Project design document form for
CDM project activities
(Version 05.0)

Complete this form in accordance with the Attachment "Instructions for filling out the project design document form for CDM project activities" at the end of this form.

PROJECT DESIGN DOCUMENT (PDD)	
Title of the project activity	EnviroServ Chloorkop Landfill Gas Recovery Project
Version number of the PDD	~~4~~5
Completion date of the PDD	~~17~~13/~~10~~04/~~2014~~2015
Project participant(s)	EnviroServ Waste Management (Pty)Ltd
Host Party	South Africa
Sectoral scope and selected methodology(ies), and where applicable, selected standardized baseline(s)	ACM0001: Large-scale Consolidated Methodology: Flaring or use of landfill gas Version 15.0 Sectoral scope(s):13
Estimated amount of annual average GHG emission reductions	~~61 280~~73 041 tCO_2e

SECTION A. Description of project activity

A.1. Purpose and general description of project activity

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The EnviroServ Chloorkop Landfill Gas Recovery Project was registered on 27 April 2007. The project was implemented and credits have been issued during the first crediting period from 19 January 2009 to 18 January 2015. The PDD has been updated in order to facilitate the request for renewal of the crediting period.

The EnviroServ Chloorkop Landfill Site has been used for the disposal of municipal solid waste since 1997. The landfill site receives approximately 400 000 tons annually. Waste accepted includes general (or domestic) waste, garden waste, soil and builder's rubble.

The objective of the project is to extract landfill gas at the Site and combust the landfill gas (LFG) by flaring. Landfill gas consists of approximately 50% methane, which has a global warming potential 21[1] times greater than CO_2. Through the destruction of methane, the emissions of greenhouse gases are reduced.

The emissions reductions due to the project activity during its second crediting period have been calculated ex ante: an estimated annual average CO_2e-reduction of ~~61 280~~73 041 tonnes with a total of ~~428 963~~511 289 tCO_2e for the chosen crediting period (19/01/2015 – 18/01/2022). As the annual average CO_2e reductions is exceeding the limit for small-scale projects (i.e. 15 000 tCO_2e annual emissions reductions for type III project activities) the project activity qualifies as a large scale project activity.

The project activity involves the installation of a new LFG capture system in an existing solid waste disposal site (SWDS). The scenario existing prior to the implementation of the project activity includes a solid waste disposal site where no LFG capture system was installed and where LFG was vented into the atmosphere. Therefore the baseline scenario is the same as the scenario existing prior to the implementation of the project activity: the atmospheric release of LFG.

The project was registered on 27/04/2007 with the first crediting period being 19/01/2008 – 18/01/2015. After successful verification of the monitored emission reductions in the first crediting period, the project participant is applying for extension of the crediting period through a request for renewal of the crediting period.

The installed technology consists of wells in the landfill, a gas collection system connecting the wells and two flare installations connected to the gas collection system. Each flare installation consists of a blower that draws the gas from the wells and the gas collection system, and the flare itself.

~~However outside the scope of the project activity, investigation into further development of the project for utilisation of the landfill gas is ongoing as better definition of gas quantity and quality has been obtained from the first crediting period. Potential uses include direct use for industrial process heating off-site or the generation of electricity for onsite use, sale to a nearby industry, or to the grid.If decisions towards further development of the project activity are made, this version of the PDD will be updated in order to reflect the changes involved.~~

[1]As per IPCC: 21 for the first commitment period and in accordance with the latest COP/MOP decision. The latest COP/MOP decision (Decision 24/CP.19, paragraph 2) stipulates that "from 2015 until a further decision is adopted by the Conference of the Parties, the global warming potential values used by Parties included in Annex I to the Convention (Annex I Parties) ... shall be those listed in the column entitled "Global warming potential for given time horizon" in table 2.14 of the errata to the contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, based on the effects of greenhouse gases over a 100-year time horizon, as contained in annex III"; This means that from 2015 the value 25 shall be used for the GWP of methane.

~~For the purpose of requesting renewal of the crediting period, this updated PDD does not include options for utilisation of the captured LFG other than flaring.~~

Project Participants' view on how the CDM project activity contributes to sustainable development

The project continues to contribute to sustainable development in multiple ways:

1. The project results in foreign direct investment through the purchase of certified emission reductions by one or more overseas buyers. In addition, the project continues to contribute to economic development by creating new markets and/or strengthening existing markets within the country for goods and services required by the project.

2. The project will generate jobs, which would not otherwise exist and build capacity, which would not otherwise occur. Landfill personnel are receiving training related to the gas recovery operation, which they would not have received otherwise. The project intends to utilise the gas provided that a feasible and viable utilisation project can be developed. Such utilisation will provide additional contribution to sustainable development in the country.

3. The project reduces pollution. The collection and destruction of methane gas reduces greenhouse gas emissions and reduces the impact of the landfill operation on air quality. In addition, labour conditions and safety on the Site have been improved due to the reduction in the risk of fire and explosion at the landfill. The capture and destruction of landfill gas trace components contributes to an improvement of local air-quality.

4. On the 26th November 2013, the project received host country approval from the South African DNA. The letter of approval confirms that the project supports sustainable development in the country.

A.2. Location of project activity

A.2.1. Host Party

>>
South Africa

A.2.2. Region/State/Province etc.

>>
Gauteng Province

A.2.3. City/Town/Community etc.

>>
EnviroServ Chloorkop Landfill, Ekurhuleni Metropolitan Municipality

A.2.4. Physical/Geographical location

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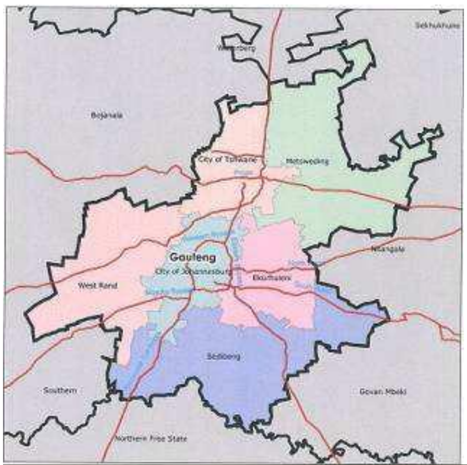
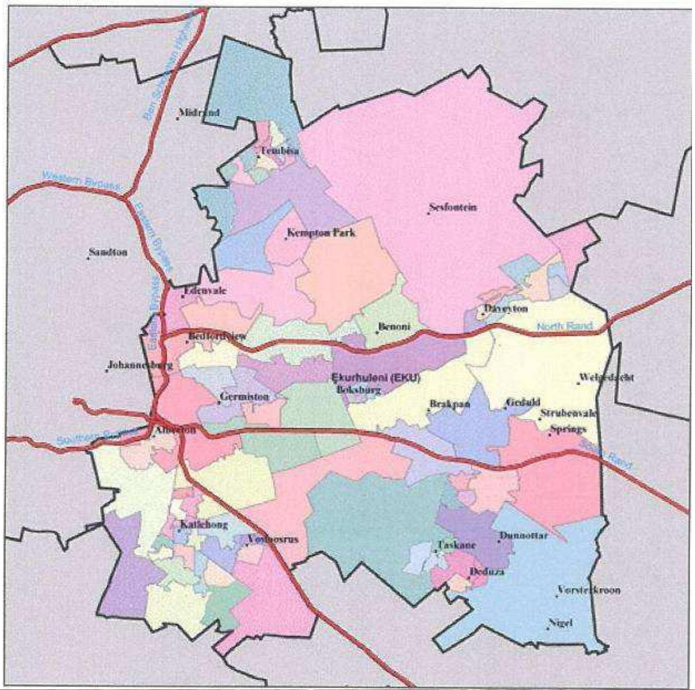
The EnviroServ Chloorkop Landfill Site is situated in the Northern Service Delivery Area of the Ekurhuleni Metropolitan Municipality. This is located in the eastern part of the Gauteng Province. It is approximately 13km from the Johannesburg International Airport, 7 km from the Buccleuch Interchange and 7 km from the Allandale off-ramp from the N1. The closest residential area is Phomolong to the east and Klipfontein View to the west (approximately 0.5 km). The Site is surrounded by industrial areas to the north, south and east.GPS coordinates: 26° 02' 30.35" S, 28° 10' 04.58" E. In decimal: Latitude (-26.0417) Longitude (28.1679).





A.3. Technologies and/or measures

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The EnviroServ Chloorkop Landfill Site has been used for the disposal of municipal solid waste since 1997, receiving 396,000 to 448,000 tons of waste per annum. The waste accepted includes general (or domestic) waste, garden waste, soil and builder's rubble. To date, 5 cells have been constructed and are now full. Cell 6 started receiving waste in May 2010 and is still in operation.

Vertical wells were installed in cells 1 to 3 by auguring into the existing waste body once the cell reached final grade. Horizontal collectors were installed in cells 4, 5 and 6 and involved the excavation of trenches into the waste at intermediate intervals before a cell reached final grade. The vertical wells and the horizontal collectors were connected to a number headers leading to the flare installations.

There are two flare installations. The flares used are high temperature enclosed flares. The two flare installations are situated alongside each other.

The commercial utilisation of the captured gas is being investigated after better definition of gas quantity and quality, as well as after consultation with prospective gas users/customers. Some possible uses of the gas which are fully investigated include generation of electricity for onsite use, sale to a nearby industry, or to the national grid; or direct off-site use of the gas as a replacement for other fossil fuels. Emission reductions as a result of fuel displacement are not included in the project activity and therefore the use of the captured landfill gas is not considered part of the project activity.

A.4. Parties and project participants

Party involved (host) indicates host Party	Private and/or public entity(ies) project participants (as applicable)	Indicate if the Party involved wishes to be considered as project participant (Yes/No)
South Africa (host)	EnviroServ Waste Management(Pty) Ltd – Private	No

A.5. Public funding of project activity

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There is no public funding of the project activity.

SECTION B. Application of selected approved baseline and monitoring methodology and standardized baseline

B.1. Reference of methodology and standardized baseline

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ACM0001
Large-scale Consolidated Methodology: Flaring or use of landfill gas
Version 15.0
Sectoral scope(s): 13

Hereinafter referred to as “the applied methodology”.

B.2. Applicability of methodology and standardized baseline

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Applicability Conditions	***Justification***
The methodology is applicable under the following conditions:	
(a) Install a new LFG capture system in a new or existing SWDS where no LFG capture system was installed prior to the implementation of the project activity; or	The project activity is the installation of a new landfill gas capture system at an existing SWDS where no LFG capture system was installed prior to the implementation of the project activity.

Applicability Conditions	***Justification***
(b) Make an investment into an existing LFG capture system to increase the recovery rate or change the use of the captured LFG, provided that: *(i) The captured LFG was vented or flared and not used prior to the implementation of the project activity; and* *(ii) In the case of an existing active LFG capture system for which the amount of LFG cannot be collected separately from the project system after the implementation of the project activity and its efficiency is not impacted on by the project system: historical data on the amount of LFG capture and flared is available;*	The project activity is the installation of a new LFG capture system in an existing SWDS where no LFG capture system was installed prior to the implementation of the project activity. Therefore condition (b) is not relevant.
(c) Flare the LFG and/or use the captured LFG in any (combination) of the following ways: *i. Generating electricity;* *ii. Generating heat in a boiler, air heater or kiln (brick firing only) or glass melting furnace;[2] and/or* *iii. Supplying the LFG to consumers through a natural gas distribution network;* *iv. Supplying compressed/liquefied LFG to consumers using trucks;[3]*	The LFG is captured in the project activity and then flared.

[2] For claiming emission reductions for other heat generation equipment (including other products in kilns), project participants may submit a revision to this methodology.

[3] In case other means of transportation are used a revision to this methodology may be requested.

