




**Verification and certification report form for
CDM project activities
(Version 03.0)**

Complete this form in accordance with the instructions attached at the end of this form.

BASIC INFORMATION

Title and UNFCCC reference number of the project activity	EnviroServ Chloorkop Landfill Gas Recovery Project 0925
Scale of the project activity	<input checked="" type="checkbox"/> Large-scale <input type="checkbox"/> Small-scale
Version number of the verification and certification report	02
Completion date of the verification and certification report	18/01/2021
Monitoring period number and duration of this monitoring period	07 19/01/2015 to 31/01/2020 both days inclusive
Version number of the monitoring report to which this report applies	05
Crediting period of the project activity corresponding to this monitoring period	Type: renewable Start date: 19/01/2015 Length: 7 years
Project participants	EnviroServ Waste Management (Pty) Ltd
Host Party	South Africa
Applied methodologies and standardized baselines	ACM0001: Large-scale Consolidated Methodology: Flaring or use of landfill gas, Version 15.0. ASB0001: Standardized baseline: Grid emission factor for the Southern African Power Pool (Version 01.0)
Mandatory sectoral scopes	Sectoral scope(s):13
Conditional sectoral scopes, if applicable	Conditional sectoral scope(s): 1
Estimated amount of GHG emission reductions or GHG removals for this monitoring duration in the registered PDD	368,511
Certified amount of GHG emission reductions or GHG removals for this monitoring period	281,350
Name and UNFCCC reference number of the DOE	AENOR Internacional S.A.U. E-0021 (AENOR)
Name, position and signature of the approver of the verification and certification report	 José Luis Fuentes Climate Change Manager

SECTION A. Executive summary

AENOR INTERNACIONAL S.A.U., hereinafter AENOR, has performed the seventh verification of the emissions reductions of the project “EnviroServ Chloorkop Landfill Gas Recovery Project” (Registration Ref No. 0925).

The purpose of the project is to reduce GHG emissions from the EnviroServ Chloorkop landfill through the destruction of methane. The CDM project activity extracts landfill gas at the EnviroServ Chloorkop Landfill Site and combusts it by flaring.

The EnviroServ Chloorkop landfill is located in Ekurhuleni Metropolitan Municipality, Gauteng Province, South Africa.

The EnviroServ Chloorkop Landfill Site has been used for the disposal of municipal solid waste since 1997, receiving general (or domestic) waste, garden waste, soil and builder’s rubble. The technology installed for the project consists of wells in the landfill, a gas collection system connecting the wells and two flare installations, but since 8 June 2018 only one flare has remained operational due to low gas volumes. Each flare installation consists of a blower that draws the gas from the wells and the gas collection system, and the flare itself.

Scope of the Verification

The verification, as an independent and objective review, shall assess and verify that the implementation of the project activity and the steps taken to report emission reductions comply with the CDM criteria and relevant guidance provided by the CMP and the CDM Executive Board. The verification shall:

1. Ensure that the project activity has been implemented and operated as per the registered PDD /1/ and that all physical features (technology, project equipment, and monitoring and metering equipment) of the project are in place. It is, therefore, necessary to:
 - Interview relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the monitoring plan /1/ included in the registered PDD.
 - Check the monitoring equipment, including calibration performance and observations of monitoring practices, against the requirements of the registered PDD and the selected methodology.
 - Check that the manual operating provisions are duly followed (processes, routines, instructions, forms and related provisions).
2. Ensure that the final version of the monitoring report /3/ and other supporting documents provided are complete and verifiable and in accordance with applicable CDM requirements. It is therefore necessary to carry out a review of:
 - Relevant documentation and conduct an on-site visit.
 - Data and information presented to verify their completeness.
 - Indicators that must be addressed in the monitoring plan.
 - The monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment including calibration requirements, and the quality assurance and quality control procedures.
3. Ensure that actual monitoring systems and procedures comply with the monitoring systems and procedures described in the monitoring plan and the approved methodology, carrying out:
 - A review of information flows for generating, aggregating and reporting the monitoring parameters.
 - A cross-check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources.

- A review of calculations and assumptions made in determining GHG data and emission reductions.
- A review of the project documentation provided by the project participant to check that it is based upon both quantitative and qualitative information on emission reductions. Quantitative information comprises the reported numbers in the monitoring report submitted to the DOE. Qualitative information comprises information on internal management controls, calculation procedures, and procedures for transfer of data, frequency of emissions reports, and review and internal audit of calculations.

