A composting facility will be set up on open land west of the above mentioned recycling building. At the composting facility, green waste such as garden refuse and sports field- and park-maintenance waste, will be stockpiled and fed into a shredding or mulching apparatus where after the bulk of the shredded/mulched material will enter a windrow composting process. Some mulched material will be stockpiled and sold off to the landscaping and/or rehabilitation industry without being subjected to further composting. Compost windrows will repeatedly be turned and moistened and the resultant compost will be sold. Seepage water from the composting windrows will be collected in a leachate collection pond for re-use to moisten the windrows. A flow diagram of this process is given below.

Phase 2 will also include the establishment of a storage area for baled and plastic wrapped refuse.



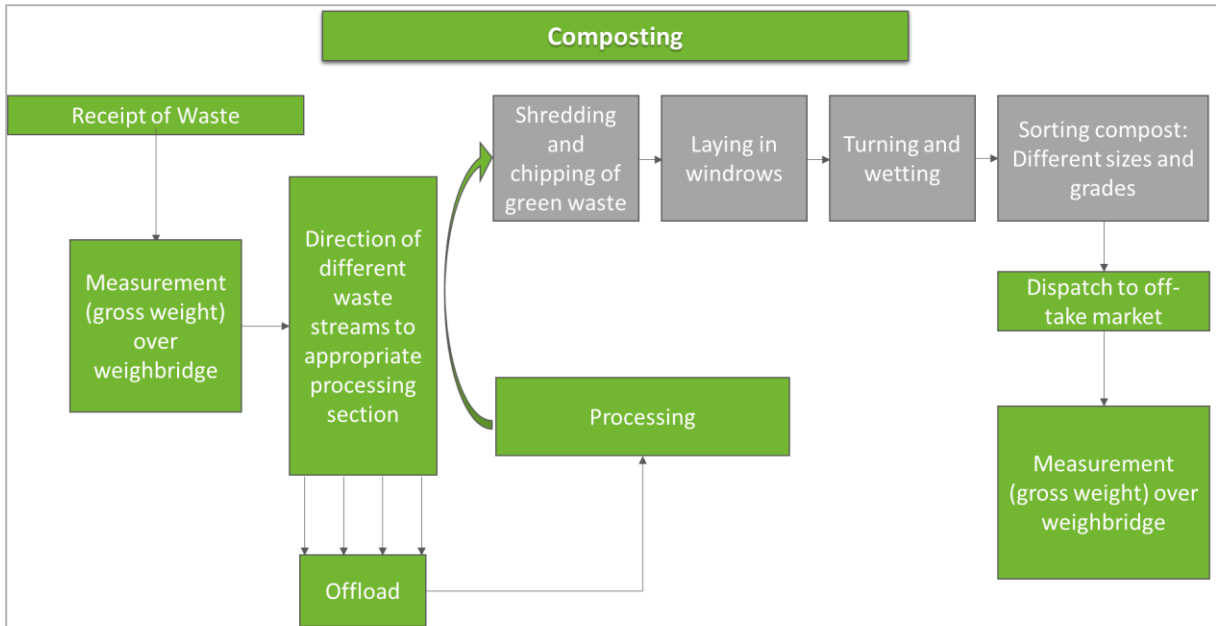


Figure 5: Flow diagram for the composting facility

Phase 3 of the project (1.87ha): A building rubble crushing plant will be erected on open land, also to the west of the above mentioned recycling building. Here building rubble will be stockpiled and crushed in a crushing plant. Crushed material will be distributed for foundation and filling material for local construction projects. A flow diagram of this process is given below.

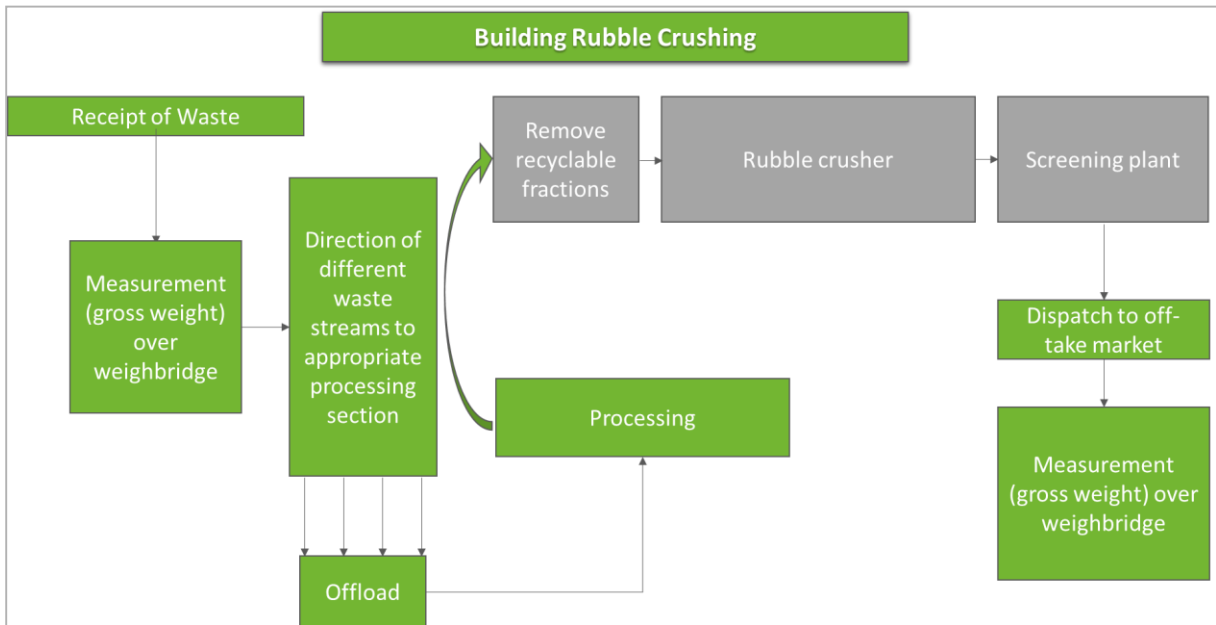


Figure 6: Flow diagram for the building rubble crusher

At a Waste Tyre Crumbing Facility, waste tyres will be de-beaded, cut, shredded, screened and grinded into rubber crumbs. The rubber crumbs will leave the site for re-use elsewhere such as, for example, in



road tarmac, rubber products, agriculture and reclaimed rubber processes. A flow diagram of this process is given below.

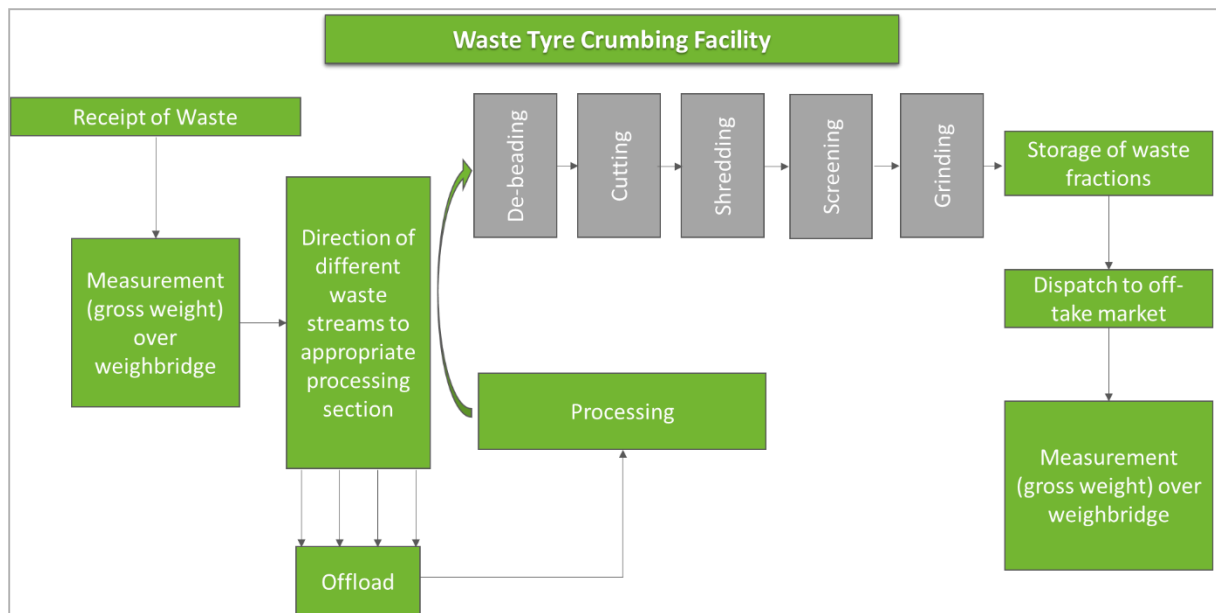


Figure 7: Flow diagram for the Waste Tyre Crumbing Facility

It is expected that the recycling facility will have the following operational times:

Table 1: Expected operational times for the facility

PERIOD	FROM	UNTIL
Weekdays	07:00	00:00
Saturdays	07:00	00:00
Sunday	07:00	00:00
Public holidays	07:00	00:00

The following listed activities in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) are being applied for:

Table 2: Listed activities in terms of GN. No R 921, dated 2013 under NEM: WA, 2008

Number and date of the relevant notice	Category	Activity No	Description
GN. No 921 of 29 November 2013	Category A	2	The sorting, shredding, grinding, crushing, screening or baling of general waste at the facility that has an operational area in excess of 1 000m ² .
			The operational area for sorting, shredding, grinding, crushing, screening and baling of waste will be approximately 128 100m ² .



Number and date of the relevant notice	Category	Activity No	Description
			<p>The following will occur at the facility:</p> <ul style="list-style-type: none"> • Sorting, screening and baling of cardboard, paper, plastic and cans. • Sorting, crushing and screening of glass. • Shredding and composting of green waste. • Sorting, screening, baling, drying and plastic wrapping of wet waste. • Crushing and screening of building rubble. • Waste tyre de-beading, cutting, shredding, screening and grinding.
GN. No 921 of 29 November 2013	Category A	3	<p>The recycling of general waste at a facility that has an operational area in excess of 500m², excluding recycling that takes place as an integral part of an internal manufacturing process within the same premises.</p> <p>General waste will be recycled at the Kwaggasrand Recycling Facility. The facility has an operational area of approximately 128 100m².</p> <p>The following waste streams will be recycled:</p> <ul style="list-style-type: none"> • Cardboard • Paper • Plastic • Cans • Glass • Green waste • Wet waste • Building rubble • Waste tyres <p>Cardboard, paper, plastic, cans and glass will pass through a Materials Recovery Facility (MRF) where the waste will be sorted, screened and baled or crushed. The waste will then leave the site for re-use as raw material for manufacturing processes or for export.</p> <p>Green waste will be shredded and composted at the composting facility. The resulting compost will be sold.</p> <p>Wet waste will either be loaded into bins and taken to an off-site bio-digester/gasifier for further processing; air dried onsite to produce Refuse Derived Fuel (RDF); or baled and plastic</p>



Number and date of the relevant notice	Category	Activity No	Description
			<p>wrapped. The baled and plastic wrapped wet waste will leave the site for use in waste-to-energy facilities.</p> <p>Waste tyres will be de-beaded, cut, shredded, screened and grinded.</p>
GN. No 921 of 29 November 2013	Category A	12	<p>The construction of a facility for a waste management activity listed in Category A of this Schedule (not isolation to associated waste management activity).</p> <p>Construction activities associated with the waste transfer station, green waste composting facility, building rubble recycling facility (building rubble crushing) and waste tyre crumbing facility. The general waste recycling building is existing and operational.</p>
GN. No 921 of 29 November 2013	Category B	6	<p>The treatment of general waste in excess of 100 tons per day calculated as a monthly average, using any form of treatment.</p> <p>1 521.5 tons of general waste will be treated (physical, biological and/or chemical treatment) at the Kwaggasrand Recycling Facility per day. The following waste streams will be treated:</p> <ul style="list-style-type: none"> • Cardboard • Paper • Plastic • Cans • Glass • Green waste • Wet waste • Building rubble • Waste tyres <p>Cardboard, paper, plastic, cans and glass will pass through a Materials Recovery Facility (MRF) where the waste will be sorted, screened, baled or crushed. The waste will then leave the site for re-use as raw materials or for export.</p> <p>Green waste will be shredded and composted at the composting facility. The resulting compost will be sold.</p> <p>Wet waste will either be loaded into bins and taken to an off-site bio-digester/gasifier for further processing; air dried onsite to produce Refuse Derived Fuel (RDF); or baled and plastic wrapped. The baled and plastic wrapped wet waste will leave the site for use in waste-to-energy facilities.</p>



Number and date of the relevant notice	Category	Activity No	Description
			Waste tyres will be de-beaded, cut, shredded, screened and grinded.
GN. No 921 of 29 November 2013	Category B	10	The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).
			Construction activities associated with recycling of general waste in excess of the current throughput capacities. This includes, for example, the construction of a Docking/Parking area for disposal/dumping of waste and refuse loads, the construction of a Waste and refuse storage area and the construction of the staff canteen and ablution facilities.