Applicability Conditions	***Justification***
(d) Do not reduce the amount of organic waste that would be recycled in the absence of the project activity.	The project does not imply any change in the waste received at the landfill and has not reduced the amount of organic waste that would have been recycled in the absence of the project activity. This was confirmed through the following additional sources: An official letter from the division/company responsible for collecting and depositing of waste at Chloorkop Landfill was obtained, confirming that the implementation of the "EnviroServ Chloorkop Landfill Gas Recovery Project" did not and will also continue to not reduce the amount of organic waste that would have been recycled in the absence of the project activity. A review of the South African Waste Information Centre (SAWIC) confirmed that recycling of organic waste is not a common/widely used practice in South Africa and in the region of the project. ~~The implementation of the project activity does not imply any change in the waste received at the landfill and has not reduced the amount of organic waste that would have been recycled in the absence of the project activity.~~
The methodology is only applicable if the application of the procedure to identify the baseline scenario confirms that the most plausible baseline scenario is:	
(a) Atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons; and	The baseline scenario is the atmospheric release of the LFG. Moreover, no regulations or contractual requirements, prescribing capturing of LFG and/or flaring thereof, exist currently[4].

[4] Department of Environmental Affairs: *Minimum Requirements for Waste Disposal by Landfill (second edition, 1998)*

Applicability Conditions	Justification
(b) In the case that the LFG is used in the project activity for generating electricity and/or generating heat in a boiler, air heater, glass melting furnace or kiln; *(i) For electricity generation: that electricity would be generated in the grid or in captive fossil fuel fired power plants; and/or* *(ii) For heat generation: that heat would be generated using fossil fuels in equipment located within the project boundary.*	In the project activity, the LFG is captured and flared and not used for other purposes.
This methodology is not applicable:	
(a) In combination with other approved methodologies. For instance, ACM0001 cannot be used to claim emission reductions for the displacement of fossil fuels in a kiln or glass melting furnace, where the purpose of the CDM project activity is to implement energy efficiency measures at a kiln or glass melting furnace;	The project activity does not apply any methodologies in addition to ACM0001 (Version 15.0).
(b) If the management of the SWDS in the project activity is deliberately changed during the crediting in order to increase methane generation compared to the situation prior to the implementation of the project activity.	The management of the SWDS has not, and will not be deliberately changed in order to increase methane generation.
The applicability conditions included in the tools referred to below also apply.	The applicability conditions in the tools referred to below have been met.

The other methodological tools referred to in the applied methodology and used are:

- Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period (Version 03.0.1)
- Emissions from solid waste disposal sites (Version 06.0.1)
- Tool to determine the mass flow of a greenhouse gas in a gaseous stream (Version 02.0.0)
- Project emissions from flaring (Version 02.0.0)

As per paragraph 48 of the CDM modalities and procedures, when choosing a baseline methodology, the approach “Existing actual or historical emissions, as applicable” has been selected as deemed being the most appropriate for the project activity.

B.3. Project boundary

The project boundary of the project activity includes the site where the LFG is captured and:

(a) Sites where the LFG is flared or used (e.g. flare, power plant, boiler, air heater, glass melting furnace, kiln, natural gas distribution network or biogas processing facility)

Summary of greenhouse gases and sources included in and excluded from the project boundary:

	Source	GHGs	Included?	Justification/Explanation
Baseline scenario	Emissions from decomposition of waste at the SWDS site	CO_2	No	CO_2 emissions from decomposition of organic waste are not accounted for since the CO_2 is also released under the project activity
		CH_4	Yes	The major source of emissions in the baseline
		N_2O	No	N_2O emissions are small compared to CH_4 emissions from SWDS. This is conservative
	Emissions from electricity generation	CO_2	No	Power generation is not included in the project activity
		CH_4	No	Power generation is not included in the project activity
		N_2O	No	Power generation is not included in the project activity
	Emissions from heat generation	CO_2	No	Heat generation is not included in the project activity
		CH_4	No	Heat generation is not included in the project activity
		N_2O	No	Heat generation is not included in the project activity
	Emissions from the use of natural gas	CO_2	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity
		CH_4	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity
		N_2O	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity
Project scenario	Emissions from fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity	CO_2	No	Fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity is not applicable.
		CH_4	No	Fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity is not applicable.
		N_2O	No	Fossil fuel consumption for purposes other than electricity generation or transportation due to the project activity is not applicable.
	Emissions from electricity consumption	CO_2	Yes	May be an important emission source
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small.

	due to the project activity	N_2O	No	Excluded for simplification. This emission source is assumed to be very small.
	Emissions from flaring	CO_2	No	Emissions are considered negligible.
		CH_4	Yes	May be an important emission source.
		N_2O	No	Emissions are considered negligible.
	Emissions from distribution of LFG using trucks	CO_2	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity
		CH_4	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity
		N_2O	No	The supply of LFG through a natural gas distribution network or using trucks is not included in the project activity

The applied methodology, paragraph 16, 17 and 18, prescribes that the procedure for estimating the end of the remaining lifetime of existing equipment must be followed in case the LFG is used in equipment that was in operation prior to the implementation of the project activity. As LFG is not being captured and/or used in the baseline, this procedure is not applicable.

B.4. Establishment and description of baseline scenario

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In accordance with the applied methodology, paragraph 19, the simplified procedures to identify the baseline scenario and demonstrate additionality are valid and applicable.

Accordingly, as per, paragraph 22 of the applied methodology, *the baseline scenario for LFG is assumed to be the atmospheric release of the LFG or capture of LFG and destruction through flaring to comply with regulations or contractual requirements, to address safety and odour concerns, or for other reasons*.

Prior to the implementation of the project activity, the LFG at the EnviroServ Chloorkop Landfill was released into the atmosphere.

The EnviroServ Chloorkop Landfill Gas Project, i.e. the project activity, captures LFG and flares it accordingly.

Therefore the baseline scenario for the project activity is the atmospheric release of LFG.

B.5. Demonstration of additionality

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In accordance with the applied methodology, paragraph 21: “The following types of project activities are deemed automatically additional, if prior to the implementation of the project activity the LFG was only vented and/or flared but not utilized for energy generation:

(a) The LFG is used to generate electricity in one or several power plants with a total nameplate capacity that equals or is below 10 MW;

(b) The LFG is used to generate heat for internal or external consumption;

(c) The LFG is flared.

Prior to the implementation of the project activity, the LFG was only vented. In the project scenario, the LFG is flared, therefore the project activity is deemed automatically additional.

B.6. Emission reductions

B.6.1. Explanation of methodological choices

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The baseline emissions are determined according to equation (1)of the applied methodology:

$$BE_y = BE_{CH_4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$$ ACM0001 equation (1)

Where:

BE_y	Baseline emissions in year *y* (tCO_2e/y)
$BE_{CH_4,y}$	Baseline emissions of methane from the SWDS in year *y* (tCO_2e/y)
$BE_{EC,y}$	Baseline emissions associated with electricity generation in year *y* (tCO_2/y)
$BE_{HG,y}$	Baseline emissions associated with heat generation in year *y* (tCO_2/y)
$BE_{NG,y}$	Baseline emissions associated with natural gas use in year *y* (tCO_2/y)

In the baseline no electricity or heat is generated, and natural gas use is not applicable, therefore:

$$\mathbf{BE_{EC,y} = BE_{HG,y} = BE_{NG,y} = 0}$$

Baseline emissions of methane from the SWDS *($BE_{CH4,y}$)*

Baseline emissions of methane from the SWDS are determined according to equation (2) of the applied methodology:

$$BE_{CH4} = ((1 - OX_{top_{layer}}) \times F_{CH4,PJ,y} - F_{CH,BL,y}) \times GWP_{CH4}$$ ACM0001 equation (2)

Where:

$BE_{CH_4,y}$	Baseline emissions of methane from the SWDS in year *y* (tCO_2e/y)
$OX_{top\ layer}$	Fraction of methane in the LFG that would be oxidized in the top layer of the SWDS in the baseline (dimensionless)
$F_{CH4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity in year *y* (tCH_4/y)
$F_{CH4,BL,y}$	Amount of methane in the LFG that would be flared in the baseline in year *y* (tCH_4/y)
GWP_{CH4}	Global warming potential of CH_4 ($tCO_2e/t\ CH_4$)

For the purposes of these calculations, and in accordance with the applied methodology, the following values are applied:

- OX_{top_layer} = 0.1 (default value as per applied methodology);
- $F_{CH4,BL,y}$ = 0, since in the baseline no requirements to destroy methane were existing and neither was the LFG captured and destroyed prior to implementation of the project activity, as per the applied methodology, paragraph 39 and 40; and
- GWP_{CH4} = ~~21~~25 (~~default value as per the applied methodology, paragraph 79, table 3~~as per Decision 24/CP.19, paragraph 2).

Ex post determination of $F_{CH4,PJ,y}$

In accordance with the applied methodology, during the crediting period, $F_{CH4,PJ,y}$ is determined as the sum of the quantities of methane flared and used in power plant(s), boiler(s), air heater(s), glass melting furnace(s), kiln(s) and/or a natural gas distribution network, as follows:

$$F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$$ ACM0001 equation (3)

Where:

$F_{CH4,PJ,y}$	Amount of methane in the LFG which is flared and/or used in the project activity in year y (tCH_4/yr)
$F_{CH4,flared,y}$	Amount of methane in the LFG which is destroyed by flaring in year y (tCH_4/yr)
$F_{CH4,EL,y}$	Amount of methane in the LFG which is used for electricity generation in year y (tCH_4/yr)
$F_{CH4,HG,y}$	Amount of methane in the LFG which is used for heat generation in year y (tCH_4/yr)
$F_{CH4,NG,y}$	Amount of methane in the LFG which is sent to the natural gas distribution network and/or to the trucks in year y (tCH_4/yr)

In the project activity no electricity or heat is generated, and natural gas use is not applicable therefore:

$\mathbf{F_{CH4,EL,y} = F_{CH4,\ HG,y} = F_{CH4,NG,y} = 0}$

Therefore the requirement as per paragraph 33(a) of the applied methodology ACM0001, Version 15.0 that "the gaseous stream the tool shall be applied to the LFG delivery pipeline to each item of electricity generation or heat generation equipment j, or the natural gas distribution system, or the trucks" is not applicable.

Requirements (33(b), (c), (d) and (e) however are applicable when determining $F_{CH4,\ flared,y}$, using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) as described below.

$\mathbf{F_{CH4,flared,y}}$ is determined as the difference between the amount of methane supplied to the flare(s) and any methane emissions from the flare(s), as follows:

$$F_{CH4,flared,y} = F_{CH4,sent_{flare},y} - \frac{PE_{flare,y}}{GWP_{CH4}}$$ ACM0001equation (4)

Where:

$F_{CH4,flared,y}$	Amount of methane in the LFG which is destroyed by flaring in year y (tCH_4/yr)
$F_{CH4,sent\_flare,y}$	Amount of methane in the LFG which is sent to the flare in year y (tCH_4/yr)
$PE_{flare,y}$	Project emissions from flaring of the residual gas stream in year y (tCO_2e/yr)
GWP_{CH4}	Global Warming Potential of CH_4 (tCO_2e/tCH_4)

$F_{CH4,sent\_flare,y}$ is determined directly using the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0), applying the requirements described ~~above~~ in paragraph 33(b), (c), (d) and (e) and where the gaseous stream the tool shall be applied to is the LFG delivery pipeline to the flare~~(s)~~s. As per paragraph 33 of the underlying methodology (ACM0001, Version 15.0), the following requirements apply:

(a) The gaseous stream the tool shall be applied to is the LFG delivery pipeline to the flares.
(b) CH_4 is the greenhouse gas for which the mass flow should be determined.
(c) The simplification offered for calculating the molecular mass of the gaseous stream is valid (equations (3) or (17) in the tool).

(d) The mass flow should be calculated on an hourly basis for each hour *h* in year *y*.
(e) The mass flow calculated for hour *h* is 0 if the equipment is not working in hour h ($Op_{j,h}$ = not working), the hourly values are then summed to a yearly unit basis.