4. Evaluate the data recorded and stored as per the monitoring methodology, carrying out:

- An evaluation of data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

5. Identify and inform the project participant of any concerns related to the project's activity and operation conformance with the registered project design document. The project participant shall address the concerns and supply additional relevant information.

6. Provide a verification report to the project participant, the Parties involved and the CDM Executive Board. The report shall be made publicly available.

The verification is not meant to provide any consultancy services to the client. However, stated requests for clarifications and/or corrective actions may provide input for improvement of the monitoring report.

AENOR, based on the Instruction for the Validation, Verification and Certification of Clean Development Mechanism (CDM) Project Activities (IE/DTC/039) /5/, which is in turn based on the CDM Validation and Verification Standard for project activities version 02.0 /6/, has used a risk-based approach in the verification, focusing on the identification of significant risks for the generation of CERs and verifying the mitigation measures for these issues.

Verification Process

The verification was performed through means of the following the requirements of the CDM validation and verification standard for project activities, version 02.0, the applied methodology, and relevant CDM rules. The process of the verification includes:

- I. A desk review of the monitoring report and all support documents.
- II. Follow-up interviews and on-site inspection.
- III. The resolution of outstanding issues and the issuance of the verification report and statement.

The verification of the emission reductions has assessed all factors and issues that constitute the basis for emission reductions from the project. These include:

- The emission reduction calculations and the relevant data records.
- The calibration and maintenance records for the monitoring instruments
- The management systems to support the project operation and monitoring.

The audit team took into consideration the approved PDD and verified that it has been adequately considered during this verification. The monitoring system is in place and the emission reductions are calculated without material misstatements.

Calibration evidence allowed the verification team to verify that all meters worked correctly during the monitoring period and when errors were detected conservative assumptions were applied according to the CDM requirements and rules

AENOR confirms that:

- the project is implemented in accordance with the approved Project Design Document. Furthermore, the monitoring system is in place and the emission reductions are calculated without material misstatements.
- only verification activities undertaken after the publication of the monitoring report on the UNFCCC CDM website have been used as a basis for AENOR to conclude its verification and submit a request for issuance of CERs to the Board.

Therefore, after the verification it is AENOR's opinion that the GHG emission reductions were calculated correctly based on the approved methodology, and the monitoring plan and formulae given in the revised PDD, and the GHG emission reductions reported in the monitoring period from 19/01/2015 to 31/01/2020 are correct and amount to 281,350 tonnes of CO₂ equivalent. It was calculated on the basis of the approved baseline and monitoring methodology ACM0001 version 15.0 /10/, the monitoring plan and formulae provided in the approved PDD.

The last version of the approved PDD, version 10, approved on 11 June 2020, it was wrong posted on the UNFCCC Website in the first crediting period for this project activity. AENOR has done the verification against the latest version of the approved PDD, version 10.

A risk-based verification approach was employed to identify key risks to emission reduction estimations.

SECTION B. Verification team, technical reviewer and approver

B.1. Verification team member

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk/document review	On-site inspection	Interviews	Verification findings
1.	Team Leader	IR	Llorente Pérez	Elena	AENOR	Yes	No	Yes	Yes
2.	Verifier in Trainee	IR	Arroyo Bovea	Marina	AENOR	Yes	No	Yes	Yes

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1.	Technical reviewer	IR	Arribas Alonso	Luis Javier	AENOR
2.	Approver	IR	Fuentes Pérez	Jose Luis	AENOR

SECTION C. Application of materiality

AENOR verification team has considered the CDM requirements on materiality concept according to:

- Decision 9/CMP.7 Materiality standard under the clean development mechanism.
- CDM Validation and Verification Standard for project activities (VVS) version 02.0.
- Guideline: Application of materiality in verifications version 02.0 /39/.

“EnviroServ Chloorkop Landfill Gas Recovery Project” is a large-scale CDM project activity achieving total emission reductions or removals of 300,000 tonnes of carbon dioxide equivalent per year or less; as such, a 2 per cent materiality threshold is applied for this verification as per VVS.