2. ENVIRONMENTAL ASSESSMENT PRACTITIONER

Name of firm	Shangoni Management Services (Pty) Ltd.	
Postal address	PO Box 74726 Lynwood Ridge Pretoria 0040	
Telephone No.	(012) 807 7036	
Fax	(012) 807 1014/086 643 5360	
E-mail	lizette@shangoni.co.za	
Team of Environmental Assessment Practitioners (EAP) on project		
Name	Qualifications	Responsibility
Mr Lourens de Villiers	<ul style="list-style-type: none"> MSc. Water Resource Management (UP) BSc. (Hons) (PU for CHE) More than 12 years' experience conducting Environmental Impact Assessments and Waste Management License Applications 	EIA Project Leader and Co-ordinator
Ms. Lizette Crous	<ul style="list-style-type: none"> MSc. Environmental Management (University of London) More than 4 years' experience conducting Environmental Impact Assessments and Waste Management License Applications 	EAP



Ms Karien Venter	<ul style="list-style-type: none">• B.Sc. (Hons) Environmental Management• 1 years' experience conducting Environmental Impact Assessments and Waste Management License Applications.	EAP
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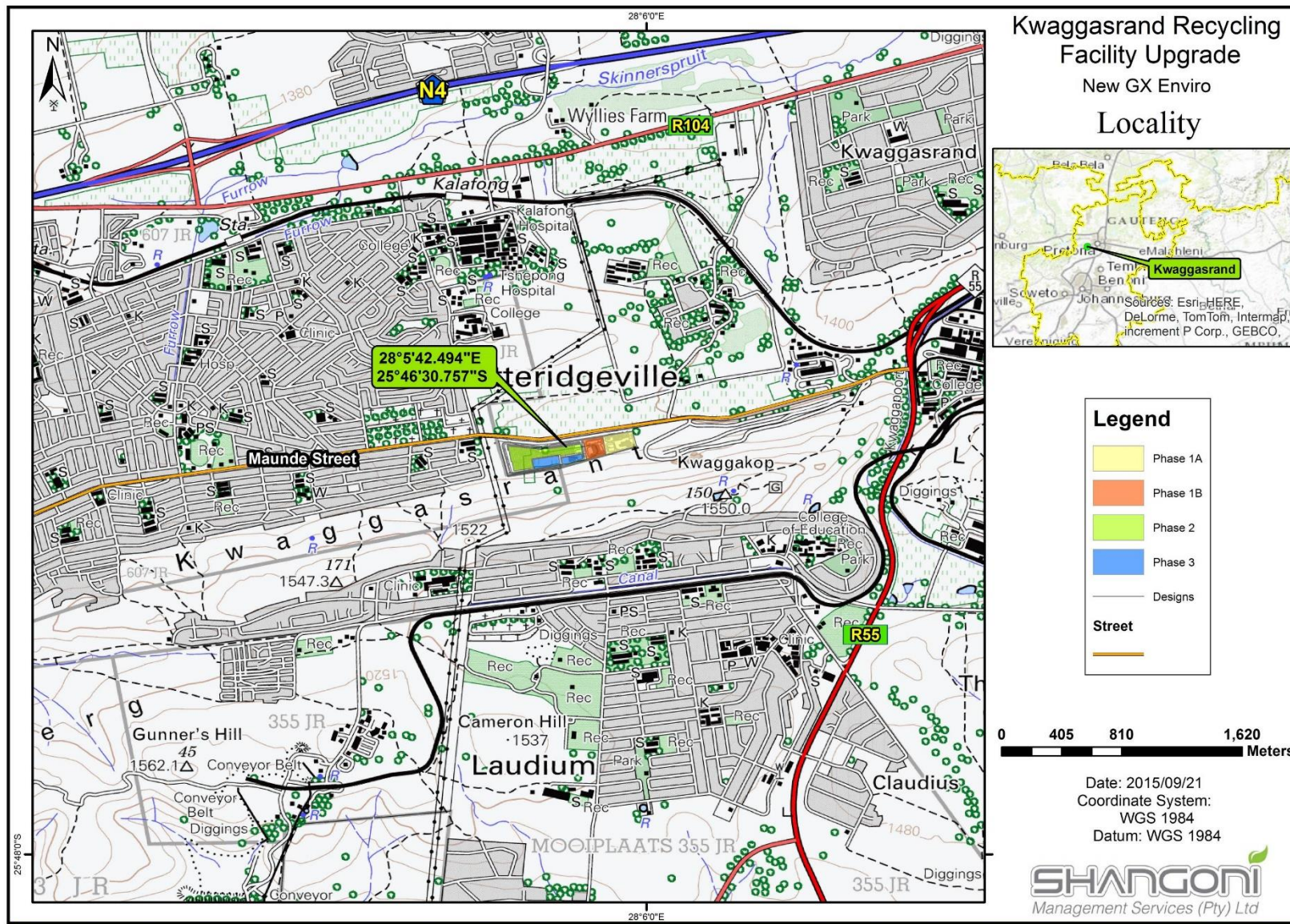


Figure 8: Locality of the Site



3. SITE DOCUMENTATION

The following documentation must be available at the site office at all times:

- Copies of the Scoping and Environmental Impact Assessment (EIA) Reports.
- A copy of this Environmental Management Programme (EMP).
- A copy of the Waste Management Licence.

4. LEGISLATION

The table below provides an indication of the main legislation, policies and/or guidelines applicable to the recycling facility project.

Table 3: Applicable legislation, policies and/or guidelines

Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
Laws of General Application		
The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	-	To establish a Constitution with a Bill of Rights for the RSA.
Environment Conservation Act, 1989 (Act No. 73 of 1989 as amended)	Gauteng Department of Agriculture and Rural Development	To control environmental conservation.
National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment, and to regulate the 'Duty of Care' Principle.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Gauteng Department of Agriculture and Rural Development	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.
Promotion of Access to Information Act, 2000 (Act No. 2 of 2000 as amended)	-	To give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights.
Air Quality and Noise		



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	City of Tshwane Metropolitan Municipality	To reform the law regulating air quality to protect the environment by providing reasonable measures for the prevention of pollution. To provide for national norms and standards regulating air quality monitoring, management and control.
Water Management		
National Water Act (NWA), 1998 (Act No. 36 of 1998)	Department of Water and Sanitation	To provide for fundamental reform of the law relating to water resources.
Waste Management		
National Environmental Management: Waste Act (Act No. 59 of 2008)	Gauteng Department of Agriculture and Rural Development	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.
National Environmental Management: Waste Act (Act No 59 of 2008) – Waste Classification and management regulations (GNR. 634 of 23 August 2013)	Gauteng Department of Agriculture and Rural Development	To regulate the classification and management of waste in a manner that supports and implements the provisions of the Waste Act.
GNR. 926 of 29 November 2013 – National Norms and Standards for the Storage of Waste	Gauteng Department of Agriculture and Rural Development	To provide a uniform national approach to the management of waste storage facilities, to ensure best practice in the management of waste storage facilities and to provide minimum standards for the design and operation of new and existing waste storage facilities.
GNR. 634 of 23 August 2013 – Waste Classification and Management Regulations	Gauteng Department of Agriculture and Rural Development	To regulate the classification and management of waste in a manner that supports and implements the provisions of the Waste Act, to establish a mechanism and procedure for the listing of waste management activities that do not require a Waste Management Licence, to prescribe requirements for the disposal of waste to landfill,



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
		to prescribe requirements and timeframes for the management of certain wastes and to prescribe general duties of waste generators, transporters and managers.
Environmental Conservation Act, 1989, Waste Tyre Regulations, 2008.	Gauteng Department of Agriculture and Rural Development	To regulate the management of waste tyres by providing for the regulatory mechanisms.
Biodiversity		
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	Gauteng Department of Agriculture and Rural Development	To provide for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998.
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	Gauteng Department of Agriculture and Rural Development	To provide for control over the utilisation of the natural agricultural resources of South Africa in order to promote the conservation of the soil, the water sources and the vegetation and the combating of weeds and invader plants.
Soil and Land Management		
National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
Environment Conservation Act, 1989 (Act No. 73 of 1989 as amended)	Gauteng Department of Agriculture and Rural Development	To control environmental conservation.
Heritage and Archaeological Resources		
National Heritage Resources Act No 25 of 1999 (Act No. 25 of 1999 as amended)	South African Heritage Resources Agency	To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, and empower civil society to nurture and conserve their heritage resources so that they may be bequeathed to future generations
Protected Areas		
National Environmental Management: Protected Areas Act,	Gauteng Department of Agriculture and Rural Development	To provide for the protection and conservation of ecologically viable



Title of legislation, policy or guideline	Administering authority	Aim of legislation, policy or guideline
2003 (Act No. 57 of 2003 as amended)		areas representative of South Africa's biological diversity and its natural landscapes.
Planning of New Activities		
National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.	Gauteng Department of Agriculture and Rural Development	To provide for the integrated management of the environment and to regulate the 'Duty of Care' Principle.
National Environmental Management: Waste Act (Act No. 59 of 2008)	Gauteng Department of Agriculture and Rural Development	To reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation.
Government Notice (GN) 718: " <i>List of waste management activities that have, or are likely to have a detrimental effect on the environment</i> ", dated 2009.	Gauteng Department of Agriculture and Rural Development	To regulate and control the authorisation of certain waste-related listed activities.



5. ENVIRONMENTAL MANAGEMENT PROGRAMME

Refer to the tables below for the EMP. Responsibility is assigned to the relevant parties, keeping in mind New GX Enviro Solutions and Logistics Holdings (Pty) Ltd are ultimately still responsible for ensuring implementation of the EMP. The EMP must be updated should any significant changes occur to the operations with regards to the recycling facility. The mitigation measures are set out in the tables below (per project phase), for the recycling facility.

Note: Mitigation measures, as contained in the tables below, have taken the various alternatives into consideration.