As per the applied "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0), the mass flow of CH_4 in a gaseous stream ($F_{CH4,sent\_flare,y}$) is determined through measurement of the flow and volumetric fraction of the gaseous stream.

Measurements will be made for each flare and instruments are located as following:

- Flowmeters are fitted to the gas inlet and the main burner gas train and measure the flow rate of the gas.
- The gas data analyser is connected to the outlet of the extraction fan and measures the methane concentration.

Since the gas analyser (GIR 5000) measures the gas per volume, 0-100% and being almost dry and the flow meter measures the gas per volume in gas volume per hour (Nm^3/hour) being wet, Option B from Table 1 in the applied tool was selected: to measure the volume flow of the gaseous stream on a wet basis and to measure the volumetric fraction of CH_4 on a dry basis.

The absolute humidity is a parameter required for Option B. Option 2 was selected to determine the absolute humidity by assuming the gaseous stream is dry or saturated in a simplified conservative approach.

Option 2: Simplified calculation without measurement of the moisture content

This option provides a simple and conservative approach to determine the absolute humidity by assuming the gaseous stream is saturated[5]. Accordingly, m_{H2O} is assumed to equal the saturation absolute humidity ($m_{H2O,t,db,sat}$) and is calculated using equation (4) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0):

$$m_{H2O,t,db,Sat} = \frac{p_{H2O,t,Sat} \times MM_{H2O}}{\left(P_t - p_{H2O,t,Sat}\right) \times MM_{t,db}}$$

Where:

$m_{H2O,t,db,sat}$	= Saturation absolute humidity in time interval *t* on a dry basis (kg H_2O/kg dry gas)
$p_{H2O,t,Sat}$	= Saturation pressure of H_2O at temperature T_t in time interval *t* (Pa)
T_t	= Temperature of the gaseous stream in time interval *t* (K) (to be monitored)
P_t	= Absolute pressure of the gaseous stream in time interval *t* (Pa)
MM_{H2O}	= Molecular mass of H_2O (kg H_2O/kmol H_2O) = 18.0152 kg/kmol
$MM_{t,db}$	= Molecular mass of the gaseous stream in a time interval *t* on a dry basis (kg dry gas/kmol dry gas) (to be monitored)

The molecular mass of the gaseous stream in a time interval *t* on a dry basis is estimated using equation (3) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0):

$$MM_{t,db} = \sum_k \left(v_{k,t,db} \times MM_k\right)$$

Where:

[5] An assumption that the gaseous stream is saturated is conservative for the situation that the mass flow of greenhouse gas *i* is underestimated (applicable for calculating baseline emissions).

$MM_{t,db}$ = Molecular mass of the gaseous stream in time interval t on a dry basis (kg dry gas/kmol dry gas)
$v_{k,t,db}$ = Volumetric fraction of gas *k* in the gaseous stream in time interval *t* on a dry basis (m^3 gas k/m^3 dry gas)
MM_k = Molecular mass of gas *k* (kg/kmol)
k = All gases, except H_2O, contained in the gaseous stream (e.g. N_2, CO_2, O_2, CO, H_2, CH_4, N_2O, NO, NO_2, SO_2, SF_6 and PFCs)

Equation (3) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0), requires measuring the volumetric fraction of all gases (k) in the gaseous stream. However as a simplification, the volumetric fraction of only CH_4 must be monitored and the difference to 100% may be considered as pure nitrogen. The underlying methodology does not specify that such simplification is not acceptable.

Option B of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0)

The mass flow of CH_4, ($F_{CH4,sent\_flare,y}$) is determined using equations (5) and (6) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0):

$$F_{i,t} = V_{t,db} \times v_{i,t,db} \times \rho_{i,t} \qquad (5)$$

With

$$\rho_{i,t} = \frac{P_t \times MM_i}{R_u \times T_t} \qquad (6)$$

Where:

$F_{i,t}$ = Mass flow of greenhouse gas *i* in the gaseous stream in time interval *t* (kg gas/h)
$V_{t,db}$ = Volumetric flow of the gaseous stream in the time interval t on a dry basis (m^3 dry gas/h)
$v_{i,t,db}$ = Volumetric fraction of greenhouse gas ~~I~~*i* in the gaseous stream in a time interval *t* on a dry basis (m^3 gas *i*/m^3 dry gas)
$\rho_{i,t}$ = Density of greenhouse gas *i* in the gaseous stream in interval *t* (kg gas i/m^3 gas $_i$)
P_t = Absolute pressure of the gaseous stream in time interval *t* (Pa)
MM_i = Molecular mass of greenhouse gas *i* (kg/kmol)
R_u = Universal ideal gases constant (Pa.m^3/kmol.K)
T_t = Temperature of the gaseous stream in time interval *t* (K)

The volumetric flow of the gaseous stream in time interval t on a dry basis ($V_{t,db}$) is determined by converting the measured volumetric flow from wet to dry basis according to equation (~~8~~7) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0):

$$V_{t,db} = V_{t,wb}/(1 + v_{H2O,t,db}) \qquad (7)$$

Where:

$V_{t,db}$ = Volumetric flow of the gaseous stream in time interval *t* on a dry basis (m^3 dry gas/h)
$V_{t,wb}$ = Volumetric flow of the gaseous stream in time interval *t* on a wet basis (m^3 wet gas/h)
$v_{H2O,t,db}$ = Volumetric fraction of H_2O in the gaseous stream in time interval *t* on a dry basis (m^3 H_2O/m^3 dry gas)

The volumetric fraction of H_2O in time interval *t* on a dry basis ($v_{H2O,t,db}$) is estimated according to equation (8) of the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0):

$$v_{H2O,t,db} = \frac{m_{H2O,t,db} \times MM_{t,db}}{MM_{H2O}} \qquad (8)$$

Where:

~~V~~$v_{H2O,t,db}$	= Volumetric fraction of H_2O in the gaseous stream in time interval *t* on a dry basis (m^3 H_2O/m^3 dry gas)
$M_{H2O,t,db}$	= Absolute humidity in the gaseous stream in time interval *t* on dry basis (kg H_2O/kg dry gas)
$MM_{t,db}$	= Molecular mass of the gaseous stream in time interval *t* on a dry basis (kg dry gas/kmol dry gas)
MM_{H2O}	= Molecular mass of H_2O (kg H_2O/kmol H_2O)

$PE_{flare,y}$ shall be determined using the methodological tool "Project emissions from flaring". If LFG is flared through more than one flare, then $PE_{flare,y}$ is the sum of the emissions for each flare determined separately.

The project activity involves the installation of two ~~Biogas 2000 m^3h^{-1}~~ enclosed ~~ground~~ flares. The calculation procedure in the applied tool "Project emissions from flaring" (Version 02.0.0) determines the project emissions from flaring the residual gas ($PE_{flare,y}$) based on the flare efficiency ($\eta_{flare,m}$) and the mass flow of methane to the flare ($F_{CH4,RG,m}$).

Step 1: Determination of the methane mass flow in the residual gas

The mass flow of methane in the residual gaseous stream in the minute *m* has been determined in accordance with the "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0) as described above.

Step 2: Determination of flare efficiency

The flare efficiency depends on the efficiency of combustion in the flare and the time that the flare is operating. For determining the efficiency of combustion of enclosed flares there is the option to apply a default value or determine the efficiency based on monitored data.

Option B to measure the flare efficiency has been selected for determining the flare efficiency for minute *m* ($\eta_{flare,m}$).

The flame enclosure has a height of 4.~~,~~1 times the diameter of the enclosure and is therefore classified to be a low height flare.

For enclosed flares that are defined as low height flares, the flare efficiency in the minute *m* ($\eta_{flare,m}$) shall be adjusted, as a conservative approach, by subtracting 0.1 from the efficiency as determined in Options A or B.

Option B: Measured flare efficiency

The flare efficiency in the minute *m* is a measured value ($\eta_{flare,m} = \eta_{flare,calc,m}$) when the following three conditions are met to demonstrate that the flare is operating:

1) The temperature of the flare ($T_{EG,m}$) and the flow rate of the residual gas to the flare ($F_{RG,m}$) is within manufacturer's specification for the flare ($SPEC_{flare}$) in minute *m*;
2) The flame is detected in minute *m* ($Flame_m$); and

Otherwise $\eta_{flare,m}$ is 0%.

In applying Option B, the project participants may choose to determine $\eta_{flare,calc,m}$ using either Option B.1 or Option B.2. Under Option B.1 the measurement is conducted by an accredited entity on a biannual basis and under option B.2 the flare efficiency is measured each minute. Option B.1 has been selected.

Option B.1: Biannual measurement of the flare efficiency

The calculated flare efficiency $\eta_{flare,calc,m}$ is determined as the average of two measurements of the flare efficiency made in year y ($\eta_{flare,calc,y}$), as follows:

$$\eta_{flare,calc,y} = 1 - \frac{1}{2}\sum_{t=1}^{2}\left(\frac{F_{CH4,EG,t}}{F_{CH4,RG,t}}\right) \quad (1)$$

Where:

$\eta_{flare,calc,y}$	= Flare efficiency in the year y
$F_{CH4,EG,t}$	= Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period *t* (kg)
$F_{CH4,RG,t}$	= Mass flow of methane in the residual gas on a dry basis at reference conditions in the time period *t* (kg)
t	= The two time periods in year *y* during which the flare efficiency is measured, each a minimum of one hour and separated by at least six months

$F_{CH4,EG,t}$ is measured according to an appropriate national or international standard. $F_{CH4,RG,t}$ is calculated according to Step 1, and consists of the sum of methane flow in the minutes *m* that make up the time period *t*.

Step 3: Calculation of project emissions from flaring

Project emissions from flaring are calculated as the sum of emissions for each minute *m* in year *y*, based on the methane mass flow in the residual gas ($F_{CH4,RG,m}$) and the flare efficiency ($\eta_{flare,m}$), as follows:

$$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,RG,m} \times \left(1 - \eta_{flare,m}\right) \times 10^{-3} \quad (15)$$

Where:

$PE_{flare,y}$	= Project emissions from flaring of the residual gas in year *y* (tCO_2e)
GWP_{CH4}	= Global warming potential of methane valid for the commitment period (tCO_2e/tCH_4)
$F_{CH4,RG,m}$	= Mass flow of methane in the residual gas in the minute *m* (kg)
$\eta_{flare,m}$	= Flare efficiency in minute *m*

Flare Specifications

In accordance with the applied methodological tool “Project emissions from flaring”, the flare specifications set by the manufacturer for the correct operation of the flare are documented in the CDM-PDD for the following parameters:

a) The minimum and maximum inlet flow rate is 50 – 2000 Nm^3/h

b) The minimum and maximum operating temperature is 1000 - 1150°C

c) The maximum duration between maintenance events is provided by the manufacturer by means of an overview of maintenance tasks and frequency and is provided in the technical manual to the installed flares. Different tasks have different maintenance frequencies. Some maintenance tasks have to be performed daily (maximum duration in days between maintenance events is 1), e.g. condensate drain valves; whereas only every six months (maximum duration in days between maintenance events is 182) e.g. the condition of all cables and connectors needs to be checked and replaced in case of any defective items. The enclosed flares will require a complete overhaul after prolonged operations, and it is recommended that this should be carried out at least at once every three years. The technical manual to the installed flares is available upon request.

Ex ante estimation of $F_{CH4,PJ,y}$

$F_{CH4,PJ,y}$ is determined ex ante according to equation (5) of the applied methodology:

$$F_{CH4,PJ,y} = \eta_{PJ} \times \frac{BE_{CH4,SWDS,y}}{GWP_{CH4}}$$ ACM0001 equation (5)

Where:

GWP_{CH4}	Global Warming Potential of CH_4 (tCO_2e/tCH_4)
η_{PJ}	Efficiency of the LFG capture system that will be installed in the project activity
$BE_{CH4,SWDS,y}$	Amount of methane in the LFG that is generated from the SWDS in the baseline scenario in year *y* (tCO_2e/y)

Estimation of $BE_{CH4,SWDS,y}$

$BE_{CH4,SWDS,y}$is determined using the methodological tool “Emissions from solid waste disposal sites” (Version 06.0.1). In accordance with the applied methodology, paragraph 38, the following guidance has been taken into account when applying the tool:

- f_y in the tool has been assigned a value of 0 because the amount of LFG that would have been captured and destroyed is already accounted for in equation (2) of the applied methodology;
- In the tool, x begins with the year that the SWDS started receiving wastes (e.g. the first year of SWDS operation, i.e. 1997); and
- Sampling to determine the fractions of different waste types is not necessary because the waste composition has been obtained from previous studies.