C.1. Consideration of materiality in planning the verification

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1.	Human error in the quantification of emissions	Low	Data used for the emissions reduction calculation are collected mostly through automated systems so the risk for human error is reduced. Calculation spreadsheets are used to determine the emissions reductions.	<p>Verification has been focused on the assessment of:</p> <ul style="list-style-type: none"> • Quality of raw data and procedures for its collection. • Calculation spreadsheets. • Controls established to detect and correct any error or omission in monitoring parameters. • Monitoring procedures. • Reliability of internal and external data. • Internal data quality control for monitored parameters and metering systems. <p>The verification plan included a desk review, remote inspection and interviews with relevant personnel.</p> <p>100% of data will be assessed, therefore sampling is not applicable.</p>
2.	Undue reliance on a poorly designed information system, which may have few effective quality controls	Low	According to MR there are QC/QA procedures applied for monitoring parameters and data management.	<p>Verification has been focused on the assessment of:</p> <ul style="list-style-type: none"> • Quality of raw data and procedures for its collection. • Calculation spreadsheets. • Controls established to detect and correct any error or omission in monitoring parameters. • Monitoring procedures. • Reliability of internal and external data. • Internal data quality control and implementation of internal procedures for

				<p>quality management.</p> <p>The verification plan included a desk review, remote inspection and interviews with relevant personnel.</p> <p>100% of data will be assessed, therefore sampling is not applicable.</p>
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C.2. Consideration of materiality in conducting the verification

The verification has been performed through a desk review and interviews with relevant personnel.

The verification activities in which risks were assessed are the evaluations of:

- Monitoring system.
- Calculation spreadsheets.
- Quality of raw data and procedures for its collection.
- Data flow.
- Data control procedures.

The risks identified were mitigated through the review of whole data set of the registers and calculation spreadsheets and crosscheck against relevant reports as well as real time verification of monitored parameters.

SECTION D. Means of verification

D.1. Desk/document review

The desk review involved:

- Project documentation: approved PDD /1/, initial version monitoring report /2/ and final version of monitoring report /3/.
- CDM project standard for project activities version 02.0 /7/ and CDM project cycle procedure for project activities version 02.0 /8/.
- CDM Monitoring report form and the instruction for filling out the MR /9/.
- Relevant decisions, clarifications and guidance from the CMP and the CDM Executive Board.
- The monitoring plan and the applied monitoring methodology, paying close attention to the frequency of measurements, the quality of metering equipment and the quality assurance and quality control procedures.
- The data and information presented to verify their completeness, including the monitoring report and the measuring records of the different monitored parameters.
- The influence of data management and the quality assurance and quality control system on the generation and reporting of emission reductions.

A complete list of all documents reviewed is attached in Appendix 3 of this report.

D.2. On-site inspection

Duration of on-site inspection: DD/MM/YYYY to DD/MM/YYYY				
No.	Activity performed on-site	Site location	Date	Team member
1.	N/A	N/A	N/A	N/A

Due to the COVID-19 pandemic the on-site visit could not be made and could not be postponed, therefore a remote visit was conducted on 09 and 30 October 2020.

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Cornish	David	Energy Systems SA	09/10/2020 30/10/2020	-Clarifications related to monitoring procedures during the videoconferences and emails	Elena Llorente Pérez Marina Arroyo Bovea
2.	Malan	Terence	EnviroServ Waste Management (Pty) Ltd	09/10/2020 30/10/2020		Elena Llorente Pérez Marina Arroyo Bovea
3.	Cummings	Tony	Energy Systems SA	09/10/2020 30/10/2020	<p>-Video and pictures of the landfill plant in order to check the six waste disposal cells, installation of first and second flare, decommission of the second flare.</p> <p>-Videoconference to explain the Landfill Gas Collection System, The vertical wells and the horizontal collectors.</p> <p>-Review of operating and measurement records during desk review</p> <p>-Picture and video of the emergency diesel fuelled electricity generator.</p> <p>-Pictures and video to check the monitoring equipment's and the serial numbers: Instruments of table of section 2 of the MR: Amount of landfill gas, methane extraction,</p> <p>-Videoconference to explain the measurement of the electricity consumed by the project and the working hours and</p>	Elena Llorente Pérez Marina Arroyo Bovea

					<p>temperature of the flare.</p> <p>Videoconference to explain the controls established to detect and correct any error or omission in monitoring parameters.</p> <p>Videoconference to explain the testing of monitoring equipment and observation of monitoring practices.</p> <p>Desk review of documents to check the calibration of official meters.</p>	
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D.4. Sampling approach

Not applicable since sampling approach is not used.