5.1 GOVERNMENT NOTICE NO. R921 (CATEGORY A), ACTIVITY 2, 3 AND 12 AND GOVERNMENT NOTICE NO. R921 (CATEGORY B), ACTIVITY 6 AND 10

Table 4: EMP – Planning and Design Phase

Activity:					
<ul style="list-style-type: none"> Designing and planning of the recycling facility upgrade, waste tyre storage area, waste tyre crumbing facility, composting facility and building rubble crushing plant. Designing and planning of the stormwater management system for the site. Designing and planning of the leachate collection pond for the composting facility. Designing and planning of the wastewater collection and treatment system for the wastewater from the wet-waste processes. Designing and planning of the sewage pipeline system. Designing and planning of the ablution facilities. Planning for the construction phase of the recycling facility upgrades. 					
Aspect:					
<ul style="list-style-type: none"> Inadequate design for the upgrading of the recycling facility, waste tyre storage area, waste tyre crumbing facility, composting facility and building rubble crushing plant.. Inadequate design of the stormwater management system for the site. Inadequate design of the leachate collection pond for the composting facility. Inadequate design of the wastewater collection and treatment system for the wastewater from the wet-waste processes. Inadequate design of the sewage pipeline system. Inadequate design of the ablution facilities. Inadequate planning for the construction phase of the recycling facility upgrades. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase	X			
	Construction	X			
	Operation				
	Decommissioning				
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
<ul style="list-style-type: none"> Non-compliance to environmental legislation. Air pollution (generation of dust) due to the inadequate design of the Recycling Facility. Soil erosion due to the inadequate design of the Recycling Facility. Contaminated runoff from waste handling areas. Leachate from the composting facility. Leachate from the waste tyre storage and crumbing facility. 	To ensure adequate design of the Recycling Facility.	<ul style="list-style-type: none"> The waste storage areas(s) must be designed according to the National Norms and Standards for the Storage of Waste (GN 926 of 29 November 2013). The waste storage area(s) must be registered on the Gauteng Waste Information System 90 days prior to them being constructed. The design of the Waste Tyre Storage Area and Crumbing Facility must be in accordance with the Waste Tyre Regulations, 2009. Adequate stormwater management measures must be designed for the Waste Tyre Storage Area. Make provision for impermeable roads, offloading areas, storage areas and processing areas, as well as curbs to prevent affected runoff from entering permeable areas. 	New GX must verify implementation of the mitigation measures proposed in this EMP	Before construction commences	<ul style="list-style-type: none"> NewGX Recycling facility designer/engineer



		<ul style="list-style-type: none"> • Make provision for affected water and/or wastewater collection systems, in order to contain and treat affected water within the boundaries of the site. • The composting area must be designed with an impervious base to prevent leachate from percolating into the ground. • A leachate collection and treatment system must be designed for the composting area. • The building rubble crushing area must be designed with an impervious base, if possible. 			
Formation of subsidence features in dolomite residuum areas.	To prevent the ingress of water into the subsurface.	<p>Geotechnical parameters applicable to the property in view of the prevailing soil conditions</p> <ul style="list-style-type: none"> • Soil Zones A and B tentatively classify as Site Class “C2/S2/P” according to the guidelines of the NHBRC Standards and Guidelines, 1999. The suffix “P” has been assigned to the classification due to the fact that the site may be underlain at depth by dolomite. In view of the potentially problematic soil conditions, modified normal construction may be considered for lightly loaded single-storey structures. Where heavy loads are proposed, one of the following foundation systems may be considered: stiffened or cellular raft foundations; soil raft foundations or piled or pier foundations. • Soil Zone C classifies as NHBRC Site Class “P” due to the presence of unconsolidated fill and disturbed ground conditions. This zone should either be excluded from the development or be properly reinstated according to recognised engineering standards. Dolomite residuum was encountered in one test pit in this zone, implying that any development where ingress of water may take place (e.g. the composting facility) should be designed and constructed in a way not to trigger subsidence features. This implies that the area under consideration should be sealed in order to prevent ingress of water into the subsurface. Adequate stormwater drainage management should also be implemented to prevent ponding of surface water in this area. • The gravelly material from Soil Zone A should qualify as G5 quality (after removal of the coarser than 150mm fraction) whereas the clayey sand from Soil Zone B should qualify as G7/G8 quality material. • The site soils may be removed to at least 3.0m below the surface, using conventional earth-moving machines. Isolated areas are present in Soil Zone A where hard rock chert and large chert boulders are present and where encountered, will probably require jackhammer work and “pop” blasting for removal. The sidewalls of excavations should be temporarily stable during the dry season although instabilities of deep excavations may occur during the wet season. • No groundwater seepages were encountered during the investigation, however, adequate damp-proofing precautions should be implemented and the normal drainage precautionary measures, applicable to dolomitic terrain, should be adhered to (van der Merwe, 2015). 	New GX must verify implementation of the mitigation measures proposed in this EMP	Before construction commences	<ul style="list-style-type: none"> • NewGX • Recycling facility designer/engineer
<ul style="list-style-type: none"> • Soil, stormwater or groundwater pollution due to the inadequate design and installation of the sewerage pipeline system. • Wastage of a valuable natural resource (water) due to the inadequate design and installation of the water pipeline system. 	To ensure adequate design and installation of sewerage and water pipeline systems.	<ul style="list-style-type: none"> • All pipelines must be designed with durability in mind. • All pipelines must be designed in accordance with engineering and municipal requirements. • Meters must be installed to monitor the volume of water used at the recycling facility. 	New GX must verify implementation of the mitigation measures proposed in this EMP	Before construction commences	<ul style="list-style-type: none"> • NewGX • Recycling facility designer/engineer
Soil, stormwater or groundwater pollution due to the inadequate design of the ablution facilities.	To ensure adequate design of the ablution facilities.	<ul style="list-style-type: none"> • The planning phase must determine the requirements for ablution facilities at the facility, in terms of the number of people that will be working at the facility. • Adequate ablution facilities must then be provided for. 	New GX must verify implementation of the mitigation measures proposed in this EMP	Before construction commences	<ul style="list-style-type: none"> • NewGX • Recycling facility designer/engineer
<ul style="list-style-type: none"> • Delays due to poor planning. • Legal non-compliances to the Waste Management Licence and EMP. • Harm to the environment. 	To ensure pro-active planning for the construction phase of the upgrade of the recycling facility.	<ul style="list-style-type: none"> • Obtain a Waste Management License before commencing with the construction phase of the proposed project. • Obtain permission from the local municipality for the discharge of wastewater into the municipal sewage disposal system, if required. • The approved EMP and Waste Management Licence must be binding on the construction contractor and included in the tender documentation and contracts. 	New GX must verify implementation of the mitigation measures proposed in this EMP	Before construction commences	<ul style="list-style-type: none"> • NewGX • Recycling facility designer/engineer



		<ul style="list-style-type: none"> • Adequate planning and scheduling of the construction activities to allow for disruptions caused by rain and wet conditions. The scheduling must make provision for environmental training/awareness raising for workers prior to the commencement of construction. Records of all training must be maintained. • Adjacent land owners must be timeously informed that the construction phase will commence and must be kept informed of the progress throughout. • Appoint an independent Environmental Control Officer (ECO) prior to the commencement of the construction phase. • Ensure that a complaints register is kept at the construction site from the first day of construction. • Ensure that the Waste Management Licence and EMP are kept at the construction site from the first day of construction. • Source unskilled labour locally, wherever possible. • A construction site plan must be compiled and approved by NewGX and the ECO. The site plan must include the location of the construction camp, toilets, stores and site office. 			
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Table 5: EMP – Environment in General

Activity:					
<ul style="list-style-type: none"> • Construction activities associated with the upgrading of the recycling facility. • Operational activities associated with the recycling facility. 					
Aspect:					
<ul style="list-style-type: none"> • Lack of knowledge amongst workers and contractors in terms of how their actions may impact on the environment. • Unauthorised access to the site. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase	X			
	Construction	X			
	Operation	X			
	Decommissioning				
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures		Monitoring and Compliance Reporting	Timeframe
Harm to the environment in general (this includes pollution of soil and water resources, as well as harm to employees and wasteful practices in terms of resource use and waste management).	To prevent harm to the environment by educating workers and contractors.	<ul style="list-style-type: none"> • The contractor is to ensure that all employees, including sub-contractors and their employees, attend onsite Environmental Awareness Training prior to commencing work on site. • Follow-up Environmental Awareness Training may be required from time to time as new subcontractors or crews commence work or for specific activities that may potentially impact the environment. • The contractor is to maintain accurate records of any training undertaken. • The ECO shall monitor the contractor's compliance with the requirement to provide sufficient environmental awareness training to all site staff. • All construction workers shall be issued with ID badges (if possible) and clearly identifiable uniforms. • Training is to cover all aspects of the EMP and procedures to be followed. • All employees are required to attend onsite Environmental Awareness Training prior to commencing work on site. • Follow-up Environmental Awareness Training may be required from time to time as new employees commence work or for specific activities that may potentially impact the environment. 		<p>Prior to Construction Phase</p> <ul style="list-style-type: none"> • New GX must verify implementation of the mitigation measures proposed in this EMP <p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Commence prior to the construction phase and also implement during the construction and operational phases.
				<ul style="list-style-type: none"> • ECO • Construction Contractor • Facility manager 	



		<ul style="list-style-type: none"> All employees must receive training on waste management in order to identify, prevent, minimise or manage actions or behaviours that are likely to cause adverse impacts on air, water, land, fauna and flora as a result of operational activities at the facility. Members of staff must be trained to manage all types of wastes in accordance with the provisions of any norms and standards and legislative requirements applicable to recycling, crushing and composting facilities. The facility manager is to maintain accurate records of any training undertaken. 			
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Table 6: EMP – Fauna and Flora

<p>Activity:</p> <ul style="list-style-type: none"> Destruction of natural vegetation due to site clearance. Activities associated with the construction phase of the proposed development. Activities associated with the operational phase of the proposed development. Consumption of waste by pests, such as rodents. <p>Aspect:</p> <ul style="list-style-type: none"> If the development encroaches into sensitive areas beyond the site, destruction of natural vegetation via for example bulldozers, additional access roads and construction camps placed within adjacent sensitive vegetation, dumping of construction wastes. During the operation phase, potential expansion due to a need for storage space or access roads. Construction and operational activities could cause edge effects on the adjacent sensitive vegetation. Edge effects include possible vehicle access, impacts from pedestrians, dumping due to broken fences, recycling material blown from the site towards the ridge etc. On site activities can lead to the spread of alien invasive plant species from the site to the adjacent natural vegetation, especially if the natural vegetation becomes disturbed. In addition, exotic plant species used in the landscaping of the site may spread into the adjacent natural vegetation. The major weed <i>Campuloclinium macrocephalum</i> (pom-pom weed) was noted on the site and can quickly become invasive in natural vegetation. Movement of construction vehicles, machinery, delivery vehicles and personnel on site. The use of poison to control pests. 						
Nature and significance of environmental impact						
Project Phase Applicability	Planning and Design Phase	X				
	Construction	X				
	Operation	X				
	Decommissioning					
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures		Monitoring and Compliance Reporting	Timeframe	
<ul style="list-style-type: none"> Impact description: Destruction of natural, sensitive vegetation (beyond the site's boundaries). Extent of impact: Local (sensitive vegetation south of the site boundary). Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof. Degree to which impact can be reversed: Not reversible if destruction/clearing of vegetation occurs. Grassland rehabilitation is costly and time consuming and rarely successful in reaching the original species diversity. Significance of impact: High significance: The impact is of major importance and mitigation is essential. Failure to mitigate, with the objective of 	Prevent access to and impacts on adjacent sensitive vegetation (outside of the project development footprint).	<ul style="list-style-type: none"> No roads, fences, storage, future expansion etc. should be planned beyond the site boundary (project property). Retain as much secondary and disturbed grassland as possible, to act as a buffer between the site and adjacent sensitive vegetation. Retain indigenous trees on the site. An independent Ecological Control Officer (ECO) should be appointed to oversee construction. A boundary wall/fence must be constructed prior to development of the various phases. The wall construction activity may not exceed the current disturbed footprint of the site. The construction activities and all related impacts such as camps and storage areas, should be restricted to the transformed vegetation. Prohibit vehicular or pedestrian access into natural areas beyond the site. No open fires or harvesting of trees for firewood is permitted. Construction workers may not remove flora and neither may anyone collect seed from the plants without permission from the local authority. 		<p>Pre-construction Phase</p> <ul style="list-style-type: none"> New GX must verify implementation of the mitigation measures proposed in this EMP. <p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. 	Commence during the planning and construction phases.	<ul style="list-style-type: none"> ECO Construction Contractor Facility manager