Procedure to determine methane emissions from the SWDS:

The amount of methane generated from disposal of waste at the Solid Waste Disposal Site (SWDS) is calculated based on a first order decay (FOD) model.

The amount of methane generated from disposal of waste at the SWDS is calculated for the year *y* ($BE_{CH_4,SWDS,y}$) using equation (1) from the applied tool:

$$BE_{CH_4,SWDS,y} = \varphi_y.(1-f_y).GWP_{CH_4}.(1-OX).\frac{16}{12}.F.DOC_{f,y}.MCF_y.\sum_{x=1}^{y}\sum_{j} W_{j,x}.DOC_j.e^{-k_j(y-x)}.(1-e^{-k_j})$$

applied tool equation (1)

Where:

φ_y	Model correction factor to account for model uncertainties for year *y*
f_y	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in the year *y*
GWP_{CH_4}	Global Warming Potential of CH_4 (tCO_2e/tCH_4)
OX	Oxidation factor (reflecting the amount of methane from SWDS that is oxidised in the soil or other material covering the waste)
F	Fraction of methane in the SWDS gas (volume fraction)
$DOC_{f,y}$	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring at the SWDS for year *y* (weight fraction)
MCF_y	Methane correction factor for the year *y*
$W_{j,x}$	Amount of solid waste type *j* disposed or prevented from disposal in the SWDS in the year *x* (tons)
DOC_j	Fraction of degradable organic carbon in the waste type *j* (weight fraction)
k_j	Decay rate for the waste type *j* (l/yr)
j	Type of residual waste or types of waste in the MSW
x	Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y ($x = y$) (x = 1) to the year *y* for which avoided emissions are calculated ($x = y$)
y	Year of the crediting period for which methane emissions are calculated (*y* is a consecutive period of 12 months)

<u>Determining the parameters required to apply the FOD model:</u>

The table below summarises the parameters used in this calculation.

Parameter	Application A	Value Applied	Units	Explanation
φ_y	Default value	0.75	-	Ekurhuleni's mean annual precipitation is less than its annual potential evapotranspiration rate [6]. Therefore, MAP/PET <1.Therefore the site is dry. Application A is also selected as the CDM project activity mitigates methane emissions from a specific existing SWDS.
OX	Default value	0.1	-	In accordance with the applied tool.
F	Default value	0.5	-	In accordance with the applied tool.
$DOC_{f,y}$	Default value	0.5	-	In accordance with the applied tool.
MCF_y	Default value	1.0	-	The landfill is an anaerobic managed solid waste disposal site. This is because there is a controlled placement of waste at the landfill (waste is specifically deposited in designated cells, and mining waste is deposited in a separate cell) and cover material and compacting equipment is used.

[6] Adelana, S. (2010). Groundwater Resource Evaluation and Protection in the Cape Flats, South Africa (University of the Western Cape).

<table>
<tr><th>Parameter</th><th>Application A</th><th>Value Applied</th><th>Units</th><th>Explanation</th></tr>
<tr><td>k_j</td><td>Default values</td><td>See table under “explanation”</td><td>l/yr</td><td>Landfill is:
Boreal and temperate (MAT <20°C)[7]
Dry (MAP/PET <1)[8]
<table><tr><td>Waste type</td><td>value</td></tr><tr><td>Domestic waste (rapidly degrading)</td><td>0.06</td></tr><tr><td>Garden waste (moderately degrading)</td><td>0.05</td></tr><tr><td>Slowly degrading</td><td>0.02</td></tr><tr><td>Inert waste (not degrading)</td><td>0.00</td></tr></table></td></tr>
<tr><td>$W_{j,x}$</td><td>Estimated once</td><td></td><td>tonnes</td><td>Based on information from the SWDS owner</td></tr>
<tr><td>DOC_j</td><td>Default value</td><td>See table under “explanation”</td><td>-</td><td><table><tr><td>Wood & Wood Products</td><td>43</td></tr><tr><td>Pulp, Paper & Cardboard</td><td>40</td></tr><tr><td>Food & Food Waste</td><td>15</td></tr><tr><td>Textiles</td><td>24</td></tr><tr><td>Garden, Yard & Park Waste</td><td>20</td></tr><tr><td>Glass, Plastic, Metal, Inerts</td><td>0</td></tr></table></td></tr>
<tr><td>f_y</td><td>Estimated once</td><td>0</td><td>-</td><td>No methane is captured and flared in the baseline.</td></tr>
</table>

Determination of $F_{CH4,BL,y}$

The procedure to determine the amount of methane that would have been captured and destroyed in the baseline due to regulatory or contractual requirements, to address safety and odour concerns, or for other reasons (collectively referred to as requirement in the table below), distinguishes four cases as presented in the table below. The appropriate case should be identified and determination of $F_{CH4,BL,y}$ can be calculated following the corresponding guidance in the applied methodology.

Situation at the start of the project activity	Requirement to destroy methane	Existing LFG capture and destruction system
Case 1	No	No
Case 2	Yes	No
Case 3	No	Yes
Case 4	Yes	Yes

Case 1 is applicable to the project activity: no requirement to destroy methane exists at the start of the project activity and no LFG system exists at the start of the project activity.

[7] http://www.cape-town.climatemps.com/

[8] Adelana, S. (2010). Groundwater Resource Evaluation and Protection in the Cape Flats, South Africa (University of the Western Cape).

Hence, in accordance with the applied methodology:

$F_{CH4,BL,y} = 0$

Project Emissions

The project emissions are calculated in accordance with equation (22) of the applied methodology:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y}$$ ACM0001 equation (22)

Where:

PE_y	Project emissions in year y (tCO_2/y)
$PE_{EC,y}$	Emissions from consumption of electricity due to the project activity in year *y* (tCO_2/y)
$PE_{FC,y}$	Emissions from consumption of fossil fuels due to the project activity, for purpose other than electricity generation, in year y (tCO_2/y)
$PE_{DT,y}$	Emissions from distribution of compressed/liquefied LFG using trucks, in year y (tCO_2/y)

For the purposes of this type of project, there will be no consumption of fossil fuels due to the project activity, and:

Project emissions from distribution of compressed/liquefied LFG using trucks is not applicable as all the LFG captured will be flared on-site.

Project emissions from consumption of electricity due to the project activity shall be calculated in accordance with equation (1) of the “Tool to calculate baseline, project and/or leakage emissions from electricity consumption” (Version 01).

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$$ applied tool equation (1)

Where:

$PE_{EC,y}$	Project emissions from electricity consumption in year y (tCO_2e/yr)
$EC_{PJ,j,y}$	Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)
$EF_{EL,j,y}$	Emission factor for electricity generation for source j in year y (tCO_2/MWh)
$TDL_{j,y}$	Average technical transmission and distribution losses for providing electricity to source j in year y

For the purpose of ex-ante calculation of emissions reductions as a result of the project activity, the electricity consumption is based on the figures as monitored during the last monitoring period of the previous crediting period (01/01/2013 – 31/07/2014).

Scenario A: “Electricity consumption from the grid” is applicable and therefore Option A1 in the tool has been selected for determination of the emission factor $EF_{EL,j,y}$:

$EF_{EL,j,y} = EF_{grid,CM,y} = 0.9488$ tCO_2e/MWh as provided by the Standardized baseline – Grid emission factor for the Southern African power pool (Version 01.0).

The value for the Average technical transmission and distribution losses ($TDL_{j,y}$) is derived from Eskom’s annual report.

Leakage

No leakage effects are accounted for under the applied methodology.

Emission Reductions

The emission reductions of the project activity are calculated using equation (25) of the applied methodology:

$$ER_y = BE_y - PE_y$$ (ACM0001 equation 25)

As per the latest approved version of the methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period" (Version 03.0.1) the original baseline is still valid and therefore not required to be updated:

- The original baseline complies with all relevant mandatory national and/or sectoral policies which have come into effect after the submission of the project activity for validation;
- Circumstances, taking into consideration changes in market characteristics such as availability of new fuels and the impact of electricity prices or fuel prices, do not affect the continued validity of the original baseline;
- Since the methodology applied in the original PDD was withdrawn after the registration of the project activity and replaced by a consolidated methodology, the only data used both at time of request for registration and at time of request for renewal of the crediting period is the input-data for the First Order Decay Model, as applied using the tool "Emissions from solid waste disposal sites" (Version 06.0.1); i.e. the amount of waste disposed of at the SWDS annually. Other (default) values are as per the latest methodology and applicable tools.

B.6.2. Data and parameters fixed ex ante

(Copy this table for each piece of data and parameter.)

Data / Parameter	OX_{top_layer}
Unit	Not applicable
Description	Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline.
Source of data	ACM0001 (Version 15.0)
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	According to the applied methodology, this value is consistent with how oxidation is accounted for in the methodological tool 'Emissions from Solid Waste Disposal Sites'.
Purpose of data	Baseline emissions calculations
Additional comment	Not applicable

Data / Parameter	GWP_{CH4}
Unit	tCO_2e/tCH_4
Description	Global warming potential of CH_4
Source of data	ACM0001 (Version 15.0)
Value(s) applied	25~~21~~

Choice of data or Measurement methods and procedures	As per IPCC: 21 for the first commitment period and in accordance with the latest COP/MOP decision. The latest COP/MOP decision (Decision 24/CP.19, paragraph 2) stipulates that "from 2015 until a further decision is adopted by the Conference of the Parties, the global warming potential values used by Parties included in Annex I to the Convention (Annex I Parties) ... shall be those listed in the column entitled "Global warming potential for given time horizon" in table 2.14 of the errata to the contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, based on the effects of greenhouse gases over a 100-year time horizon, as contained in annex III"; This means that from 2015 the value 25 shall be used for the GWP of methane. ~~21 for the first commitment period. Shall be updated according to any future COP/MOP decisions.~~
Purpose of data	Baseline emissions calculations
Additional comment	Not applicable

Data / Parameter	η_{PJ}
Unit	Not applicable
Description	Efficiency of the LFG capture system that will be installed in the project activity.
Source of data	ACM0001 (Version 15.0)
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Since the technical specifications are not available for the LFG capture system, a default value of 50% is applied for the purposes of ex-ante emissions estimation.
Purpose of data	Baseline emissions calculations
Additional comment	Not applicable

Data / Parameter	φ_y
Unit	Not applicable
Description	Default value for the model correction factor to account for model uncertainties.
Source of data	Version 06.0.1 of the 'Emissions from solid waste disposal sites'.
Value(s) applied	0.75
Choice of data or Measurement methods and procedures	Application A is applied as the project activity mitigates methane emissions from a specific existing SWDS. The project site is located within dry conditions[9].
Purpose of data	Baseline emissions calculations
Additional comment	Not applicable

Data / Parameter	OX
Unit	Not applicable
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste).

[9]http://www.johannesburg.climatemps.com/

Source of data	Based on an extensive review of published literature on this subject, including the IPCC Guidelines for National Greenhouse Gas Inventories, as per Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.
Value(s) applied	0.1
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Baseline emissions calculations
Additional comment	When methane passes through the top-layer, part of it is oxidised by methanotrophic bacteria to produce CO_2. The oxidation factor represents the proportion of methane that is oxidised to CO_2. This should be distinguished from the methane correction factor (MCF) which is to account for the situation that ambient air might intrude into the SWDS and prevent methane from being formed in the upper layer of SWDS.