D.5. Clarification requests (CLs), corrective action requests (CARs) and forward action requests (FARs) raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	-	CAR 1	-
Compliance of the project implementation and operation with the registered PDD	-	CAR 2	-
Post-registration changes	-	-	-
Compliance of the registered monitoring plan with the methodologies including applicable tools and standardized baselines	-	-	-
Compliance of monitoring activities with the registered monitoring plan	CL 1 CL 2	CAR 4	-
Compliance with the calibration frequency requirements for measuring instruments	-	-	-
Assessment of data and calculation of emission reductions or net removals	-	CAR 3	-
Assessment of reported sustainable development co-benefits	-	-	-
Global stakeholder consultation	-	-	-
Others (please specify)	-	-	-
Total	2	4	-

SECTION E. Verification findings**E.1. Compliance of the monitoring report with the monitoring report form**

Means of verification	<p>The compliance of the monitoring report with the monitoring report form was verified crosschecking it against the last version of the monitoring report form (CDM-MR-FORM version 07.0) /9/, and Instructions for filling out the monitoring report form.</p> <p>The monitoring report was made publicly available on the UNFCCC website on 22/10/2020.</p>
Findings	<p>CAR 1 - Section A.1, section A.4, section B.5.2. of the MR does not comply with the Instructions for completing the form. According to the instructions, the MR shall indicate the approval dates and reference numbers of the post-registration changes and refer to the UNFCCC CDM website for the exact reference of the applied methodologies, methodological tools and standardized baselines. Appendix 4 summarizes the findings found during the verification process and how they were closed.</p>
Conclusion	<p>According to Paragraph 352 of VVS /6/, AENOR verification team confirm that the latest version of the monitoring report was completed using the latest version of the applicable monitoring report form and the instructions for filling it were properly followed by the PP.</p> <p>Therefore, in AENOR's opinion the monitoring report was completed using the version 07.0 of the applicable monitoring report form published by the UNFCCC which is the latest version and has followed the Instructions for filling out the monitoring report form published by the UNFCCC.</p>

E.2. Remaining forward action requests from validation and/or previous verifications

No remaining forward action is requested from validation or previous verifications.

E.3. Compliance of the project implementation and operation with the registered project design document

Means of verification	<p>The compliance of the project implementation with the approved project design document was verified through the remote on-site visit and desk-review of documents provided by the project participants (all revised documents are listed in Appendix 3). The audit team reviewed the main technical features of the project activity, including the landfill site, gas collection system, flare system and project boundary.</p> <p>Also, an overview diagram of the landfill cells (vertical wells, horizontal collectors, headers, flare & blower and emergency diesel generator) and one of the measuring points were provided to the audit team.</p> <p>Since it was not possible to carry out an on-site visit due to Covid restrictions, videos and pictures of the landfill site and equipment were provided by the PP, and a remote visit and interviews were carried out.</p> <p>The EnviroServ Chloorkop Landfill Site consists of six waste disposal cells. Construction of the wellfield was done in a phased manner. The first vertical wells were installed in cells 1, 2 and 3 in 2005 as a pilot trial. The first gas flared on 19/01/2008 (the start date of the project activity) and the installation of the second flare was completed in December 2008 and started operation in January 2009. However, since 8 June 2018, Flare 2 on the site was shut down and only one flare has remained operational to date due to low gas volumes. The LFG that was previously sent to Flare 2 has been redirected to Flare 1. The design capacity of the first flare is 2000 Nm³/h. AENOR has checked the decommission of the flare 2 against the Chloorkop Management Report June 2018 /31/.</p>
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	<p>Electricity generation it is not applicable during this monitoring period.</p> <p>The second flare was subsequently decommissioned when the flare compound facility was moved to another location on the site. The flare compound was originally located on the north-eastern corner of the Chlookop facility. The flare compound was subsequently moved to the south-western corner of the facility and was recommissioned on 09/12/2019 with only one flare. Cell 7 of the landfill site has been constructed and was only granted permission to fill the cell with waste on the 29 October 2020 which was only approved after the end of this monitoring period. AENOR has checked this against the hand over and recommissioning certificate /32/.</p> <p>Also, the audit team verified that there had not been significant incidents. Furthermore, it was verified that no personnel involved in the monitoring process were changed during the current monitoring period.</p> <p>Project participant has provided all necessary information and documentation to demonstrate compliance and consistency of the implemented CDM project activity and monitored GHG emission with all applicable requirements to the VVS, the applicable CDM rules, the revised PDD and other supporting evidence.</p>
Findings	<p>CAR 2 - In accordance with the approved PDD, version 10, initially two high temperature enclosed flares were installed. However, since 8 June 2018, only one flare has remained operational due to low gas volumes. Description of section A.1 of the MR it is not in accordance with section A. 1 of the approved PDD.</p> <p>Appendix 4 summarizes the findings found during the verification process and how they were closed.</p>
Conclusion	<p>According to paragraph 356 of VVS, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • The implementation status and equipment installation of the Project are consistent with the registered PDD. • The actual operation of the Project is as per the registered PDD. • Information (data and variables) provided in the monitoring report is in accordance with that stated in the registered PDD. • There has not been any increase in the actual GHG emissions reductions achieved by the project activity in the current monitoring period.