<p>preventing this impact, could render the entire development option or entire project proposal unacceptable.</p> <ul style="list-style-type: none"> • Degree to which impact may cause irreplaceable loss: The vegetation on the ridge is situated in an area classified as Important to reach the Gauteng conservation targets, as well as being situated in a critically endangered ecosystem. Destruction of the vegetation will cause irreplaceable loss to this ecosystem and potential loss of threatened species. • Mitigation possibility: Mitigation is feasible. If mitigation measures are strictly implemented and adhered to, it is possible that there will be no resulting impact. 		<ul style="list-style-type: none"> • Prohibit vehicular or pedestrian access into natural areas beyond the demarcated boundary of the construction area within the site. • Any contravention of these measures e.g. clearing of vegetation, must immediately be stopped and corrective action taken in consultation with the ECO and GDARD. 			
<ul style="list-style-type: none"> • Impact description: Deterioration of sensitive vegetation due to edge effects. • Extent of impact: Local (sensitive vegetation south of the site boundary). • Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof. • Degree to which impact can be reversed: Must be prevented, but can be reversed with human intervention, if immediate action is taken. If degradation is allowed to proceed, the impact may become irreversible. • Significance of impact: Medium: the impact is of importance and is therefore considered to have a negative impact. Mitigation is required to prevent the negative impacts. • Degree to which impact may cause irreplaceable loss: The vegetation on the ridge is situated in an area classified as Important to reach the Gauteng conservation targets, as well as being situated in a critically endangered ecosystem. Deterioration of the vegetation caused by edge effects from the development could result in irreplaceable loss in the long term. • Mitigation possibility: Mitigation is both feasible and possible. If mitigation measures are strictly implemented and adhered to, it is possible that there will be no resulting impact. 	<p>To prevent edge effects into the adjacent sensitive vegetation.</p>	<ul style="list-style-type: none"> • The boundary wall/fence must be monitored to ensure that the fence is in proper order. • No dumping of any material (including garden refuse) may take place over the fence. • All construction activities must remain within the boundaries of the development area, as demarcated at the start of construction. There must be no vehicular or pedestrian access to the south of the site. • Ensure that waste from the site is not carried over the fences by the wind. A planted hedge could be used to trap waste. The hedge should comprise indigenous species that occur naturally in the area such as <i>Euclea crispa</i> and <i>Searsia leptodictya</i>. • Allow natural fires to burn across the vegetation, except if infrastructure and lives are threatened. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.</p>	<p>Commence during the construction phase.</p>	<ul style="list-style-type: none"> • ECO • Construction Contractor • Facility manager
<p>The majority of invasive species observed during the Vegetation Assessment were recorded in the transformed vegetation areas. Many of these are classified as category 1b invasive species. A few individuals of the major invasive weed <i>Campuloclinium macrocephalum</i> (pom-pom weed) were noted in the secondary and</p>	<p>To remove alien invasive plant species from the site and immediate surrounds and monitor re-emergence.</p>	<ul style="list-style-type: none"> • Alien invasive species that were identified within the site and the secondary and disturbed grassland should be removed prior to construction. By removing these species, the spread of seeds into adjacent vegetation will be prevented. • The eradication of the invasive species should take place as per an Alien and Invasive Plant Eradication and Monitoring plan that should contain the following: <ul style="list-style-type: none"> ○ Eradication methodology, including prioritising of species and areas to be cleared on site. 	<p>New GX must verify implementation of the mitigation measures proposed in this EMP.</p>	<p>Commence prior to the construction phase.</p>	<ul style="list-style-type: none"> • ECO • Construction Contractor • Facility manager



<p>disturbed grassland, from where this species could likely and quickly spread to the rocky grasslands. The category 1b species on the site could spread to the ridge to the south of the site.</p> <ul style="list-style-type: none"> • Impact description: Spread of alien invasive plant species from the transformed site to the natural vegetation that will result in the deterioration of the sensitive ridge vegetation. • Extent of impact: Local (sensitive vegetation south of the site boundary). • Duration of impact: Lasting during the construction phase and a possibility of extending into the operational phase and for the duration thereof. • Degree to which impact can be reversed: Must be prevented, but can be reversed with human intervention, if immediate action is taken and eradication and monitoring is implemented. If degradation is allowed to proceed, the impact may become irreversible. • Significance of impact: Medium: the impact is of importance and is therefore considered to have a negative impact. Mitigation is required to prevent the negative impacts. • Degree to which impact may cause irreplaceable loss: Spread of alien invasive plant species into the natural vegetation could lead to a dominance of these invasive species, which could replace the canopy or herbaceous layer of natural ecosystems, thereby transforming the structure, composition and function of natural ecosystems. Deterioration of the vegetation caused by alien invasive species spreading from the site could result in irreplaceable loss over the long term. • Mitigation possibility: Mitigation is both feasible and possible. If mitigation measures are strictly implemented and adhered to, it is possible that there will be no resulting impact. 		<ul style="list-style-type: none"> ○ In particular, the tenacious weed <i>Campuloclinium macrocephalum</i> (pom-pom weed) should be eradicated prior to any disturbances. ○ Ideally the invasive species should be removed from the whole site, even the phases that will not be undertaken immediately. In order to protect the soils, the cleared areas could be sown with an indigenous grass mix until such time as they are developed. ○ If the entire site cannot be cleared of the invasive species, the eradication and monitoring plan should include monitoring of the boundary area and the natural vegetation south of the site and enforce the eradication of all new infestations. ○ Eradicate all invasive species (<i>Rumex usambarensis</i> and <i>Lantana camara</i>) from the natural vegetation south of the site. ○ All alien seedlings and saplings must be removed from the site/adjacent vegetation as they become evident for the duration of construction. ○ Manual/mechanical removal is preferred to chemical control. • All construction vehicles and equipment, as well as construction material, should be free of plant material. Therefore, all equipment and vehicles should be thoroughly cleaned prior to access onto the construction areas. This should be verified by the ECO. • No alien invasive plant species should be planted as part of landscaping within the site. The following plants are recommended for landscaping: <p>Recommended trees: <i>Combretum molle</i> (velvet bushwillow) – semi deciduous tree (1-3m high) <i>Searsia leptodictya</i> (mountain karee) – evergreen <i>Cussonia spicata</i> (cabbage tree/kiepersol) – evergreen <i>Dombeya rotundifolia</i> (wild pear/drolpeer) – deciduous tree up to 5m <i>Olea europea</i> subsp <i>africana</i> (wild olive/olienhout) <i>Combretum erythrophyllum</i> (rivier vaderslandswilg/river bushwillow)</p> <p>Recommended tree/shrubs, especially for perimeter planting or to screen areas: <i>Euclea crispata</i> (Ghwarrie), <i>Searsia lancea</i> or <i>Searsia leptodictya</i> (karee species), <i>Gymnosporia polyacantha</i> (kraalpendoring/kraal spike-thorn), <i>Grewia occidentalis</i> (raisin bush/kruisbessie)</p> <p>Lawns Due to the invasive properties of <i>Pennisetum clandestinum</i> (kikuyu), this grass is not recommended. This grass can easily spread into surrounding natural vegetation and should thus not be used around the perimeter. In addition, seeds of this grass may also spread from the site. The indigenous <i>Cynodon dactylon</i> (couch grass/kweek gras) or any of its varieties are recommended.</p> <p>Water retention dam <i>Typha capensis</i> (bulrush) <i>Imperata cylindrica</i> (Cotton Wool Grass) and <i>Cynodon dactylon</i> (Couch Grass), <i>Hemarthria altissima</i> (red swamp grass) and sedges such as <i>Cyperus latifolius</i></p>			
<p>Disturbance and displacement of fauna species onsite.</p>	<p>To minimise the disturbance of fauna species onsite.</p>	<ul style="list-style-type: none"> • Site workers and contractors should ensure that no animals are disturbed, trapped, hunted or killed. • Access to suitable and sensitive habitats of faunal species (the ridge to the south of the site) should be restricted. • All outside lighting should be directed away from sensitive areas (the ridge to the south of the site) towards the interior of the project site. 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> • ECO • Construction Contractor • Facility manager



		<ul style="list-style-type: none"> Fluorescent and mercury vapour lighting should be avoided. Sodium vapour lights should rather be used as far as possible. 	Operational Phase <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 		
The use of poison to control pests negatively impacts upon untargeted animals such as birds, cats and dogs.	To effectively control pests without negatively impacting upon untargeted fauna species.	<ul style="list-style-type: none"> Implement good housekeeping practices and clean waste offloading areas daily. Regularly clean waste storage containers. Implement biological or mechanical pest control programmes. The placement of owl boxes can attract barn owls to the site for biological control of rodents. Mechanical rodent traps can also be used. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	During the operational phase.	Facility manager

Table 7: EMP – Topsoil and Erosion

Activity: <ul style="list-style-type: none"> Scheduling the construction phase of the proposed project. Site clearance. Stockpiling of topsoil and cleared vegetation. Landscaping, replacement and levelling of subsoil and topsoil and re-vegetation. Vegetation establishment as part of rehabilitation. Operation of the upgraded recycling facility. 						
Aspect: <ul style="list-style-type: none"> Construction activities scheduled during summer months (raining season). Prolonged exposure of cleared areas (areas that are bare and devoid of vegetation). Ineffective topsoil removal and storage. Topsoil being exposed to the elements. Incorrect replacement and levelling of subsoil and topsoil. Inadequate concurrent rehabilitation and unsatisfactory establishment of vegetation. Incorrect management of stormwater runoff. 						
Nature and significance of environmental impact						
Project Phase Applicability	Planning and Design Phase	X				
	Construction	X				
	Operation	X				
	Decommissioning					
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures		Monitoring and Compliance Reporting	Timeframe	Responsibility
Degradation and loss of a valuable resource (topsoil) through increased runoff as stormwater flows over cleared, bare areas during rainfall events.	To prevent the degradation and loss of topsoil.	<ul style="list-style-type: none"> If possible, schedule construction activities for dry months (winter). 		New GX must verify implementation of the mitigation measures proposed in this EMP.	Complete prior to the start of the construction phase.	<ul style="list-style-type: none"> Construction contractor NewGX
Degradation and loss of a valuable resource (topsoil). Changes to surface characteristics, such as the removal of vegetation and soil compaction result in increased runoff and decreased infiltration of water. Increased runoff leads to erosion and the loss of topsoil.	To reduce the duration and extent of exposure of topsoil to preserve it as a resource and protect it from erosion.	<ul style="list-style-type: none"> Topsoil (top 150mm), where still present, is to be stockpiled in discrete areas and retained for future landscaping efforts. Any sub-soil or rocks removed should also be stockpiled separately and be used during the rehabilitation phase. Cleared indigenous vegetation should be used as a brush pack on topsoil stockpiles for erosion prevention. Minimise the length and steepness of slopes. 		ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.	During the construction phase, up until operation of the facility.	<ul style="list-style-type: none"> Construction contractor ECO.



		<ul style="list-style-type: none"> • If sterilisation of the topsoil has occurred during stockpiling, fertilisers may be used to supplement the soils before seeding of the area takes place. • Replace topsoil concurrent with construction, whenever possible. • Cordon off areas under rehabilitation using danger tape. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • Aim to replace stockpiled topsoil to its original depth. • Topsoil should be returned to the same area from where it was stripped. • If there is not enough topsoil available from a particular soil zone, topsoil of a similar quality may be used to replace it. • Compacted soil should be ripped to ensure effective re-vegetation. • Re-vegetation using indigenous grass species. • If areas show no specific vegetation growth within three months, areas shall receive additional topsoil, be ripped to a depth of 100mm and re-planted. • Soil stabilising measures could include rotovating in straw bales (at a rate of 1 bale/20m²), applying mulching or brush packing, or creating windbreaks using brush or bales. 			
<p>Erosion of cleared areas. Changes to surface characteristics, such as the removal of vegetation and soil compaction result in increased runoff and decreased infiltration of water. Increased runoff leads to erosion and the loss of topsoil.</p>	<p>To minimise the duration of exposure of cleared areas and to limit erosion of subsoil.</p>	<ul style="list-style-type: none"> • The contractor is to ensure that all reasonable measures are taken to limit erosion during the construction phase. Erosion protection measures include sand bags, cut-off drains and/or berms. • Placement of erosion prevention structures such as cement, rock or vegetation (grass) to reduce water velocity at concentration points within the drainage system, if required. • Cleared indigenous vegetation can be stockpiled for possible reuse in later rehabilitation or landscaping, or as a brush pack for erosion prevention. • Removal of vegetation is to be avoided until such time as soil stripping is required. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.</p>	<p>During construction phase, up until operation of the facility.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO
<p>Ineffective rehabilitation causing soil erosion and the generation of dust.</p>	<p>To ensure proper replacement of subsoil and topsoil to promote effective rehabilitation of disturbed areas.</p>	<ul style="list-style-type: none"> • Replacement and rehabilitation should be progressive during the project and not left until the end. • Implementation of effective and sustainable rehabilitation and remediation practices. • Cordon off areas under rehabilitation using danger tape. If necessary, these areas should be fenced off to prevent vehicular, pedestrian and livestock access. • Disturbed areas must be cleared of any building rubble or other debris. • All weeds must be removed prior to soil replacement. • Subsoil must be used to fill in excavations around the recycling facility and associated infrastructure. • The disturbed area must be top-soiled, sloped and re-vegetated as soon as possible using indigenous grass species. • If sterilisation of the topsoil has occurred during stockpiling, fertilisers may be used to supplement the soils before seeding of the area takes place. • Aim to replace stockpiled topsoil to its original depth. • Topsoil should be returned to the same area from where it was stripped. • If there is not enough topsoil available from a particular soil zone, topsoil of a similar quality may be used to replace it. • Compaction must be minimised by using the correct equipment. Excessively heavy vehicles should not be used to replace the soil. A dozer must be used instead of a grader. • Compacted soil should be ripped to ensure effective re-vegetation. • Soils should ideally only be moved when dry. • Soil stabilising measures could include rotovating in straw bales (at a rate of 1 bale/20m²), applying mulching or brush packing or creating windbreaks using brush or bales. • Re-vegetated areas should be continuously monitored to verify whether the vegetation is growing and covering bare areas. • If areas show no specific vegetation growth within three months, areas must receive additional topsoil, be ripped to a depth of 100mm and re-planted. 	<p>ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.</p>	<p>Before completion of the construction phase.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO



		<ul style="list-style-type: none"> Fertilisers can also be used to promote growth of vegetation. 			
Soil erosion due to improper management of stormwater onsite.	To ensure adequate stormwater management and to prevent soil erosion.	<ul style="list-style-type: none"> It is the responsibility of the applicant to ensure that storm water control measures are designed and constructed to be capable of withstanding the maximum design flood. It should be taken into consideration that the potential for erosion increases where the surface runoff is concentrated and must be addressed within the designs. Designs should incorporate gradual drainage to avoid siltation of storm water infrastructure. The site must have an adequate and effective stormwater management system in place. Stormwater measures should be inspected on a regular basis in order to ensure that the structures are functional and not causing soil erosion. Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from the recycling and related activities. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	Life of operation	Facility Manager

Table 8: EMP - Soil, surface water, stormwater and groundwater

<p>Activity:</p> <ul style="list-style-type: none"> The handling, storage, mixing and disposal of cement and concrete. The cleaning of equipment and construction areas. Handling, storage and disposal of general, domestic and hazardous waste. Installation and use of ablution facilities. Storage and handling of hazardous chemical substances including fuel, greases and oils. Vehicle and equipment maintenance and fuelling. Stormwater runoff on site. The release of treated wastewater into the municipal sewage system. The pumping of sewage off site into the municipal sewage system. The storage of waste tyres and rubber crumbs. The operation of the composting facility. 						
<p>Aspect:</p> <ul style="list-style-type: none"> Incorrect management, storage and disposal of concrete and cement. Incorrect management and disposal of contaminated wash water or wastewater. Spillages from cleaning equipment used for construction (e.g. cement mixers). Incorrect management, storage and disposal of construction waste, general waste and hazardous waste. Unsanitary conditions on site. Poor management and spills of hazardous chemical substances, fuel, greases and oils. Leaking equipment or vehicles and/or spillage of fuels, greases and oils. Incorrectly managed stormwater runoff and contamination of stormwater runoff. The release of wastewater of unsuitable quality into the municipal sewage system. Leaking or broken sewage pipes. Incorrect storage of waste tyres and rubber crumbs. Waste leachate from the composting facility. 						
Nature and significance of environmental impact						
Project Phase Applicability	Planning and Design Phase	X				
	Construction	X				
	Operation	X				
	Decommissioning					
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures		Monitoring and Compliance Reporting	Timeframe	Responsibility



Soil and surface water pollution due to the incorrect management of cement and concrete.	To prevent the pollution of soil and surface water as a result of spillage, improper handling, storage, mixing or disposal of cement and concrete.	<ul style="list-style-type: none"> • Cement may only be mixed in a designated area. • Dry cement must be removed from the soil surface to prevent an impermeable layer forming on top of the soil. The cement must be disposed of together with any building rubble. • Ready-mix trucks are not permitted to clean chutes on site. Cleaning into foundations or a dedicated cleaning pit is permitted. • Bricklayers and plasterers are to minimise any cement spill or runoff in their work area and are to ensure that the work area is cleaned of all cement spillage at the end of each workday. • Both used and unused cement bags are to be stored in weatherproof containers so as not to be affected by rain or runoff. • Contaminated soil resulting from concrete or cement spills is to be removed immediately after the spillage has occurred and placed on the appropriate rubble stockpile. • Runoff from the washing out of wall cavities is to be contained against the building by excavations or berms around the foundations. All reasonable measures must be taken to prevent the dirty water from contaminating a watercourse. 	ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.	During construction phase, up until operation of the facility.	<ul style="list-style-type: none"> • Construction contractor • ECO
Soil and surface water pollution due to the release of contaminated wash water into the environment.	To prevent the pollution of soil and surface water bodies, through contaminated wash water. An example of this would be water that is contaminated with cement or concrete.	<ul style="list-style-type: none"> • No washing of construction vehicles is permitted on site. • A dedicated temporary cleaning area is to be identified to facilitate washing of all cement and painting equipment. • The cleaning area could be a plastic lined cleaning pit or dedicated plastic or metal drums, located as close as possible to a water point. • No wastewater/wash water may be disposed of on site, onto the soil or into any water body. • Runoff from the washing activities is to be contained against the building by excavations of berms around the foundations. 	ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority.	During construction phase, up until operation of the facility.	<ul style="list-style-type: none"> • Construction contractor • ECO
Soil, surface water and groundwater pollution from incorrect waste management practices. Nuisance caused by odours and unsightly appearance of waste onsite.	To prevent soil, surface and groundwater pollution and nuisance due to poor waste management.	<ul style="list-style-type: none"> • Building and demolition waste must be disposed of at a licensed landfill site or recycling facility. • Installation of sufficient waste bins, skips or bulk containers. Containers must be present on site at all times. • All containers (bins, skips or bulk containers) shall be kept in a clean and hygienic manner. • Containers (bins, skips or bulk containers) utilised for the disposal of general and hazardous waste must be demarcated accordingly. • Waste material may only be temporarily stored at areas demarcated for such storage practices. • General waste shall be stored in a manner that prevents the harbouring of pests. • General waste materials should always be stored or disposed of separately from hazardous waste material (e.g. oil rags). • General and hazardous waste can be deposited into appropriately demarcated bins at the construction activities. Bins are then emptied into appropriately demarcated skips or bulk containers at the end of each day or more often if required. • Waste must be collected regularly to prevent its accumulation on site. • New waste storage areas/facilities must be registered with the competent authority within ninety (90) days prior to construction taking place. • The location of the waste storage facility must be in accordance with GNR. 926 of 29 November 2013 [National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008): National Norms and Standards for the storage of waste]. • The design of the waste storage facility must be conducted in accordance with GNR. 926 of 29 November 2013. 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	During the construction and operational phases.	<ul style="list-style-type: none"> • Construction contractor • ECO • Facility manager



		<ul style="list-style-type: none"> • Waste storage facilities must have correct access control and signage as stipulated in GNR. 926 of 29 November 2013. • Waste storage facilities must be operated as stipulated in GNR. 926 of 29 November 2013. • All waste storage containers must comply with the conditions as stipulated in GNR. 926 of 29 November 2013. • Training must be provided continuously to employees working with waste. The training programme must include the provisions stipulated in GNR. 926 of 29 November 2013. • An Emergency Preparedness Plan must be compiled in accordance with GNR. 926 of 29 November 2013. • Monitoring, auditing, reporting and record keeping must be conducted in accordance with GNR. 926 of 29 November 2013. • Installation of sufficient waste bins, skips or bulk containers. The design of the bins, skips or bulk containers must ensure containment to prevent seepage, must be covered to prevent water ingress and must be placed on impermeable surfaces within bunded areas. • All containers (bins, skips or bulk containers) shall be kept in a clean and hygienic manner. • Containers (bins, skips or bulk containers) utilised for the disposal of general and hazardous waste must be demarcated accordingly. • Waste material may only be temporarily stored at areas demarcated for such storage. • General waste shall be stored in a manner that prevents the harbouring of pests. • Skips or bulk containers should be removed to a licensed landfill site on a regular basis. No build-up of waste is permitted onsite. • Safe disposal certificates should be requested from general and hazardous landfill sites with every waste disposal. Waste may only be disposed of at a licensed landfill in accordance with the Norms and Standards for Disposal to Landfill as stipulated in Section 7(1)(c) of the NEMWA, 2008. • Safe disposal certificates should be kept on file to illustrate compliance with the cradle to grave principle. • Hazardous waste may only be handled by a registered waste disposal company. • Any waste generated at the facility must be classified in terms of GNR. 634 of 23 August 2013 (National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008): Waste Classification and Management Regulations), except where the waste is listed under Annexure A of GN. 634. • Safety data sheets must be obtained or prepared for any hazardous waste generated at the facility, as stipulated in GNR. 634 of 23 August 2013. • All waste storage containers must be labelled, as stipulated in GNR. 634 of 23 August 2013. • Detailed records must be kept of all waste generated, as stipulated in GNR. 634 of 23 August 2013. This includes the classification of the waste, quantities of waste generated and re-used, recycled, recovered, treated or disposed of (in tons or m³ per month), and by whom the waste was managed. • Waste manifest documents must be compiled for any hazardous waste generated onsite, as stipulated in GNR. 634 of 23 August 2013 (specifically Annexure 2). • All waste transporters must also complete waste manifest documents for each load of waste transported, as stipulated in GNR. 634 of 23 August 2013 (specifically Annexure 2). • Waste manifest documentation must be retained for a period of at least five (5) years. • No incineration of any kind of waste will be permitted onsite. 			
<p>Soil, surface water and groundwater pollution as a result of unsanitary conditions onsite.</p>	<p>Prevent soil, surface and groundwater pollution from unsanitary conditions onsite.</p>	<ul style="list-style-type: none"> • Sufficient ablution facilities shall be provided – minimum of 1 toilet per 10 workers. • The ablution facilities must be on impermeable surfaces. • The location of toilets shall be located within 100m of any work point. • Ablating anywhere other than in the toilets shall not be allowed. • Any temporary ablution facilities are to be secured to avoid them from blowing or falling over. 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO • Facility manager



		<ul style="list-style-type: none"> • The contractor shall ensure that any chemicals and/or waste from the ablution facilities are not spilled on the ground at any time. • Ablution facilities are to be serviced weekly or more frequently if required. • The contractor is to ensure that no spillage occurs and that the contents are removed from site on a regular basis. • Ablution facilities shall be inspected and maintained to prevent and minimise blockage and leakages. • Toilets should have properly closing doors and be supplied with toilet paper. • Awareness of the importance of proper hygiene should be created among employees. • Undertake regular groundwater studies to determine the impact of the recycling facility on the groundwater resource. 	<p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 		
<p>Chemical and hydrocarbon pollution of soil, stormwater and groundwater due to the chemical-, fuel-, grease- or oil spillages or leaking equipment and vehicles.</p>	<p>To prevent and minimise soil and water pollution as a result of poor management and accidental spills of hazardous chemical substances, fuel, greases and oils used onsite, including from leaking equipment or vehicles.</p>	<ul style="list-style-type: none"> • Identify all hazardous chemical substances used onsite including fuel, greases and oils. • Obtain the material safety data sheet of each of hazardous chemical substance. • Ensure that the material safety data sheets have sufficient information to enable the user to take the necessary measures to protect his/her health and safety and that of the environment. • Material Safety Data Sheets for all hazardous chemical substances must be readily available on site. • Keep a stock inventory register of all chemicals in the store. • Powders must be stored above liquids. • Proper storage of chemicals in a lockable, well ventilated building. • Ensure adequate access control for the storage area. • Storage areas for hazardous chemicals are to comply with standard fire safety regulations. • Safety signage including "No Smoking", "No Naked Lights" and "Danger", and product identification signs, are to be clearly displayed in areas housing chemicals. • Appropriate equipment to deal with emergency spill incidents is to be readily available on site. This includes fire extinguishers, spill kits for hydrocarbon spills, drip trays for equipment and/or machinery leaks, drums or containers for contaminated water. • Chemicals are to be properly labelled and handled in a safety conscious manner. • All personnel handling hazardous chemicals and hazardous materials are to be issued with the appropriate Personal Protective Equipment (PPE). • The removal of only the daily-required amount of chemicals to be used from the shed. • If refuelling on site or from drums, the ground must be protected and proper dispensing equipment is to be used i.e. hand pumps and funnels. Drums may not be tipped to dispense fuel. • Drip trays are to be utilised during greasing and re-fuelling of machinery or equipment and to contain incidental spills and pollutants. Drip trays should be emptied into secondary containers on a regular basis. • Ensure that any spilled chemical cannot exit the designated storage area by constructing a berm or bump at the exit, or store chemicals in a spill tray. • Immediately clean all spillage of fuels, lubricants and other petroleum based products. • No hazardous chemical may be discarded in the sewage or stormwater system. • Train staff on the use of chemicals in accordance with the risks as described in the material data sheets. • After construction, the land must be cleared of rubbish, surplus materials, and equipment, and all parts of the land shall be left in a condition as close as possible to that prior to use. • Ensure that maintenance work does not take place haphazardly, but, according to a fixed plan, from one area to the other. • Maintenance of construction vehicles. • Inspection and maintenance of equipment and vehicles owned by NewGX shall take place on a regular basis. • Equipment and vehicles are to be repaired immediately upon developing leaks. 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> • Construction contractor • ECO • Facility manager