Data / Parameter	F
Unit	Not applicable
Description	Fraction of methane in the SWDS gas (volume fraction).
Source of data	Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value
Purpose of data	Baseline emissions calculations
Additional comment	Upon biodegradation, organic material is covered to a mixture of methane and carbon dioxide.

Data / Parameter	$DOC_{f,default}$
Unit	Weight fraction
Description	Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS.
Source of data	IPCC 2006 Guidelines for National Greenhouse Gas Inventories as per Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.
Value(s) applied	0.5
Choice of data or Measurement methods and procedures	Default value applied since the project activity mitigates methane emissions from a specific existing SWDS.
Purpose of data	Baseline emissions calculations
Additional comment	This factor reflects the fact that some degradable organic carbon does not degrade, or degrades very slowly, in the SWDS. This default value can only be used for i) Application A; or ii) Application B if the tool is applied to MSW.

Data / Parameter	$MCF_{default}$
Unit	Not applicable

<table>
<tr><td>Description</td><td>Methane correction factor</td></tr>
<tr><td>Source of data</td><td>Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.</td></tr>
<tr><td>Value(s) applied</td><td>1.0</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>The project site is an anaerobic managed solid waste disposal site. This is because there is a controlled placement of waste at the landfill (waste is specifically deposited in designated cells, and mining waste is deposited in a separate cell)and cover material and compacting equipment is used.</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions calculations</td></tr>
<tr><td>Additional comment</td><td>Not applicable</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>DOC_j</td></tr>
<tr><td>Unit</td><td>Not applicable</td></tr>
<tr><td>Description</td><td>Fraction of degradable organic carbon in the waste type j.</td></tr>
<tr><td>Source of data</td><td>Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><td>Wood and wood products</td><td>43</td></tr>
<tr><td>Pulp, paper and cardboard (other than sludge)</td><td>40</td></tr>
<tr><td>Food, food waste, beverages and tobacco (other than sludge)</td><td>15</td></tr>
<tr><td>Textiles</td><td>24</td></tr>
<tr><td>Garden, yard and park waste</td><td>20</td></tr>
<tr><td>Glass, plastic, metal, other inert waste</td><td>0</td></tr>
</table>
</td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>The most appropriate fraction(s) based on the options provided on page 11 of version 06.0.1 of the ‘Emissions from solid waste disposal sites’ were selected.</td></tr>
<tr><td>Purpose of data</td><td>Baseline emissions calculations</td></tr>
<tr><td>Additional comment</td><td>Not applicable</td></tr>
</table>

<table>
<tr><td>Data / Parameter</td><td>k_j</td></tr>
<tr><td>Unit</td><td>l/yr</td></tr>
<tr><td>Description</td><td>Decay rate for the waste type j.</td></tr>
<tr><td>Source of data</td><td>Version 06.0.1 of the ‘Emissions from solid waste disposal sites’.</td></tr>
<tr><td>Value(s) applied</td><td>
<table>
<tr><td>Pulp, paper, cardboard (other than sludge), textiles</td><td>0.04</td></tr>
<tr><td>Wood, wood products and straw</td><td>0.02</td></tr>
<tr><td>Other (nonfood) organic putrescible garden and park waste</td><td>0.05</td></tr>
<tr><td>Food, food waste, sewage sludge, beverages and tobacco</td><td>0.06</td></tr>
</table>
</td></tr>
</table>

Choice of data or Measurement methods and procedures	The most appropriate decay rate(s) based on the options provided on page 12 of version 06.0.1 of the 'Emissions from solid waste disposal sites'. In the case of this project activity, the landfill site is boreal and temperate, and dry.
Purpose of data	Baseline emissions calculations
Additional comment	Not applicable

Data / Parameter	EF_{EL}
Unit	tCO_2/MWh
Description	Emission factor for electricity generation
Source of data	Standardized baseline: Grid emission factor for the Southern African Power Pool (Version 01.0).
Value(s) applied	0.~~9688~~9488
Choice of data or Measurement methods and procedures	Combined margin CO_2 emission factor for the project electricity system applicable to all project activities other than wind and solar for the second or third crediting period.
Purpose of data	Calculations of project emissions
Additional comment	Not applicable

Data / Parameter	$\mathbf{W}_{j.x}$
Unit	Tonnes
Description	Amount of solid waste type *j* disposed in the SWDS in year *x* – Domestic Waste
Source of data	Measured by the project participant
Value(s) applied	430 536 tonnes annually
Choice of data or Measurement methods and procedures	Data taken from historical records of landfill operation, aggregated into annual figures and provided by Enviroserv.
Purpose of data	Baseline emission calculations
Additional comment	The amount of waste in tonnes has been obtained from the project participant. However assumptions have been applied when differentiating the waste as required for the calculations using the First Order Decay Model.

Data / Parameter	P_n
Unit	Pa
Description	Total pressure at normal conditions
Source of data	Version 02.0.0 of the 'Tool to determine the mass flow of a greenhouse gas in a gaseous stream'.
Value(s) applied	101,325
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Data / Parameter	T_n
Unit	K
Description	Temperature at normal conditions
Source of data	Version 02.0.0 of the ‘Tool to determine the mass flow of a greenhouse gas in a gaseous stream’.
Value(s) applied	273.15
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Data / Parameter	R_u
Unit	Pa.m^3/kmol.K
Description	Universal ideal gases constant
Source of data	Version 02.0.0 of the ‘Tool to determine the mass flow of a greenhouse gas in a gaseous stream’.
Value(s) applied	8,314
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Data / Parameter	MM_i
Unit	Kg/kmol
Description	Molecular mass of greenhouse gas i
Source of data	Version 02.0.0 of the ‘Tool to determine the mass flow of a greenhouse gas in a gaseous stream’.
Value(s) applied	(see table below)
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Value(s) applied:

Compound	Structure	Molecular mass (kg/kmol)
Carbon dioxide	CO_2	44.01
Methane	CH_4	16.04
Nitrous oxide	N_2O	44.02
Sulfur hexafluoride	SF_6	146.06
Perfluoromethane	CF_4	88.00
Perfluoroethane	C_2F_6	138.01
Perfluoropropane	C_3F_8	188.02
Perfluorobutane	C_4F_{10}	238.03
Perfluorocyclobutane	$c\text{-}C_4F_8$	200.03
Perfluoropentane	C_5F_{12}	288.03
Perfluorohexane	C_6F_{14}	338.04

<table>
<tr><td>Data / Parameter</td><td>MM_k</td></tr>
<tr><td>Unit</td><td>Kg/kmol</td></tr>
<tr><td>Description</td><td>Molecular mass of gas k</td></tr>
<tr><td>Source of data</td><td>Version 02.0.0 of the ‘Tool to determine the mass flow of a greenhouse gas in a gaseous stream’.</td></tr>
<tr><td>Value(s) applied</td><td>For gases k that are greenhouse gases apply values for MM_i.
<table>
<tr><td>Compound</td><td>Structure</td><td>Molecular mass (kg/kmol)</td></tr>
<tr><td>Nitrogen</td><td>N_2</td><td>28.01</td></tr>
<tr><td>Oxygen</td><td>O_2</td><td>32.00</td></tr>
<tr><td>Carbon monoxide</td><td>CO</td><td>28.01</td></tr>
<tr><td>Hydrogen</td><td>H_2</td><td>2.02</td></tr>
<tr><td>Nitric oxide</td><td>NO</td><td>30.01</td></tr>
<tr><td>Nitrogen dioxide</td><td>NO_2</td><td>46.01</td></tr>
<tr><td>Sulfur dioxide</td><td>SO_2</td><td>64.06</td></tr>
</table></td></tr>
<tr><td>Choice of data or Measurement methods and procedures</td><td>Not applicable</td></tr>
<tr><td>Purpose of data</td><td>Calculation of baseline emissions</td></tr>
<tr><td>Additional comment</td><td>Not applicable</td></tr>
</table>

Data / Parameter	$\mathbf{MM_{H2O}}$
Unit	kg/kmol
Description	Molecular mass of water
Source of data	Version 02.0.0 of the ‘Tool to determine the mass flow of a greenhouse gas in a gaseous stream’.
Value(s) applied	18.0152
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Data / Parameter	$\mathbf{SPEC_{flare}}$
Unit	Temperature - °C Flow rate kg/h or m^3/h Maintenance schedule – number of days
Description	Manufacturer’s flare specifications for temperature, flow rate and maintenance schedule
Source of data	Flare manufacturer

Value(s) applied	Document in the CDM-PDD the flare specifications set by the manufacturer for the correct operation of the flare for the following parameters: (a) Minimum and maximum inlet flow rate, if necessary converted to flow rate at reference conditions or heat flux; (b) Minimum and maximum operating temperature; and (c) Maximum duration in days between maintenance events The flare specifications set by the manufacturer for the correct operation of the flare are the following: a) The minimum and maximum inlet flow rate is 50 – 2000 Nm^3/h b) The minimum and maximum operating temperature is 1000 - 1150°C c) The maximum duration between maintenance events is provided by the manufacturer by means of an overview of maintenance tasks and frequency and is provided in the technical manual to the installed flares. Different tasks have different maintenance frequencies. Some maintenance tasks have to be performed daily (maximum duration in days between maintenance events is 1), e.g. condensate drain valves; whereas only every six months (maximum duration in days between maintenance events is 182) e.g. the condition of all cables and connectors needs to be checked and replaced in case of any defective items. The enclosed flares will require a complete overhaul after prolonged operations, and it is recommended that this should be carried out at least at once every three years. The technical manual to the installed flares is available upon request.
Choice of data or Measurement methods and procedures	Not applicable
Purpose of data	Determination of flare efficiency
Additional comment	Only applicable in case of enclosed flares. The maintenance schedule is not required if Option A is selected to determine flare efficiency of an enclosed flare.

B.6.3. Ex ante calculation of emission reductions

>>

Baseline Emissions

The baseline emissions are determined according to equation (1) of the applied methodology:

$$BE_y = BE_{CH4,y} + BE_{EC,y} + BE_{HG,y} + BE_{NG,y}$$ ACM0001 equation (1)

Year	BEy	$BE_{CH4,y}$	$BE_{EC,y}$	$BE_{HG,y}$	$BE_{NG,y}$
	tCO_2e	tCO_2e	tCO_2e	tCO_2e	tCO_2e
2015	~~59 260~~70 548	~~59 260~~70 548	0	0	0
2016	~~60 381~~71 883	~~60 381~~71 883	0	0	0
2017	~~61 312~~72 990	~~61 312~~72 990	0	0	0
2018	~~62 067~~73 890	~~62 067~~73 890	0	0	0

2019	~~62 662~~74 597	~~62 662~~74 597	0	0	0
2020	~~63 109~~75 130	~~63 109~~75 130	0	0	0
2021	~~63 421~~75 501	~~63 421~~75 501	0	0	0

Baseline emissions of methane from the SWDS are determined according to equation (2) and equation (5) of the applied methodology:

$$BE_{CH4} = \left(\left(1 - OX_{top\_layer}\right) \times F_{CH4,PJ,y} - F_{CH4,BL,y}\right) \times GWP_{CH4}$$ ACM0001 equation (2)

Year	$BE_{CH4,y}$	$OX_{top\ layer}$	$F_{CH4,PJ,y}$	$F_{CH4,BL,y}$	GWP_{CH4}
	tCO_2e	-	tCH_4	tCH_4	tCO_2e/tCH_4
2015	~~59 260~~70 548	0.1	3 135	0	~~21~~25
2016	~~60 381~~71 883	0.1	3 195	0	25~~21~~
2017	~~61 312~~72 990	0.1	3 244	0	25~~21~~
2018	~~62 067~~73 890	0.1	3 284	0	25~~21~~
2019	~~62 662~~74 597	0.1	3 315	0	25~~21~~
2020	~~63 109~~75 130	0.1	3 339	0	25~~21~~
2021	~~63 421~~75 501	0.1	3 356	0	25~~21~~

$$F_{CH4,PJ,y} = \eta_{PJ} \times \frac{BE_{CH4,SWDS,y}}{GWP_{CH4}}$$ ACM0001 equation (5)