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, applied methodologies, standardized baselines or other methodological regulatory documents¹

Not applicable.

E.4.2. Corrections

Post Registration Change reference PRC-0925-001 approved on the 11/06/2020 for corrections to the project design.

E.4.3. Changes to the start date of the crediting period

In this monitoring period there is no change of start date of the crediting period.

¹ Other standards, methodologies, methodological tools and guidelines (to be) applied in accordance with the applied(selected) methodologies are collectively referred to as the other (applied) methodological regulatory documents).

E.4.4. Inclusion of a monitoring plan

Not applicable.

E.4.5. Permanent changes from registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines or other methodological regulatory documents

Post Registration Change reference PRC-0925-001 approved on the 11/06/2020 for permanent changes to the registered monitoring plan.

E.4.6. Changes to the project design

Post Registration Change reference PRC-0925-001 approved on the 11/06/2020 for changes to the project design.

E.4.7. Changes specific to afforestation and reforestation project activities

Not applicable.

E.5. Compliance of the registered monitoring plan with applied methodologies, applied standardized baselines, and other applied methodological regulatory documents

Means of verification	<p>The compliance of monitoring plan with the monitoring methodology was verified by reviewing whether the CDM project activity was in accordance with the applied methodology and if any other monitoring aspect of the project activity that is not specified in the methodology was established. During the remote on-site visit, and desk review the audit team was able to review different records and whether the monitoring methodology has been adequately considered and documented.</p> <p>The audit team verified the monitoring of reductions in GHG emissions to result from the proposed CDM project activity and whether it was implemented in accordance with the approved PDD and the project participants are recording the data and parameters following the monitoring methodology applied.</p> <p>Regarding this issue, the verification team reviewed:</p> <ul style="list-style-type: none"> • The monitoring of reductions in GHG emissions to result from the proposed CDM project activity was implemented in accordance with the Monitoring Plan contained in the registered PDD. • The monitoring plan and the applied methodology had been properly implemented and followed by the project participants. • All parameters stated in the monitoring plan, the applied methodology and relevant CDM EB decisions have been sufficiently monitored and updated. • The responsibilities and authorities for monitoring and reporting were in accordance with the responsibilities and authorities stated in the monitoring plan. <p>The audit team has verified that the monitoring of reductions in GHG emissions to result from the proposed CDM project activity is implemented in accordance with the monitoring plan contained in the approved PDD.</p>
Findings	No specific CARs/CLs/FARs raised regarding this issue.
Conclusion	<p>The verification team reviewed whether the monitoring plan of the approved PDD was in accordance with the applied methodology and any other monitoring aspect of the project activity that is not specified in the methodology that was established.</p> <p>The verification team confirms that the monitoring plan of the approved PDD is in</p>

accordance with the applied methodology ACM0001 "Large-scale Consolidated baseline and monitoring methodology for landfill gas project activities" version 15.0 /10 / based on the following reasons:

- During the desk review monitoring parameters included in the applied methodology were compared with the ones included in the Monitoring plan of the approved PDD, and they were found consistent.
- The monitoring plan perfectly fulfils the criteria stated in the monitoring methodology.
- No other relevant aspects for monitoring not included in the methodology were identified.