		<ul style="list-style-type: none"> • Drip trays shall be supplied for all repair work undertaken on machinery on site. • Drip trays are to be inspected daily for leaks and effectiveness and emptied when necessary. This is to be closely monitored during rain events to prevent overflow. • Soil contaminated with hazardous substances, fuel or oil shall be treated as hazardous waste and removed from site. 			
<p>Soil and surface water pollution due to the contamination of clean stormwater runoff.</p> <p>A Stormwater Management Plan has been compiled to ensure effective management of clean stormwater runoff at the recycling facility.</p>	<p>To prevent the contamination of 'clean' stormwater in 'dirty' areas through effective control of stormwater runoff.</p>	<p>The following mitigation measures have been extracted from the Stormwater Management Plan for the recycling facility and correspond to the figures below.</p> <p>Phases 1A and 1B</p> <p>1. The first recommendation is to implement a storm water channel along the cut-off berm to divert runoff around the MRF, associated buildings and storage areas (Phases 1a and 1b of the project). Two types of channels are recommended: parabolic channels and/or trapezoidal. The storm water conveyance channel should link up with the existing municipal storm water channel (concrete trapezoidal channel) in which runoff will follow the slope in an eastern direction.</p> <p>The channel should be designed so that the velocity of flow expected from the design storm does not damage the type of lining used. Different channel linings can be considered in accordance to the expected runoff velocity. As per the modelling, it is recommended to use riprap due to the fact that the expected velocity exceeds 1.8 m³/s. The hilly terrain situated south of the proposed recycling facility will induce runoff velocities that, most often, grass lined channels won't work effectively and riprap will be needed instead.</p> <p>Another consideration could be to use a permanent diversion dike or swale intended to divert overland sheet flow to a stabilised outlet or a sediment trapping facility during the establishment of a site. The dyke/swale can be used instead of a conveyance channel (concrete) along the proposed cut-off berm. When used at the base of a slope, as in the case of the proposed recycling facility, the structure protects adjacent and downstream areas by diverting sediment-laden runoff to a sediment trapping facility. It is recommended to stabilise the dike or swale with permanent vegetation. The slope behind the dike or swale is also an important consideration as it should prevent runoff from entering the site. Vegetated swales or dikes are often used as an alternative to, or an enhancement of, traditional storm sewer pipes. They do not pond water for a long period of time and induce infiltration. Vegetated swales or dikes generally have a trapezoidal or parabolic shape with relatively flat side slopes. The dike or swale should have a positive grade to ensure drainage in an eastern direction, from where it should link up with the municipal storm water system. This practise is considered an economical one as it uses material available on the site and can usually be constructed with equipment needed for site grading. It is recommended to apply seed or mulch within 5 days of dike/swale construction. Stabilisation should be done immediately using riprap to avoid erosion.</p> <p>2. No erosion should occur at the outlet. It is recommended to provide energy dissipation measures as necessary. Sediment-laden runoff should be released through a sediment trapping facility before entering the municipal storm water channel, thereby reducing maintenance requirements by the municipality. The measure should be inspected after every major storm and repairs made when necessary. The swale or channel chosen (lined with riprap), should reduce the velocity of concentrated flows, reducing erosion of the swale/channel and slow water velocity to allow retention of sediments.</p> <p>3. Paved areas at the MRF, roofs of associated buildings to be constructed and the paved areas and roofs at the storage areas will have a considerable effect on the run-off characteristics of the catchment as it may increase the size of flood peaks by 20-50% of those under natural conditions. Storm water runoff from the MRF and associated buildings should be allowed to enter the proposed storm water conveyance channel/swale that will be located around the facility.</p>	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of operation</p>	<p>Facility Manager</p>



4. Surface runoff is also expected to report to the site as a result of the modified topography created by adjacent landfill activities. The Kwagga landfill site situated just east of the proposed recycling facility created a slope from where runoff is expected to flow towards the project site. By implementing the proposed measures, the runoff should be intercepted by the proposed channel/swale around the eastern perimeter of the facility and convey runoff towards the sediment trap (outlet) from where it will enter the municipal storm water channel.



Phases 2 and 3

1. A proposed storm water conveyance channel or a swale/dike will divert clean runoff originating from the ridge situated south of the facility. Refer to full discussion within Table 3 of the SWMP for considerations when implementing such a storm water measure.



		<p>2. Affected runoff from the composting areas/plastic wrapped baled refuse storage should be contained within a dirty water containment facility. Affected water contained within the facility can be re-used in the composting process. The containment facility should be lined to limit seepage into the ground. It is recommended to fit the containment facility with a suitable spillway to prevent failure during a flood emergency.</p> <p>3. The proposed berm along the northern perimeter of the compost/plastic wrapped baled refuse storage area will isolate the dirty water area from the adjacent municipal storm water channel. Investigations should take place to determine the necessity of constructing lined leachate conveyance channels towards the leachate collection pond.</p> <p>4. Heavy rainfall may wash some of the composting materials into the proposed leachate conveyance channels towards the containment facility. Therefore, a screen should be installed at the inlet of the leachate collection pond to prevent debris from entering the facility and thereby reducing maintenance requirements. During a 1:50 year 24 hour flood, an expected amount of 2 833.831m³ will be generated from the impermeable composting area. In order to contain this amount of water, a facility with dimensions 32m x 32m x 3m deep would be required. It is further recommended to conduct surface water quality monitoring within the containment facility to determine the risk of affected water release from the site.</p>			
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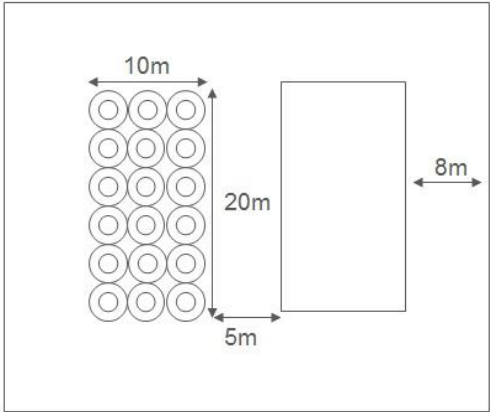


		<p style="text-align: center;">Phase 2 and 3 - SWMP</p> <p>The site plan shows a residential area at the top. The SWMP area is divided into several zones: Phase 1A (yellow), Phase 1B (orange), Phase 2 (green), and Phase 3 (blue). Key features include: <ul style="list-style-type: none"> Compost/plastic wrapped baled refuse storage (yellow area) Leachate collection pond (yellow area) Waste tyre crumbling (blue area) Organic refuse stockpile (yellow area) Shredded organic material (yellow area) Building rubble Aggregate stockpile (blue area) The legend defines runoff types: Dirty runoff (red arrow), Clean runoff (blue arrow), Municipal channel (green line), Cut-off Berm (orange line), Proposed channel (Dyke/swale) (red line), Leachate collection pond (yellow area), Berm (red line), Designs (red line), and Potential dirty areas (orange area). Contours are shown at 2m intervals from 1366 to 1544 MAMSL. A scale bar shows 0 to 0.11 Kilometers. An inset map shows the location in Gauteng province, South Africa, with coordinates 28° 5' 42.494" E and 25° 46' 30.757" S. </p>			
<p>The release of treated wastewater into the municipal sewage system and compromising the municipal system's efficiency.</p>	<p>To ensure responsible release of treated wastewater/effluent into the municipal sewage disposal system/sewer system.</p>	<ul style="list-style-type: none"> Should it be desired for treated wastewater to be discharged into the municipal sewage disposal system, permission must be obtained from the City of Tshwane Metropolitan Municipality in terms of Section 33 of the Sanitation By-laws, 2003. All the requirements and conditions contained in the Sanitation By-laws, 2003, must be adhered to. Subject to the above permission, the wastewater/effluent must comply with the standards and criteria set out in Section 35(1) and Appendix A of the Sanitation By-laws, 2003. Preliminary treatment may be required to ensure that these standards and criteria are met. Subject to the above permission, the wastewater/effluent entering the municipal sewage disposal system must comply with the following [Section 35(1) of the Sanitation By-laws, 2003], unless otherwise authorised by the authorised official: 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept 	<p>Life of operation</p>	<p>Facility Manager</p>



		<ul style="list-style-type: none"> ▪ It may not be offensive or cause a nuisance to the public; ▪ It may not be in the form of vapour or steam or have a temperature exceeding 44°C at the point of entry to the sewer. ▪ It may not have a pH of less than 6.0 or greater than 10.0. ▪ It may not contain any substance that is likely to produce or emit explosive, poisonous, flammable or offensive vapours or gases in the sewer. ▪ It may not contain a substance with a flash-point of less than 93°C or which emits a poisonous vapour at a temperature below 93°C. ▪ It may not contain any material whatsoever, including oil, grease, fat or detergents that are capable of causing interference with the proper operation of a waste-water treatment plant and the Municipality's sewer system. ▪ It may not show any visible signs of tar or associated products or distillates, bitumens or asphalts. ▪ It may not contain a substance in such concentration as is likely in the final, treated effluent from a waste-water treatment plant to produce an undesirable taste after sterilisation or an undesirable odour or colour, or excessive foam. ▪ It may not exceed any of the limits or concentrations of substances given in Appendix A of the Sanitation By-laws, provided that the Municipality may approve greater limits or concentrations for such period or on such conditions as it may specify after consideration of the effect of dilution in the sewer and of the effect of such industrial effluent or other liquid or substance on the sewer or on any sewage treatment process. ▪ It may not contain any substance which, in the opinion of the Engineer- <ul style="list-style-type: none"> (i) is not amenable to treatment at a waste-water treatment plant and which causes or may cause a breakdown or inhibition of the normal sewage treatment processes; (ii) is or may be amenable to treatment only to such degree as to prevent the final, treated effluent from the waste-water treatment plant from satisfactorily complying in all respects with any requirements imposed in terms of the Water Act; or (iii) whether listed in the relevant appendix to these by-laws or not, either alone or in combination with other matter may— <ul style="list-style-type: none"> (aa) generate or constitute a toxic substance detrimental to the health of persons who are employed at the waste-water treatment plant or who enter the Municipality's sewers or manholes in the course of their duties; (bb) be harmful to sewers, waste-water treatment plants or land used for the disposal of purified sewage effluent; or (cc) adversely affect any of the processes whereby sewage is purified or any re-use of purified sewage effluent. 	<p>onsite. Shortcomings must immediately be addressed.</p>		
<p>Soil and groundwater pollution from leaking or broken sewerage pipes.</p>	<p>To prevent soil, stormwater and groundwater pollution from leaking or broken sewerage pipes.</p>	<ul style="list-style-type: none"> • Ablution facilities should be maintained to prevent or minimise blockage and leakages. • Should toilets become blocked or run slowly, this should be reported and the cause investigated. This could be due to a blocked or broken pipe leading from the toilets to the sewerage system. • Create employee awareness about the proper use of ablution facilities and the importance of proper hygiene. No cigarette butts, fats, oils, paper towels etc. may be disposed of into toilets or wash basins. • Toilets should have properly closing doors and be supplied with toilet paper. 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of operation</p>	<p>Facility Manager</p>