Year	$F_{CH4,PJ,y}$	η_{PJ}	$BE_{CH4,SWDS,y}$	GWP_{CH4}
	tCH_4/yr	-	tCO_2e/yr	tCO_2e/tCH_4
2015	3 135	0.5	~~131 689~~ 156 773	~~21~~25
2016	3 195	0.5	~~134 181~~159 739	25~~21~~
2017	3 244	0.5	~~136 248~~162 201	25~~21~~
2018	3 284	0.5	~~137 927~~164 199	25~~21~~
2019	3 315	0.5	~~139 248~~165 772	25~~21~~
2020	3 339	0.5	~~140 242~~ 166 955	25~~21~~
2021	3 356	0.5	~~140 936~~167 780	25~~21~~

Project Emissions

The project emissions are determined according to equation (22) of the applied methodology:

$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{DT,y}$ ACM0001 equation (22)

Year	PEy	$PE_{EC,y}$	$PE_{FC,y}$	$PE_{DT,y}$
	tCO_2	tCO_2	tCO_2	tCO_2
2015	464	464	0	0
2016	464	464	0	0
2017	464	464	0	0
2018	464	464	0	0
2019	464	464	0	0
2020	464	464	0	0
2021	464	464	0	0

$PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EL,j,y} \times (1 + TDL_{j,y})$ applied tool equation (1)

Year	PE_{EC}	EC	EF	TDL
	tCO_2	MWh	$tCO_{2/MWh}$	tCO_2
2015	464	463	~~0.95~~0.9488	~~0.06~~0.0568
2016	464	463	0.9488~~0.95~~	0.0568~~0.06~~
2017	464	463	0.9488~~0.95~~	0.0568~~0.06~~
2018	464	463	0.9488~~0.95~~	0.0568~~0.06~~
2019	464	463	0.9488~~0.95~~	0.0568~~0.06~~
2020	464	463	0.9488~~0.95~~	0.0568~~0.06~~
2021	464	463	0.9488~~0.95~~	0.0568~~0.06~~

Leakage

No leakage effects are accounted for under the applied methodology.

Emission reductions

The emission reductions are determined according to equation (25) of the applied methodology:

$ER_y = BE_y - PE_y$ ACM0001 equation (25)

Year	ER_y	BE_y	PE_y
	tCO_2e	tCO_2e	tCO_2e
2015	~~58 796~~ 70 084	~~59 260~~ 70 548	464
2016	~~59 917~~71 418	~~60 381~~71 883	464
2017	~~60 848~~ 72 526	~~61 312~~72 990	464
2018	~~61 603~~73 425	~~62 067~~73 890	464
2019	~~62 198~~ 74 133	~~62 662~~74 597	464
2020	~~62 645~~74 666	~~63 109~~75 130	464
2021	~~62 957~~ 75 037	~~63 421~~75 501	464

Total	**~~428 963~~ 511 289**	**~~432 212~~514 538**	**3 249**
Average	~~61 280~~73 041	~~61 745~~73 505	464

B.6.4. Summary of ex ante estimates of emission reductions

Year	Baseline emissions ($t\ CO_2e$)	Project emissions ($t\ CO_2e$)	Leakage ($t\ CO_2e$)	Emission reductions ($t\ CO_2e$)
Year 2015	~~59 260~~70 548	464	0	~~58 796~~70 084
Year 2016	~~60 381~~71 883	464	0	~~59 917~~71 418
Year 2017	~~61 312~~72 990	464	0	~~60 848~~72 526
Year 2018	~~62 067~~73 890	464	0	~~61 603~~73 425
Year 2019	~~62 662~~74 597	464	0	~~62 198~~74 133
Year 2020	~~63 109~~75 130	464	0	~~62 645~~74 666
Year 2021	~~63 421~~75 501	464	0	~~62 957~~75 037
Total	~~432 212~~514 538	3 249	0	~~428 963~~511 289
Total number of crediting years	7			
Annual average over the crediting period	~~61 745~~73 505	464	0	~~61 280~~73 041

B.7. Monitoring plan

B.7.1. Data and parameters to be monitored

Copy this table for each piece of data and parameter.

Data / Parameter	**Management of SWDS**
Unit	Not applicable
Description	Management of SWDS
Source of data	Different sources of data: • Original design of the landfill; • Technical specifications for the management of the SWDS; • National regulations.
Value(s) applied	Waste management licence: number 16/2/7/A230/D17/Z1/P280.
Measurement methods and procedures	Annual
Monitoring frequency	Annual
QA/QC procedures	The waste management licence is granted by a governmental department (third party).
Purpose of data	To ensure that management of the SWDS is not changed during the crediting period in order to increase methane generation compared to the situation prior to the implementation of the project activity and to ensure that the SWDS complies with the waste management licence.
Additional comment	Not applicable

Data / Parameter	**$Op_{j,h}$**
Unit	Not applicable
Description	Operation of the equipment that consumes the LFG.
Source of data	Project Participants
Value(s) applied	Not applicable
Measurement methods and procedures	For each equipment unit *j* using the LFG monitor that the plant is operating in hour *h* by the monitoring any one or more of the following three parameters: (a) Temperature. Determine the location for temperature measurements and minimum operational temperature based on manufacturer's specifications of the burning equipment. Document and justify the location and minimum threshold in the PDD; (b) Flame. Flame detection system is used to ensure that the equipment is in operation; (c) Products generated. Monitor the generation $Op_{j,h}$ = 0 when: (a) One of more temperature measurements are missing below the minimum threshold in hour h (instantaneous measurements are made at least every minute); (b) Flame is not detected continuously in hour h (instantaneous measurements are made at least every minute) Otherwise, $Op_{j,h}$ = 1
Monitoring frequency	Hourly
QA/QC procedures	Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations.
Purpose of data	Calculation of baseline emissions
Additional comment	Not applicable

Data / Parameter:	**$EG_{EC,y}$**
Unit:	MWh
Description:	Amount of electricity consumed by the project activity in year y.
Source of data:	Electricity meter
Value(s) applied:	Not applicable
Measurement methods and procedures:	As per table 14, in paragraph 80 of the applied methodology: sources of consumption shall include electricity consumed for the operation of the LFG capture system (blowers) and for the operation of the two flare installations.
Monitoring frequency:	Continuous
QA/QC procedures:	Electricity meter will be subject to regular (in accordance with stipulation of the meter supplier) maintenance and testing to ensure accuracy. The readings will be double checked by the electricity distribution company.
Purpose of data:	Calculation of project emissions
Additional comment:	This parameter is required for calculating project emissions from electricity consumption due to an alternative waste treatment process t $PE_{EC,y}$) using the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption".

Data / Parameter	CAPEX and OPEX
Unit	Currency (USD, EUR, etc.)
Description	Total investment to implement the project and total cost to operate the project.
Source of data	Engineering, procurement and construction contracts; and maintenance contracts.
Value(s) applied	Not applicable
Measurement methods and procedures	Not applicable
Monitoring frequency	At the first issuance request after each phase of the project is fully implemented.
QA/QC procedures	Audited by professional, independent financial auditors. The DOE should only verify that the data provided corresponds to the data from independent financial auditors.
Purpose of data	In order to collect the information that is required for the update of the provisions in section 5.3.1 of ACM0001 (version 15). Project activities that are registered using these simplified procedures are required to report cost and revenue information at the first issuance request after each phase of the project is fully implemented.
Additional comment	The information provided for CAPEX shall indicate the investment made: (i) in the collection and flaring system. The information supplied for OPEX shall indicate the costs for: (i) staff and maintenance involved in the operation of the collection and flaring system. The monitoring of this parameter is only required for projects applying the simplified procedures to identify the baseline scenario and demonstrate additionality.

Data / Parameter	TDL_y
Unit	Not applicable
Description	Average technical transmission and distribution losses for providing electricity.
Source of data	Data obtained from grid operator.
Value(s) applied	0.0568
Measurement methods and procedures	Use recent, accurate and reliable data available within the host country.
Monitoring frequency	Annually. In the absence of data from the relevant year, most recent figures should be used, but not older than 5 years.
QA/QC procedures	Not applicable
Purpose of data	Calculation of project emissions
Additional comment	Not applicable

~~Data / Parameter~~	~~$SPEC_{flare}$~~

Unit	Temperature - °C Flow rate or heat flux – kg/h or m^3/h Maintenance schedule – number of days
Description	Manufacturer's flare specifications for temperature, flow rate and maintenance schedule.
Source of data	Flare manufacturer as per Version 02.0.0 of the methodological tool "Project emissions from flaring".
Value(s) applied	Not applicable
Measurement methods and procedures	Document in the CDM-PDD the flare specifications set by the manufacturer for the correct operation of the flare for the following parameters: (a) Minimum and maximum inlet flow rate, if necessary converted to flow rate at reference conditions or heat flux; (b) Minimum and maximum operating temperature; and (c) Maximum duration in days between maintenance events
Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Purpose of data	Calculation of baseline emissions
Additional comment	Only applicable in case of enclosed flares. The maintenance schedule is not required if Option A is selected to determine flare efficiency of an enclosed flare.

Data / Parameter	**$Flame_m$**
Unit	Flame on or Flame off
Description	Flame detection of flare in the minute m
Source of data	Measurements by the project participants
Value(s) applied	n/a as only used in ex-post calculations
Measurement methods and procedures	Measured using a fixed installation optical flame detector: Ultra Violet detector or Infra Red or both.
Monitoring frequency	Once per minute. Detection of flame recorded as a minute that the flame was on, otherwise recorded as a minute that the flame was off.
QA/QC procedures	Equipment shall be maintained and calibrated in accordance with manufacturer's recommendations.
Purpose of data	Calculation of baseline emissions
Additional comment	Applicable to all flares

Data / Parameter	**V_i $v_{k,t,wb}$ (also equivalent to $V_{k,t,wb}$)**
Unit	m^3 gas *i*/*k*/m^3 wet gas
Description	Volumetric fraction of greenhouse gas *i*/*k* in the gaseous stream in a time interval *t* on a wet basis.
Source of data	Not applicable
Value(s) applied	n/a as only used in ex-post calculations
Measurement methods and procedures	Calculated based on the dry basis analysis plus water concentration measurement or continuous in-situ analyzers if not specified in the underlying methodology.
Monitoring frequency	Continuous if not specified in the underlying methodology

QA/QC procedures	Analysers must be periodically calibrated according to the manufacturer's recommendation.Calibration should include zero verification with an inert gas (e.g. N2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in year y.Calculation of baseline emissions
Additional comment	Calibration should include zero verification with an inert gas and at least one reading verification with a standard gas. All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.

Data / Parameter	$M_{t,wb}$
Unit	kg/h
Description	Mass flow of the gaseous stream in time interval *t* on a wet basis.
Source of data	Not applicable
Value(s) applied	Not applicable
Measurement methods and procedures	Instruments with recordable electronic signal (analogical or digital) are required.
Monitoring frequency	Continuous
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data	Calculation of baseline emissions
Additional comment	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacurer's specifications.

Data / Parameter	$V_{t,wb}$
Unit	m^3 wet gas/h
Description	Volumetric flow of the gaseous stream in time interval *t* on a wet basis
Source of data	Measurement
Value(s) applied	Not available ex ante
Measurement methods and procedures	Volumetric flow measurement should always refer to the actual pressure and temperature. Instruments with recordable electronic signal (analogical or digital) are required.
Monitoring frequency	Continuous if not specified in the underlying methodology
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.
Additional comment	This parameter will be monitored in Options B and C as per the applied "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0).