Therefore, AENOR, according to paragraph 357 of the VVS, confirms that the monitoring plan is in compliance with the approved methodology applied by the CDM project activity and applicable tool.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	<p>Data and parameters fixed ex ante were verified through desk-review of final version of monitoring report, approved PDD and 2006 IPCC Guidelines on National GHG Inventories /11/. The fixed parameters used for calculating the emission reduction have been indicated and verified as follows:</p> <ul style="list-style-type: none"> • Fraction of methane that would be oxidized in the top layer of the SWDS in the baseline: Used value is 0.1 as per approved PDD. • Global warming potential of CH₄: Used value is 25 as per registered PDD and CDM requirements. • Efficiency of the LFG capture system that will be installed in the project activity: Used value is 0.5 as per approved PDD. • Default value for the model correction factor to account for model uncertainties: Used value is 0.75 as per approved PDD. • Oxidation factor: Used value is 0.1 as per approved PDD. • Fraction of methane in the SWDS gas: Used value is 0.5 as per approved PDD. • Default value for the fraction of degradable organic carbon (DOC) in MSW that decomposes in the SWDS: Used value is 0.5 as per approved PDD. • Methane correction factor: Used value is 1.0 as per approved PDD. • Fraction of degradable organic carbon in the waste type j: Used values are the following as per approved PDD. <table border="1"> <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> <ul style="list-style-type: none"> • Decay rate for the waste type j: Used values are the following as per approved PDD. <table border="1"> <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> </table>	Wood and wood products	43	Pulp, paper and cardboard (other than sludge)	40	Food, food waste, beverages and tobacco (other than sludge)	15	Textiles	24	Garden, yard and park waste	20	Glass, plastic, metal, other inert waste	0	Pulp, paper, cardboard (other than sludge), textiles	0.04	Wood, wood products and straw	0.02	Other (nonfood) organic putrescible garden and park waste	0.05
Wood and wood products	43																		
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Wood, wood products and straw	0.02																		
Other (nonfood) organic putrescible garden and park waste	0.05																		