<p>Incorrect storage of waste tyres and rubber crumbs resulting in soil, stormwater and groundwater pollution.</p> <p>Stored tyres (whole or in pieces) may leach substances into the soil if the tyres are stored on bare ground (California Integrated Waste Management Board, 1995).</p> <p>Should a fire become established at the waste tyre storage area, the burning tyres would decompose into the following:</p> <ul style="list-style-type: none"> Ash (typically containing carbon, zinc oxide, titanium dioxide, silicon dioxides); Sulphur compounds such as carbon disulfide, sulphur dioxide and hydrogen sulphide; Polynuclear aromatic hydrocarbons such as benzo(a)pyrene, chrysene, benzo(a)anthracene, etc. in the oil that is produced; Aromatic-, naphthenic- and paraffinic oils; Particulates; Various light-end aromatic hydrocarbons, such as toluene, xylene and benzene; and Oxides of nitrogen and carbon (www.mfe.gov.nz). <p>The oily runoff can be carried by water, if water is used to extinguish the fire, or by rainwater. It is estimated that the average passenger car tyre produces 7.8 litres of oil (www.epa.gov). Immediate soil pollution will be caused when the liquid decomposition products penetrate the soil. Gradual pollution of the deeper soil horizons and groundwater can also result from the leaching of ash and unburnt residues after rain events (www.mfe.gov.nz).</p>	<p>To ensure that the waste tyres are stored in the correct manner so as to prevent environmental pollution, due to, for example, the release of oil from burning tyres.</p>	<ul style="list-style-type: none"> The waste tyre storage site/area must have an impermeable surface, such as a concrete slab. The waste tyres must be stored in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyre storage site/facility must be registered within the competent authority 90 days prior to the construction phase commencing. The waste tyre storage facility must be designed in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyre storage facility must have correct access control and signage as stipulated in GNR. 926 of 29 November 2013. The waste tyre storage facility must be operated as stipulated in GNR. 926 of 29 November 2013. In accordance with the Waste Tyre Regulations (2009), the waste tyre storage area may not exceed 30 000m². A waste tyre storage area plan must be developed. The plan must be approved by the municipal fire department and must be available onsite at all times. The site must have clearly visible signs posted near the entrance of the facility. The signs must show the operating hours, contact details and site regulations. A security attendant trained in fire prevention must be on site at all times. The site manager must be on site at all times (when the facility is open/operational). No single pile of waste tyres may exceed a height of 3 metres, a length of 20 metres or a width of 10 metres. All interior firebreaks between the waste tyre piles must be at least five metres wide. The storage area must be flat and hard packed. The site must make provision for storm water management. The edges of the waste tyre piles must be at least 8 metres from the perimeter fence and any buildings. The area between the piles and the fence and buildings must be clear of debris and vegetation. All firebreaks must be at least 8 metres wide. Waste tyre piles may not be located within 8 metres from a power line. The following diagram gives an example of the correct waste tyre storage area design.  <ul style="list-style-type: none"> The waste tyres must not be stored on steeply graded surfaces or anywhere else where they may pose a significant environmental or fire risk. The stormwater system at the site must ensure that water runoff from the waste tyre storage area is contained. This will ensure that runoff water contaminated by oil from the burning of the tyres can be contained. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>Life of operation</p>	<p>Facility Manager</p>
<p>Composting processes may lead to groundwater contamination from waste leachate.</p>	<p>To prevent the contamination of groundwater from waste leachate from</p>	<ul style="list-style-type: none"> The areas where the compostable material will be stored and processed (composted) as well as the storage areas for the final product must be impervious to prevent leachate from percolating into the ground. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept 	<p>During the operational phase.</p>	<p>Site Manager</p>



<p>Leachate may contain organic material, nitrates, phenols, dissolved metals and other contaminants (World Bank Group, 2007).</p>	<p>the composting facility.</p>	<ul style="list-style-type: none"> • Install a drainage system to contain all leachate from the composting area. A leachate treatment system should also be installed. • Maintain ideal composting conditions. • Bulking agents enhance the compost's water-holding capacity and thereby reduce leachate loss (Ulén, 1993). • Reduce the amount of water percolating through the compost by covering the compost piles using, for example, a straw or tarpaulin cover (Ulén, 1993). • Regular turning of the windrows will reduce the moisture content by bringing wetter material to the surface where it can dry (Hao & Benke, 2008). 	<p>onsite. Shortcomings must immediately be addressed.</p>		
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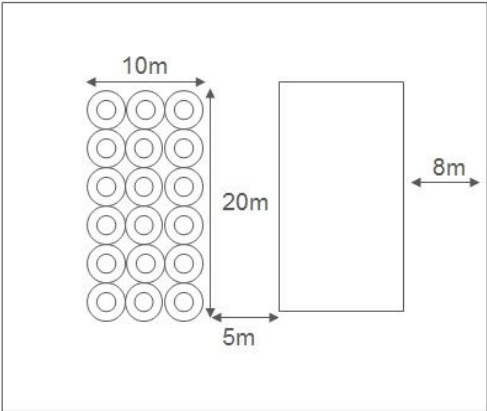
Table 9: EMP - Atmosphere and Noise

<p>Activity:</p> <ul style="list-style-type: none"> • Scheduling of the construction phase for the proposed project. • Construction activities, including excavation activities, loading and offloading activities and vehicles travelling to and from the site. • Construction workers, vehicles, machinery and general noisy construction activities on site. • Operational activities, such as the receipt of incoming waste and the storage of processed waste fractions. 							
<p>Aspect:</p> <ul style="list-style-type: none"> • Construction activities occurring during inconvenient times of the day. • Construction vehicles not adhering to speed limits on the site. • Noise and nuisance generated by additional construction vehicles and equipment during the construction activities. • Ineffective dust suppression. • Vehicle emissions released from the additional construction vehicles and equipment used during the construction phase. • Vehicles not adhering to speed limits on the site. • Release of atmospheric emissions from potential burning of stockpiled tyres, rubber crumbs or waste due to unsafe storage practices that result in the establishment of fires. • Increased traffic flow to the site. • Generation of odorous emissions from the composting processes and waste handled onsite. • Noise generated from the recycling processes, such as through exterior processing equipment and vehicles travelling to and from the facility. • Windblown waste/litter as a result of the incorrect management of large quantities of loose waste material. 							
Nature and significance of environmental impact							
Project Phase Applicability	Planning and Design Phase	X					
	Construction	X					
	Operation	X					
	Decommissioning						
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures			Monitoring and Compliance Reporting	Timeframe	Responsibility
<p>Generation of noise and nuisance to neighbours as a result of construction activities occurring during inconvenient times of the day. According to Jorgensen & Johnson (1981), the noise levels generated by general construction activities on a building site can reach levels of approximately 70dB, caused by for instance heavy machinery. It can therefore be assumed that the proposed development will have a</p>	<p>To maintain a dB reading of less than 50dB at the site boundary and minimise nuisance to neighbours.</p>	<ul style="list-style-type: none"> • Schedule activities that will generate the most noise during times of the day that will result in least disturbance to neighbours. • Site workers and contractors will adhere to the requirements of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993) regarding hearing protection and noise control measures. • The Gauteng Noise Control Regulations, 1999, must be adhered to. • Regular maintenance of vehicles and equipment. • All equipment and machinery should be fitted with adequate silencers. • Select equipment with low noise emissions, where possible. • Working hours should be restricted to daylight hours. 			<p>Pre-construction Phase</p> <ul style="list-style-type: none"> • New GX must verify implementation of the mitigation measures proposed in this EMP. <p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. 	<p>Pre-construction, construction and operational phases.</p>	<ul style="list-style-type: none"> • NewGX • Construction contractor



<p>negative impact on the environmental noise of the area once construction starts.</p> <p>Sound is inversely proportional to the distance from the source and can get absorbed by buildings and vegetation barriers. Noise intensities (dB) will be at their highest on site and will decrease as one moves away from their sources. The noise decline curve gives an indication of how noise generated at the site will decrease with distance. It gives an indication of the distance that the sound would have travelled upon reaching a level of 60 dB, prescribed by the SABS as being the acceptable limit for environmental noise. According to noise decline curve, at a distance of 27 metres from the construction site, the generated noise would have decreased to a level of 60 dB and at a distance of 45 metres it would have decreased to approximately 55dB. It can therefore be said that noise travelling further than 45 metres will have a low impact on neighbouring farms and residential areas.</p> <p>The distance to sensitive noise receptors (residences) is more than 45 metres in all cases.</p> <p>Noise disturbance and nuisance to neighbours and other sensitive receptors due to operational activities. Noise will be generated through the recycling processes, such as through exterior processing equipment and vehicles travelling to and from the facility.</p>		<ul style="list-style-type: none"> No sound amplification equipment such as sirens, loud hailers or hooters are to be used on site except in emergencies and no amplified music is permitted on site. If work is to be undertaken outside of normal work hours permission must be obtained from the ECO and the facility manager. No noisy work is to be conducted over the weekends or on public holidays. Maintain roads to prevent noise and vibration from vehicles onsite. A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed. 	<p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 		
<p>Ambient air quality degradation as well as disturbance and nuisance to neighbours and other sensitive receptors due to dust generated from onsite traffic.</p>	<p>To minimise the impact of excavation activities, loading and offloading activities and vehicles travelling to and from the site on the ambient air quality.</p>	<ul style="list-style-type: none"> A dustcart needs to be onsite to water down dusty roads. Speed bumps or traffic speed signs need to be erected to reduce speeding onsite that could result in the generation of dust. Regular maintenance of vehicles to address wear of tires and breaks. Optimal engine combustion will allow for 'cleaner' exhaust emissions. If the soil is compacted, open areas should be ripped, fertilised and re-vegetated as soon as possible using suitable grass species (indigenous seed mix). A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> Construction contractor Facility Manager ECO
<p>Release of atmospheric emissions from potential burning of stockpiled tyres, rubber crumbs or waste due to unsafe storage practices that result in the establishment of fires.</p>	<p>To minimise the likelihood of fire establishment at the recycling facility.</p>	<ul style="list-style-type: none"> At the composting facility, avoid conditions that can result in spontaneous combustion (temperatures higher than 93°C and moisture content of between 25-45%). Keep windrows less than 3m high and turn when the temperatures reach 60°C. Install sufficient firefighting equipment at strategic points at the recycling facility. The waste tyre storage facility must be designed in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyres must be stored in accordance with the stipulations in GNR. 926 of 29 November 2013. The waste tyre storage facility must be operated as stipulated in GNR. 926 of 29 November 2013. 	<ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the operational phase.</p>	<p>Site Manager</p>



		<ul style="list-style-type: none"> • In accordance with the Waste Tyre Regulations (2009), the waste tyre storage area may not exceed 30 000m². • A waste tyre storage area plan must be developed. The plan must be approved by the municipal fire department and must be available onsite at all times. • The site must have clearly visible signs posted near the entrance of the facility. The signs must show the operating hours, contact details and site regulations. • A security attendant trained in fire prevention must be on site at all times. • The site manager must be on site at all times (when the facility is open/operational). • No single pile of waste tyres may exceed a height of 3 metres, a length of 20 metres or a width of 10 metres. • All interior firebreaks between the waste tyre piles must be at least five metres wide. • The edges of the waste tyre piles must be at least 8 metres from the perimeter fence and any buildings. The area between the piles and the fence and buildings must be clear of debris and vegetation. • All firebreaks must be at least 8 metres wide. • Waste tyre piles may not be located within 8 metres from a power line. • The following diagram gives an example of the correct waste tyre storage area design.  <ul style="list-style-type: none"> • The waste tyres must not be stored on steeply graded surfaces or anywhere else where they may pose a significant environmental or fire risk. 			
<p>Generation of atmospheric emissions, odours and nuisance to neighbours due to activities at the recycling facility, and in particular, at the composting facility.</p> <p>The final product from the process (compost) can be stored and applied to the soil with little to no odour, pathogen, weed or fly breeding potential (Zhao <i>et al.</i>, 2008).</p>	<p>To minimise the generation of odours at the recycling, and in particular at the composting facility, to thereby minimise the nuisance to neighbours.</p>	<ul style="list-style-type: none"> • Install extraction systems in all waste processing buildings, specifically to remove dust. • Consider the use of negative pressure in processing buildings. • Reasonable measures must be put in place to minimise odour emissions from the composting site. Should no effective preventative measures exist, provision must be made for the processing and storage of the waste in enclosed storage and processing facilities. • Emissions of biogas in aerobic processes must be controlled by keeping the organics adequately aerated. • Maintain a minimum oxygen content of at least 5%, by volume, in the free air space of every active and curing compost pile. Each compost pile must be tested at least once a week to determine the oxygen content. • Maintain the moisture content of every active and curing compost pile between 45% and 60%, by weight. The moisture content must be tested every day that the pile is turned to determine the moisture content. • Manage every active compost pile such that the initial carbon to nitrogen ratio is at least 25:1. The ideal C:N ratio is between 25:1 and 30:1. • Compost stockpiles and windrows must regularly be turned to ensure that they have sufficient moisture contents. The piles should, however, not be turned more than required, as this stimulates aerobic decomposition processes and leads to elevated NH₃ emissions (Parkinson <i>et al.</i>, 2004). 	<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the construction and operational phases.</p>	<p>Site Manager</p>