~~Data / Parameter~~	~~$V_{t,db}$~~
~~Unit~~	~~m^3 dry gas/h~~
~~Description~~	~~Volumetric flow of the gaseous stream in time interval *t* on a dry basis~~
~~Source of data~~	~~Measurement~~
~~Value(s) applied~~	~~Not available ex ante~~
~~Measurement methods and procedures~~	~~Volumetric flow measurement should always refer to the actual pressure and temperature. Calculated based on the wet basis flow measurement plus water concentration measurement.~~
~~Monitoring frequency~~	~~Continuous if not specified in the underlying methodology~~
~~QA/QC procedures~~	~~Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications.~~
~~Purpose of data~~	~~Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.~~
~~Additional comment~~	~~This parameter will be monitored in Option A as per the applied "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0).~~

Data / Parameter	$V_{i,t,db}$
Unit	m^3 gas $_i$/m^3 dry gas
Description	Volumetric fraction of greenhouse gas $_i$ in a time interval $_t$ on a dry basis.
Source of data	Measurement
Value(s) applied	Not available ex ante
Measurement methods and procedures	Continuous gas analyser operating in a dry-basis. Volumetric flow measurement should always refer to the actual pressure and temperature.
Monitoring frequency	Continuous if not specified in the underlying methodology.
QA/QC procedures	Calibration should include zero verification with an inert gas (e.g. N_2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.
Additional comment	This parameter will be monitored in Options B ~~and E and may be monitored in Options A and D~~ as per the applied "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0).

~~Data / Parameter~~	~~$M_{t,db}$~~
~~Unit~~	~~kg/h~~
~~Description~~	~~Mass flow of the gaseous stream in time interval $_t$ on a dry basis.~~
~~Source of data~~	~~Calculation~~
~~Value(s) applied~~	~~Not available ex ante~~
~~Measurement methods and procedures~~	~~Calculated based on the wet basis flow measurement plus water concentration measurement.~~
~~Monitoring frequency~~	~~Continuous if not specified in the underlying methodology.~~
~~QA/QC procedures~~	~~Calibration and frequency of calibration is according to manufacturer's specifications.~~
~~Purpose of data~~	~~Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.~~

Additional comment	This parameter will be monitored in Option D as per the applied "Tool to determine the mass flow of a greenhouse gas in a gaseous stream" (Version 02.0.0).

Data / Parameter	T_t
Unit	K
Description	Temperature of the gaseous stream in time interval *t*.
Source of data	Measurement
Value(s) applied	Not available ex ante
Measurement methods and procedures	Instruments with recordable electronic signal (analogical or digital) are required. Examples include thermocouples, thermos resistance, etc.
Monitoring frequency	Continuous unless differently specified in the underlying methodology.
QA/QC procedures	Periodic calibration against a primary device provided by an independent accredited laboratory is mandatory. Calibration and frequency of calibration is according to manufacturer's specifications.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.
Additional comment	Provided all parameters are converted to normal conditions during the monitoring process, this parameter may not be needed except for moisture content determination and therefore it should be metered only when performing such measurements (with same frequency). However, if the applicability condition related to the gaseous stream flow temperature being below 60°C is adopted, this parameter must be monitored continuously to assure the applicability condition is met.

Data / Parameter	P_t
Unit	Pa
Description	Asolute Ppressure of the gaseous stream in time interval *t*
Source of data	Measurement
Value(s) applied	Not available ex ante
Measurement methods and procedures	Instruments with recordable electronic signal (analogical or digital) are required. Examples include pressure transducers, etc.
Monitoring frequency	Continuous unless differently specified in the underlying methodology.
QA/QC procedures	Periodic calibration against a primary device must be performed periodically and records of calibration procedures must be kept available as well as the primary device and its calibration certificate. Pressure transducers (either captive or resistive) must be calibrated monthly.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.Determination of absolute humidity of the gaseous stream.
Additional comment	Provided all parameters are converted to normal conditions during the monitoring process, this parameter may not be needed except for moisture content determination and therefore it should be metered only when performing such measurements (with same frequency).

Data / Parameter	$p_{H2O,t,sat}$
Unit	Pa
Description	Saturation pressure of H_2O at temperature T_t in time interval *t*

Source of data	Fundamentals of Classical thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4° Edition 1994, John Wiley & Sons, Inc.
Value(s) applied	
Measurement methods and procedures	This parameter is solely a function of the gaseous stream temperature Tt and can be found at reference [1] (Fundamentals of Classical thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4° Edition 1994, John Wiley & Sons, Inc.) for a total pressure equal to 101,325 Pa
Monitoring frequency	Not applicable
QA/QC procedures	Not applicable
Purpose of data	Determination of absolute humidity of the gaseous stream.~~Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.~~
Additional comment	Fundamentals of Classical thermodynamics; Gordon J. Van Wylen, Richard E. Sonntag and Borgnakke; 4° Edition 1994, John Wiley & Sons, Inc.

Data / Parameter	$v_{k,t,db}$
Unit	m^3 gas k/m^3 dry gas
Description	Volumetric fraction of gas *k* in the gaseous stream in time interval *t* on a dry basis.
Source of data	Measurement
Value(s) applied	Not available ex ante
Measurement methods and procedures	Continuous gas analyser operating in dry-basis.
Monitoring frequency	Continuous if not specified in the underlying methodology.
QA/QC procedures	Calibration should include zero verification with an inert gas (e.g. N_2) and at least one reading verification with a standard gas (single calibration gas or mixture calibration gas). All calibration gases must have a certificate provided by the manufacturer and must be under their validity period.
Purpose of data	Ex post determination of the amount of methane in the LFG which is flared in the project activity in the year *y*.
Additional comment	Not applicable

Data / Parameter	$F_{CH4,EG,t}$
Unit	kg
Description	Mass flow of methane in the exhaust gas of the flare on a dry basis at reference conditions in the time period *t*.
Source of data	Measurements undertaken by a third party accredited entity
Value(s) applied	Not available ex ante
Measurement methods and procedures	Measure the mass flow of methane in the exhaust gas according to an appropriate national or international standard e.g. UKs Technical Guidance LFTGN05. The time period t over which the mass flow is measured must be at least one hour. The average flow rate to the flare during the time period *t* must be greater than the average flow rate observed for the previous six months.

Monitoring frequency	Biannual
QA/QC procedures	According to the standard applied.
Purpose of data	Determination of flare efficiency
Additional comment	Monitoring of this parameter is required in the case of enclosed flares and if the project participants select Option B.1 to determine flare efficiency.

Data / Parameter	$T_{EG,m}$
Unit	°C
Description	Temperature in the exhaust gas of the enclosed flare in minute *m*.
Source of data	Project Participants
Value(s) applied	Not available ex ante
Measurement methods and procedures	Measure the temperature of the exhaust gas in the flare by an appropriate temperature measurement equipment. Measurement outside the operational temperature specified by the manufacturer may indicate that the flare is not functioning correctly and may require maintenance. Flare manufacturers must provide suitable monitoring ports for the monitoring of the temperature of the flare. These would normally be expected to be in the middle third of the flare. Where more than one temperature port is fitted to the flare the flare manufacturer must provide written instructions detailing the conditions under which each location shall be used and the port most suitable for monitoring the operation of the flare according to manufacturer's specifications for temperature.
Monitoring frequency	Once per minute
QA/QC procedures	Temperature measurement equipment should be replaced or calibrated in accordance with their maintenance schedule.
Purpose of data	Determination of flare efficiency
Additional comment	Unexpected changes such as a sudden increase/drop in temperature can occur for different reasons. These events should be noted in the site records along with any corrective action that was implemented to correct the issue. Monitoring of this parameter is applicable in case of enclosed flares. Measurements are required to determine if manufacturer's flare specifications for operating temperature are met.
Data / Parameter	$Maintenance_y$
Unit	Calendar dates
Description	Maintenance events completed in year *y*.
Source of data	Project Participants
Value(s) applied	Not available ex ante
Measurement methods and procedures	Record the date that maintenance events were completed in year *y*. Records of maintenance logs must include all aspects of the maintenance including the details of the person(s) undertaking the work, parts replaced, or needing to be replaced, source of replacement parts, serial numbers and calibration certificates.
Monitoring frequency	Annual
QA/QC procedures	Records must be kept in a maintenance log for two years beyond the life of the flare.

Purpose of data	Determination of flare efficiency.
Additional comment	Monitoring of this parameter is required for the case of enclosed flares and the project participant selects Option B to determine the flare efficiency. These dates are required so that they can be compared to the maintenance schedule to check that maintenance events were completed within the minimum time between maintenance events specified by the manufacturer ($SPEC_{flare}$).

B.7.2. Sampling plan

>>

None of the data and parameters monitored in section B.7.1.are to be determined by a sampling approach.

B.7.3. Other elements of monitoring plan

>>

The amount of methane will be determined by monitoring the amount of landfill gas, the temperature and pressure of the landfill gas and the percentage methane in the landfill gas.

The regulatory framework will be monitored on an annual basis. In case upcoming regulations in South Africa mandate methane capture and destruction during the crediting period, the baseline scenario and emissions shall be adapted accordingly.

Monitoring as required in terms of the EIA authorisation will also be conducted.

To assure correct monitoring, staff will receive ongoing on-the-job training, including:

- General knowledge of equipment used in the landfill and for landfill gas extraction and monitoring;
- Specialized training with reading and recording data;
- Specialized training regarding calibration of equipment;
- Environmental safety and health, including emergency situations; and
- General CDM understanding

A training-register and an operations and maintenance manual is being kept on-site. The operations and maintenance manual has been developed for the EnviroServ Chloorkop Landfill Gas Recovery Project which is inclusive of environmental safety and health.

This manual includes:

- Detailed information on operations
- As-built drawings
- Maintenance procedures
- Equipment drawings and specifications
- Methodologies for monitoring, maintenance of monitoring equipment, and equipment calibration
- Environmental safety and health guidelines and procedures.

Parameters that will be monitored and the frequency of monitoring are described in section B7.1.

B.7.4. Date of completion of application of methodology and standardized baseline and contact information of responsible persons/ entities

>>

Date of completion of application of the selected methodology ACM0001 Large-scale Consolidated Methodology “Flaring or use of landfill gas”, Version 15.0: 22/08/2014.

Consultant (not to be considered as a project participant):

Promethium Carbon
Ballyoaks Office Park
Lacey Oaks House, 2nd Floor
35 Ballyclare Drive
Bryanston
South Africa

SECTION C. Duration and crediting period

C.1. Duration of project activity

C.1.1. Start date of project activity

>>

The start date of the project activity was 01/07/2007, being the earliest date at which construction of the flare and the LFG capture system began.

C.1.2. Expected operational lifetime of project activity

>>

Landfill gas will be produced at the Site for more than 20 years, and the gas extraction and combustion system will remain in place until no longer required.

C.2. Crediting period of project activity

C.2.1. Type of crediting period

>>

Second renewable crediting period

C.2.2. Start date of crediting period

>>

The starting date of the second crediting period will depend on the timing of the approval of the updated project description. The anticipated starting date is 19/01/2015.

C.2.3. Length of crediting period

7 years

SECTION D. Environmental impacts

D.1. Analysis of environmental impacts

>>

There are no transboundary impacts associated with this project as the project is far from any neighbouring country.

Pollution and degradation will be avoided and the collection and destruction of methane gas will reduce greenhouse gas emissions and reduce the impact of the landfill operation on air quality. This includes odour nuisances, local air pollution, and stratospheric ozone destruction. In addition, labour conditions and safety on the Site will be improved.

The Gauteng Department of Agriculture, Conservation and Environment (GDACE), is the relevant provincial South African authority required an Environmental Impact Assessment (EIA) for this project. As agreed with the authorities at the start of the project, a Scoping Report was prepared with a focus on air quality issues.

D.2. Environmental impact assessment

>>

Although the project is expected to have a net positive impact, the competent authority (GDACE) required that an environmental impact assessment be conducted. A detailed Scoping Report was compiled by Synergistics Environmental Services. The main findings and conclusions were as follows:

Findings:

No fatal flaws or negative impacts of high significance were identified. The scoping assessment concluded that the benefits of the project far outweigh its costs. The overall benefits of the project include:

- *Direct foreign investment in South Africa through the purchase of CERs by an overseas buyer (the JCF).*
- *The recovery and combustion of methane gas that will result in an improvement of air quality and the reduction of greenhouse gas, thus contributing to more sustainable landfill practices.*
- *There will be a reduction in the ozone depletion potential of the waste disposal facility.*
- *The destruction of the trace gases in landfill gas that will contribute to the reduction of local odour nuisances and an improvement of the air quality.*
- *The reduced ozone depletion potentials and global warming potentials will have positive transboundary impacts as these are global phenomena.*
- *Promotion of local economic development through the creation of a new market and/or strengthening the existing market in South Africa for the equipment and materials required by the project (i.e. piping and flares).*
- *Improved protection of the groundwater resource in the vicinity of the waste disposal facility since the gas extraction wells will be equipped for leachate removal.*
- *EnviroServ's site personnel will receive training related to the gas recovery operation, which they would not receive in the absence of the project.*
- *The project will be developed in accordance with the laws and regulations of South Africa, which would demonstrate to the overseas emissions trading market that*

South Africa is a prime destination for further CDM projects, thereby attracting additional and sustainable foreign investment into the country.

- *As a case study, the project may eventually lead to future reductions of greenhouse gas emissions in South Africa through the promotion of future CDM projects.*
- *EnviroServ is committed to investigate the feasibility of future downstream utilisation of the gas or the heat energy generated by the flaring process – this provides the option to create and utilise landfill gas and/or landfill gas energy, which is a renewable source of energy.*

  EnviroServ is committed to assist with the establishment of a social benefit project.

Conclusions

The scoping assessment concluded that the project is desirable from an environmental point of view and that it would contribute to sustainable landfill practices.

No information gaps or need for further studies have been identified and, to date, IAPs have not raised any concerns or issues regarding the project. IAPs were provided with the opportunity to review the scoping report (Version 0) for a period of 30 days. No comments were received.

SECTION E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

>>

The stakeholder consultation prior to implementation of the project has been sufficient for initial project validation and subsequent registration and is therefore deemed to still be relevant in terms of extension of the crediting period.

Stakeholder consultation to date has included the following:

<u>Pilot project (2005):</u>

Letters and the Briefing Paper describing the pilot project and inviting Interested and Affected Parties (I&APs) to become involved were faxed and e-mailed to the Chloorkop Monitoring Committee members and other I&APs on 24 March 2005. The closing date for comments was 19 May 2005.

- The Ekurhuleni Department of Environmental Health sent a letter stating that there was no objection to the project.
- No further comments were received.

The Pilot Project was discussed at the meeting of the Chloorkop Monitoring Committee held on 16 May 2005.

- No comments were raised regarding the landfill gas extraction project.

A meeting to discuss the pilot project and expected future phased of the project was held on 17 November 2005. This included a site visit to the pilot project installation.

- The only comment received was a request to share information about CDM projects for landfills owned by the Local Authority.

Full-scale project:

As part of the EIA process the following public consultation was undertaken:

- Advertising the project in a local newspaper on 2 February 2006, inviting Interested and Affected Parties to register with the public consultation office.
- A briefing document with details regarding the project was distributed to the Chloorkop Monitoring Committee during February 2006 and other registered I&APs on request.
- The draft Scoping Report was made available for a period of 30 days (7 April to 8 May 2006) for comment by stakeholders. The availability of the report was advertised in a local newspaper on 30March 2006 and written notification was sent to the members of the Chloorkop Landfill Monitoring Committee.
- A meeting was held on 18 April 2006 at which the outcome of the impact assessment was discussed. This meeting was advertised in the advertisement placed in the local newspaper on 30 March 2006 and the Monitoring Committee members and registered Interested and Affected Parties were notified by telephone or fax. Only one community member attended the meeting and her main concern was the odours arising from the landfill site and the potential impact of the project on odours.
- No written comments were received from the stakeholders on the Scoping Report.

E.2. Summary of comments received

>>

Only one comment was received at the Monitoring Committee meeting held on 18 April 2006. The concern was related to odours from the landfill site

E.3. Report on consideration of comments received

>>

A detailed air quality assessment was done as part of the Scoping Process of the EIA. Odours are expected to improve as a result of the Chloorkop Landfill Gas Recovery project.

SECTION F. Approval and authorization

>>

The letter of approval was issued on 26/11/2013 by the Department of Energy being the Designated National Authority for the Clean Development Mechanism in South Africa, the Host Country.

Appendix 1. Contact information of project participants and responsible persons/ entities

Project participant and/or responsible person/ entity	☒ Project participant ☐ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	EnviroServ Waste Management(Pty) Ltd
Street/P.O. Box	PO Box 232
Building	
City	Bedfordview
State/Region	Gauteng Province
Postcode	2008
Country	South Africa
Telephone	+27 11 456 5400
Fax	+27 11 453 9048
E-mail	esmeg@snviroserv.co.za
Website	www.enviroserv.co.za
Contact person	Ms Esmé Gombault
Title	Director
Salutation	Ms
Last name	Gombault
Middle name	
First name	Esmé
Department	
Mobile	+27 82 779 6276
Direct fax	+27 11 453 9048
Direct tel.	+27 11 456 5400
Personal e-mail	esmeg@enviroserv.co.za

Project participant and/or responsible person/ entity	☐ Project participant ☒ Responsible person/ entity for application of the selected methodology (ies) and, where applicable, the selected standardized baselines to the project activity
Organization name	Promethium Carbon(Pty) Ltd
Street/P.O. Box	PO Box 131253
Building	Lacey Oak House, Ballyoaks Office park
City	Bryanston
State/Region	Gauteng Province
Postcode	2021
Country	South Africa
Telephone	+27 11 7068185
Fax	+27 865893466
E-mail	robbie@promethium.co.za
Website	www.promethium.co.za
Contact person	Mr Robbie Louw
Title	Director
Salutation	Mr
Last name	Louw
Middle name	
First name	Robbie
Department	
Mobile	+27 82 557 8646
Direct fax	+27 11 7068185
Direct tel.	+27 865893466
Personal e-mail	robbie@promethium.co.za

Appendix 2. Affirmation regarding public funding

Not applicable

Appendix 3. Applicability of methodology and standardized baseline

Refer to Section B.2. of this PDD.

ENVIROSERV
WASTE MANAGEMENT

27 February 2015

CDM team
UNFCCC Secretariat
(Via email: cdmregistration@unfccc.int)

Dear Sir/Madam,

Solid Waste, a division of EnviroServ Waste Management Ltd, wishes to record that the implementation of the "EnviroServ Chloorkop Landfill Gas Recovery Project" did not and will also continue to not imply any change to the waste received at the landfill and therefore has not reduced the amount of organic waste that would have been recycled in the absence of the project activity.

I trust to have informed you sufficiently.

Yours Sincerely,

N Vermeulen
GM - TDS
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t +27 (011) 456 5660
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www.enviroserv.co.za

Appendix 4. Further background information on ex ante calculation of emission reductions

The ex ante emission reductions calculation is based on data obtained from the project participant on tonnages of waste disposed of at the Chloorkop SWDS, which in turn has been used as input-data for the First Order Model:

General (domestic) waste inputs as follows:

Year	Domestic Waste	Waste Total
1997	16412	16412
1998	137125	137125
1999	198239	198239
2000	312867	312867
2001	338733	338733
2002	327923	327923
2003	317114	317114
2004	279566	349457
2005	344429	430536
2006	344429	430536
2007	344429	430536
2008	344429	430536
2009	344429	430536
2010	344429	430536
2011	344429	430536
2012	344429	430536

Cumulative mass of waste= 4683409.41 tonnes and 4257644.92 m^3

Chloorkop domestic waste was assumed to be 70% from affluent communities and 30% from non-affluent communities. Assumed waste fraction characteristics were as follows [all mass fractions]:

- Affluent domestic waste assumed to be 0.45 putresibles [food, garden, etc.] and 0.25 paper.

  This is based on data from the Benoni area in the Gauteng Province from a study by Shamrock in 1998, which showed that the waste fraction from rich/affluent areas is 0.46 putresibles and 0.24 paper, based on data collected during a comparative study.

- Non-affluent domestic waste assumed to be 0.20 putresibles and 0.05 paper.

  This is based on data from the Wattville area from a study by Shamrock in 1998, which showed the waste fraction from poor/non-affluent residential areas is 0.18 putresibles and 0.04 paper.

  {Reference: Shamrock, J.R., 1998, A Comparative Study of the Decomposition Processes and Products of Rich and Poor Refuse in South Africa, M.S. thesis, Faculty of Engineering, University of the Witwatersrand, Johannesburg}.

Appendix 5. Further background information on monitoring plan

The amount of methane will be determined by monitoring the amount of landfill gas, the temperature and pressure of the landfill gas and the percentage methane in the landfill gas.

The regulatory framework will be monitored on an annual basis. Other monitoring as required in terms of the EIA authorisation will also be conducted.

Parameters that will be monitored and the frequency of monitoring are indicated below:

Parameter	Unit	Monitoring frequency	Comment
Amount of landfill gas collected from project wells	m^3	continuous	Measured by a flow meter. Data will be aggregated monthly and yearly
Methane fraction in the landfill gas	% g/m^3	continuous	Measured by continuous gas quality analyser. The % - reading will be calculated to a g/m^3 unit by using the molecular mass of methane and relevant temperature and pressure measurements.
Amount of landfill gas flared	m^3	continuous	Measured by a flow meter. Data will be aggregated monthly and yearly
Combustion efficiency	%	annual	Methane content of flare exhaust gas: The efficiency of the enclosed flare (% of methane completely oxidized by combustion in the flare) will be determined on a yearly basis, with the first measurement to be made at the time of installation. The measured value of the efficiency of the flare shall be applicable for the period up to the next measurement. In case the yearly measurement of efficiency of the flare is not performed, the efficiency of the flare shall be a default value of 90%. If the last measured value of the efficiency of the flare is lower than 90%, then the last lower measured value shall be used.
Combustion efficiency	%	semi-annual, monthly if unstable	Methane content of boiler/engine exhaust gas. Data will be aggregated monthly and yearly
LFG temperature and pressure	°C, Pa	continuous	Thermometer and pressure meter. To monitor the efficiency of the flare. Data will be aggregated monthly and yearly Standard calculations for mass/volume of a given gas at NTP require measurement of gas temperature (in K) and pressure and calculations using standard gas law equations. These measurements and calculations will be performed
Flare working hours	h	continuous	Clock. Data will be aggregated monthly and yearly
Flare temperature	°C	continuous	Thermometer. Data will be aggregated monthly and yearly.

Appendix 6. Summary of post registration changes

- ~~Application of consolidated methodology ACM0001 (Version 15.0)~~
  ~~Re-calculation of estimated emission reductions due to application of ACM0001 (Version 15.0)~~
- ~~Change value for the GWP for methane from 21 to 25 as per the latest COP/MOP decision (Decision 24/CP.19, paragraph 2) and re-calculate the ex ante emission reductions in accordance.~~

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Document information

Version	*Date*	*Description*
05.0	25 June 2014	Revisions to: • Include the Attachment: Instructions for filling out the project design document form for CDM project activities (these instructions supersede the "Guidelines for completing the project design document form" (Version 01.0)); • Include provisions related to standardized baselines; • Add contact information on a responsible person(s)/ entity(ies) for the application of the methodology (ies) to the project activity in B.7.4 and Appendix 1; • Change the reference number from *F-CDM-PDD* to *CDM-PDD-FORM;* • Editorial improvement.
04.1	11 April 2012	Editorial revision to change version 02 line in history box from Annex 06 to Annex 06b
04.0	13 March 2012	Revision required to ensure consistency with the “Guidelines for completing the project design document form for CDM project activities” (EB 66, Annex 8).
03.0	26 July 2006	EB 25, Annex 15
02.0	14 June 2004	EB 14, Annex 06b
01.0	03 August 2002	EB 05, Paragraph 12 Initial adoption.

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