		<ul style="list-style-type: none"> • Use windrow turning equipment designed to minimise air emissions. Wheeled loaders or conveyors that drop waste onto windrows are not ideal. • Cover all active compost piles within 3 hours of each turning with one of the following: a waterproof covering, a layer of finished compost or soil. • Covering the piles has been shown to reduce air exchange and therefore NH₃ emissions (Gottschall & Vogtmann, 1988). • Enclose leachate collections systems to reduce odour emissions. • The quantities of incoming and processed organics must not exceed the design requirements of the storage and processing areas. • Good housekeeping measures must be implemented. • Waste offloading areas should be cleaned daily. • Deodorising systems or water misting can be considered to minimise odours. • A complaints register must be kept onsite. The register must record the following: Date when complaint was received, name of person who reported the complaint, details of the complaint and when and how concern was addressed. 			
Nuisance and an unsightly appearance to people in the vicinity of the recycling facility due to windblown litter/waste.	To prevent the occurrence of windblown waste/litter and nuisance conditions.	<ul style="list-style-type: none"> • Waste being transported should be secured or covered on the transport vehicles for the duration of the journey to ensure that waste/litter cannot become airborne. • Waste transport vehicles should not be filled beyond their capacities. • Make provision for adequate storage of waste prior to it being processed. • Waste offloading and storage areas must be swept at the end of each day to ensure that no waste can be blown offsite. • Waste transportation vehicles should be cleaned regularly. • A fence should be constructed around the perimeter of the property to trap any windblown litter. 	<ul style="list-style-type: none"> • Regular site inspections. • Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	During the operational phase.	Site Manager

Table 10: EMP - Infrastructure

Activity:					
<ul style="list-style-type: none"> • Increased traffic frequency on road infrastructure during the construction and operational phases. 					
Aspect:					
<ul style="list-style-type: none"> • Wear of access roads and insufficient vehicle inspections. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase				
	Construction	X			
	Operation	X			
	Decommissioning				
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures		Monitoring and Compliance Reporting	Timeframe
Wear of access roads, accidents on access roads, unpermitted transport of materials and loss of materials being transported on access roads.	To minimise the impact of an increase in traffic on access roads to the facility, during the construction phase, as well as a minimisation of the impacts during	<ul style="list-style-type: none"> • Ensure that all vehicles using access roads are roadworthy. • All loads are to be securely fastened when being transported. • All vehicles are to adhere to the tonnage limitation and acquire a permit as required. • All speed limits and other traffic regulations on the public roadways must be adhered to. 		<p>Construction Phase</p> <ul style="list-style-type: none"> • ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> • Regular site inspections. 	During the construction and operational phases.
					<ul style="list-style-type: none"> • Facility Manager • ECO



	the operational phase (increased traffic to the facility).		<ul style="list-style-type: none"> Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 		
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Table 11: EMP – Resource Usage

Activity:					
<ul style="list-style-type: none"> Usage of resources, such as electricity and water (municipal water supply). 					
Aspect:					
<ul style="list-style-type: none"> Inefficient and redundant use of valuable resources (electricity and water from the municipal water supply). Leaking or broken water storage vessels. Leaking or broken water pipelines. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase				
	Construction	X			
	Operation	X			
	Decommissioning				
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
<p>Wastage or depletion of a valuable resources (water and electricity) due to inefficient or redundant usage.</p> <p>Water and electricity will be obtained from the municipality.</p>	To prevent the wastage or depletion of a valuable resources (water and electricity).	<p>General</p> <ul style="list-style-type: none"> Ensure that all employees have been informed on the importance of natural resources (proper environmental training and awareness). Supervisors to inspect the operations regularly to determine areas of improvement with regards to resource consumption. Regular maintenance and inspection of equipment such as hose pipes, to prevent leaks. Monitoring of resource consumption. Identify areas where resource consumption can be minimised. Set targets to try minimise resource consumption. Identify technologies and practices that may reduce resource consumption. Implementation of technologies and practices that can reduce resource consumption. <p>Water</p> <ul style="list-style-type: none"> Regular inspection and maintenance of all boreholes, water tanks or reservoirs, toilets, water pipes and taps. Leaking tanks or reservoirs, taps, toilets and pipes are to be repaired immediately. Running water taps and pipes may not be left unattended. All pipe, hose and tap connections are to be fitted with correct and appropriate plumbing fittings. All measuring devices must be properly maintained, must be in good working order and must be easily accessible. This shall include a programme of checking, calibration, and/or renewal of measuring devices. <p>Electricity</p> <ul style="list-style-type: none"> Save electricity by turning off lights and computers when leaving the office. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	During the construction and operational phases.	<ul style="list-style-type: none"> Facility Manager ECO



		<ul style="list-style-type: none"> Halogen light bulbs convert approximately 80% of the energy used into heat rather than light. Rather use energy saving CFLs (compact fluorescent lights) or newer and more efficient LEDs (light-emitting diodes). 			
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Table 12: EMP – Visual

Activity: <ul style="list-style-type: none"> Operation of the recycling facility. 					
Aspect: <ul style="list-style-type: none"> Existence of the site in view of receptors in the vicinity of the site, such as adjacent neighbours and motorist travelling on Maunde Street. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase				
	Construction	X			
	Operation	X			
	Decommissioning				
Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
Negative impact on neighbours and motorist having to see the recycling facility from their residences and Maunde Street, respectively.	To minimise the visual impact of the recycling site on receptors in the vicinity of the site.	<ul style="list-style-type: none"> Operational measures must be put in place to keep weed, pest and vermin presence as low as possible. Operational measures must be put in place to ensure that vehicles leaving the site do not track loose mud, waste and/or litter outside the facility. Operational procedures must be put in place to minimise the generation and proliferation of windblown litter. A screen of fast growing trees should be planted along the boundaries of the site to screen the site from the adjacent receptors to the North and West. Sweep waste recycling areas on a daily basis. Ensure that minimal waste is present outside of waste storage and handling/processing areas (non-operational areas). Lighting onsite must be directed towards the interior of the site and not outwards towards residential areas and Maunde Street. Lighting should be adequate to ensure security, but should not disturb receptors beyond the site boundary. 	Construction Phase <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. Operational Phase <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	During the construction and operational phases.	Site Manager

Table 13: EMP – Heritage and Palaeontological

Activity: <ul style="list-style-type: none"> Site clearance. General construction and excavation activities. Operational activities at the recycling facility. 					
Aspect: <ul style="list-style-type: none"> Disturbance of artefacts or sites of cultural heritage (archaeological and historical) significance. 					
Nature and significance of environmental impact					
Project Phase Applicability	Planning and Design Phase				
	Construction	X			
	Operation	X			
	Decommissioning				



Impact Description	Environmental Objective	Management / Mitigation / Monitoring Measures	Monitoring and Compliance Reporting	Timeframe	Responsibility
<p>Loss of heritage artefacts or sites protected by the National Heritage Resources Act, 1999 (Act No. 25 of 1999).</p>	<p>To protect artefacts or sites of cultural heritage (historical) significance.</p>	<ul style="list-style-type: none"> The subterranean presence of archaeological or historical sites, features or objects is always a possibility. Should any be uncovered during the development process, all activities must cease and an archaeologist should be called in to investigate and recommend the best way forward. The presence of other low stone packed or unmarked graves should also be kept in mind. No sites, features or objects may be disturbed (e.g. picked up) by employees. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> Facility Manager ECO
<p>Loss of fossils protected by the National Heritage Resources Act, 1999 (Act No. 25 of 1999).</p>	<p>To protect artefacts or sites of archaeological significance.</p>	<ul style="list-style-type: none"> The EAP as well as the ECO for this project must be made aware of the fact that the Pretoria Group sediments are Highly significant for fossil remains of stromatolites and rocks of the Chuniespoort Group are allocated a Very Highly significance for fossils, albeit mostly where good outcrops are available for inspection. In areas that are allocated a Very High and High Palaeontological sensitivity and specifically where deep excavation into bedrock is envisaged (following the geotechnical investigation), or where fossils are recorded during the geotechnical investigations, a qualified palaeontologist must be appointed to assess/inspect the excavated material and record fossils at specific footprints (collect a representative sample of the fossil rich rocks according to SAHRA specifications) of infrastructure developments (Phase 1 PIA). These recommendations should form part of the EMP of the project. A Mini Conservation Plan must be compiled and submitted to SAHRA via the SAHRIS website, as required by SAHRA in their Final Comment letter dated 27 October 2015. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments and charcoal/ash concentrations), fossils or other categories of heritage resources are found during the proposed activities, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources (if any) prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation might be necessary and a permit from SAHRA will be needed before mitigation. 	<p>Construction Phase</p> <ul style="list-style-type: none"> ECO to verify implementation of the mitigation measures proposed in this EMP during the construction phase. ECO to submit monthly compliance reports to the competent authority. <p>Operational Phase</p> <ul style="list-style-type: none"> Regular site inspections. Internal audits against this EMP must be conducted every 6 months and records kept onsite. Shortcomings must immediately be addressed. 	<p>During the construction and operational phases.</p>	<ul style="list-style-type: none"> Facility Manager ECO



5.1.5 Decommissioning Phase

Decommissioning of the recycling facility is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the Gauteng Department of Agriculture and Rural Development prior to decommissioning.

5.1.6 Closure Phase

Closure of the recycling facility is not anticipated for the foreseeable future. Should the facility close, a detailed closure and rehabilitation plan will be submitted to the Gauteng Department of Agriculture and Rural Development prior to decommissioning.



6. ENVIRONMENTAL AWARENESS PLAN

The following Environmental Awareness Plan must be implemented by New GX Enviro Solutions and Logistic Holdings (Pty) Ltd in order to inform their employees and contractors of the environmental risk that may result from their work. The plan must be conducted as part of the induction process for all new employees (including contractors) that will perform work in terms of the proposed activities. Proof of all training provided must be kept on-site.

The Environmental Awareness Plan is referred to as the “SHE match” training programme. The training programme focuses on the following aspects:

1. Explaining clearly what the environment is and what the environment consist of namely: air, water, soil, fauna, flora and people.
2. Once participants have grasped the description of what the environment entails, the training focuses on the potential impacts that the construction and operational activities may have on each one of these environmental components. This is done by making use of the aspect register, where each one of the environmental aspects and associated impacts has been identified.
3. To ensure that the training is effective, visual aids are used. Photos are taken of actual and potential impacts occurring on site and in some cases role-play is used to illustrate a potential impact.
4. The participants are then exposed to a poster that reflects the various environmental components. The various photos taken are posted on the poster on a rotational basis and the participants indicate (based on the visual component) what environmental component was or could have been affected by the activities portrayed on the photo.
5. By doing this the participants visualise the action as well as the potential consequence (environmental impact) of their action.
6. This general awareness training must be done before construction commences and also when new employees start work. The training should be done every two years during the Operational Phase. The poster is posted in the communal area where the impacts are visualised and the photos rotated on a monthly basis.