	Food, food waste, sewage sludge, beverages and tobacco	0.06																																				
	<ul style="list-style-type: none"> Emission factor for electricity generation: Used value is 0.9488 as per approved PDD. Amount of solid waste type j disposed in the SWDS in year x – Domestic Waste: Used value is 430,536 as per approved PDD. Total pressure at normal conditions: Used value is 101,325 as per approved PDD. Temperature at normal conditions: Used value is 273.15 as per approved PDD. Universal ideal gases constant: Used value is 8,314 as per approved PDD. Molecular mass of greenhouse gas i: Used values are the following as per approved PDD. 																																					
	<table border="1"> <thead> <tr> <th>Compound</th> <th>Structure</th> <th>Molecular mass (kg / kmol)</th> </tr> </thead> <tbody> <tr><td>Carbon dioxide</td><td>CO₂</td><td>44.01</td></tr> <tr><td>Methane</td><td>CH₄</td><td>16.04</td></tr> <tr><td>Nitrous oxide</td><td>N₂O</td><td>44.02</td></tr> <tr><td>Sulfur hexafluoride</td><td>SF₆</td><td>146.06</td></tr> <tr><td>Perfluoromethane</td><td>CF₄</td><td>88.00</td></tr> <tr><td>Perfluoroethane</td><td>C₂F₆</td><td>138.01</td></tr> <tr><td>Perfluoropropane</td><td>C₃F₈</td><td>188.02</td></tr> <tr><td>Perfluorobutane</td><td>C₄F₁₀</td><td>238.03</td></tr> <tr><td>Perfluorocyclobutane</td><td>c-C₄F₈</td><td>200.03</td></tr> <tr><td>Perfluoropentane</td><td>C₅F₁₂</td><td>288.03</td></tr> <tr><td>Perfluorohexane</td><td>C₆F₁₄</td><td>338.04</td></tr> </tbody> </table>		Compound	Structure	Molecular mass (kg / kmol)	Carbon dioxide	CO ₂	44.01	Methane	CH ₄	16.04	Nitrous oxide	N ₂ O	44.02	Sulfur hexafluoride	SF ₆	146.06	Perfluoromethane	CF ₄	88.00	Perfluoroethane	C ₂ F ₆	138.01	Perfluoropropane	C ₃ F ₈	188.02	Perfluorobutane	C ₄ F ₁₀	238.03	Perfluorocyclobutane	c-C ₄ F ₈	200.03	Perfluoropentane	C ₅ F ₁₂	288.03	Perfluorohexane	C ₆ F ₁₄	338.04
	Compound	Structure	Molecular mass (kg / kmol)																																			
	Carbon dioxide	CO ₂	44.01																																			
Methane	CH ₄	16.04																																				
Nitrous oxide	N ₂ O	44.02																																				
Sulfur hexafluoride	SF ₆	146.06																																				
Perfluoromethane	CF ₄	88.00																																				
Perfluoroethane	C ₂ F ₆	138.01																																				
Perfluoropropane	C ₃ F ₈	188.02																																				
Perfluorobutane	C ₄ F ₁₀	238.03																																				
Perfluorocyclobutane	c-C ₄ F ₈	200.03																																				
Perfluoropentane	C ₅ F ₁₂	288.03																																				
Perfluorohexane	C ₆ F ₁₄	338.04																																				
<ul style="list-style-type: none"> Molecular mass of gas k: Used values are the following as per approved PDD. 																																						
<table border="1"> <thead> <tr> <th>Compound</th> <th>Structure</th> <th>Molecular mass (kg/kmol)</th> </tr> </thead> <tbody> <tr><td>Nitrogen</td><td>N₂</td><td>28.01</td></tr> <tr><td>Oxygen</td><td>O₂</td><td>32.00</td></tr> <tr><td>Carbon monoxide</td><td>CO</td><td>28.01</td></tr> <tr><td>Hydrogen</td><td>H₂</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>NO₂</td><td>46.01</td></tr> <tr><td>Sulfur dioxide</td><td>SO₂</td><td>64.06</td></tr> </tbody> </table>		Compound	Structure	Molecular mass (kg/kmol)	Nitrogen	N ₂	28.01	Oxygen	O ₂	32.00	Carbon monoxide	CO	28.01	Hydrogen	H ₂	2.02	Nitric oxide	NO	30.01	Nitrogen dioxide	NO ₂	46.01	Sulfur dioxide	SO ₂	64.06													
Compound	Structure	Molecular mass (kg/kmol)																																				
Nitrogen	N ₂	28.01																																				
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Hydrogen	H ₂	2.02																																				
Nitric oxide	NO	30.01																																				
Nitrogen dioxide	NO ₂	46.01																																				
Sulfur dioxide	SO ₂	64.06																																				
<ul style="list-style-type: none"> Manufacturer's flare specifications for temperature, flow rate and maintenance schedule: Used value are 400 – 2000 Nm³/h and 350 – 1150°C as per approved PDD. 																																						
Findings	No specific CARs/CLs/FARs raised regarding this issue.																																					
Conclusion	<p>Data parameters fixed at validation, used for calculating the emission reduction, are in accordance with approved PDD, IPCC reports and CDM requirements.</p> <p>All data sources and assumptions are appropriate, and calculations are correct as applicable to the proposed CDM project activity.</p>																																					

E.6.2. Data and parameters monitored

Means of verification	The audit team carried out a review of information flows for generating, aggregating and reporting the monitoring parameters to assess a completeness of monitoring in line with the monitoring plan and the applied methodology, including:
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- The measurement/determination method used.
- Relevant monitoring equipment, their features and the control and calibration procedures.
- Significant inaccuracies occurred in case of measured or estimated values of some parameters.
- Measuring, reading and/or recording frequency.
- QA/QC procedures applied to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

Data and monitored parameters were verified through the remote on-site visit and desk-review. The monitoring system and all applied procedures are in compliance with the monitoring plan and the applied methodology ACM0001 version 15.0 based on the information included in the final monitoring report. The list of all monitored parameters and the means of verification used are detailed as follows:

- **Management of SWDS:** This parameter is measured annually. Data comes from the original design of the landfill, technical specifications for the management of the SWDS and national regulations. Quality assurance and quality control procedures have been applied in accordance with the monitoring plan. AENOR checked that the SWDS waste management licence number 16/2/7/A230/D17/Z1/P280 is still valid /14/ and found no inconsistencies.
- **Operation of the equipment that consumes the LFG:** This parameter is measured hourly. Data comes from the Programme Logic Controller (PLC) and UV sensor and thermocouples. Quality assurance and quality control procedures have been applied in accordance with the monitoring plan. AENOR checked the raw data from compiled in the monthly spreadsheets /15/ /16/ and found no inconsistencies.
- **Quantity of electricity consumed by the project electricity consumption source j in year y:** Data comes from the electricity meter. The meters are solid state sealed meters and are not serviceable items. This electricity meter was checked against the video and pictures of the landfill project /38/.
- **Total investment to implement the project and total cost to operate the project:** This parameter is measured after each phase of the project is fully implement. Data comes from PP and the data unit is Currency – ZAR. Quality assurance and quality control procedures have been applied in accordance with the monitoring plan. AENOR has checked the balance spreadsheet /12/ and the fixed assets register /13/ and no inconsistencies were found.
- **Tariff of electricity exported:** This parameter is measured continuously. Data comes from power purchase agreement and the data unit is currency-ZAR. This parameter is not applicable for this monitoring period as no electricity generation has been installed to date.
- **Average technical transmission and distribution losses for providing electricity:** This parameter is measured annually. Data comes from the grid operator. AENOR checked the values from Eskom annual reports /17/ and found no inconsistencies.
- **Quantity of electricity that would be consumed by the baseline electricity consumption source k in year y:** Data comes from direct measurements or calculations based on electricity meters. This parameter is not applicable for this monitoring period, as no electricity power has been produced nor exported to date.
- **Flame detection of flare in the minute m:** This parameter is measured continuously using a fixed installation optical flame detector: Ultra Violet detector or Infra Red or both. Data comes from measurements of the PP. Quality assurance and quality control procedures have been applied in

	<p>accordance with the monitoring plan. AENOR has checked the flare monitoring equipment /18/ /19/ and no inconsistencies were found.</p> <ul style="list-style-type: none"> • Volumetric fraction of greenhouse gas i in a time interval t on a wet basis: This parameter is measured continuously with in-situ gas analysers. Data comes from PP and the data unit is m³ gas /m³ wet gas. The calculation method is ex post determination of the amount of methane in the LFG which is flared in the project activity in the year y. Quality assurance and quality control procedures have been applied in accordance with the monitoring plan. AENOR checked the span gas certificates and the raw data records per month /37/ and no inconsistencies were found. • Mass flow of the gaseous stream in time interval t on a wet basis: This parameter is measured continuously. Data comes from the flow meter and the data unit is kg/h. Quality assurance and quality control procedures have been applied in accordance with the monitoring plan. AENOR has checked the flow meter certificates/21/ /22/ /23/ /24/ /25/ and the raw data records per month /37/ and no inconsistencies were found. • Quantity of fuel type i combusted in process j during the year y: Data comes from PP by onsite measurements. The data unit is volume unit per year. The Ruler is calibrated annually and the fuel consumption quantities are cross-checked with the diesel register on site for the bulk tank. AENOR checked the Diesel ruler calibration certificate /28/ and the Sheets record for the volume of diesel based on the ruler /36/ and found no inconsistencies. • Weighted average net calorific value of diesel in year y: Data comes from IPCC /11/. The data unit is GJ/ L diesel. This data is a default value. AENOR checked the reference and found no inconsistencies. • Weighted average CO₂ emission factor of diesel in year y: Data comes from IPCC /11/. The data unit is tCO₂/GJ. This data is a default value. AENOR checked the reference and found no inconsistencies. • Temperature of the flare: This parameter is measured continuously. Data comes from Thermocouple. The data unit is °C. AENOR has checked the Thermocouple test procedures /40/ and found no inconsistencies.
Findings	<p>CL 1 - The PP shall provide pictures/video of the installed technologies, technical processes and equipment, for instance, electricity meters installed at the electricity consumption sources, flare thermocouples, gas analysers, flow meters.</p> <p>CL 2 - The PP shall provide the following evidences in order to check the monitoring parameters:</p> <ul style="list-style-type: none"> -Waste management licence: number 16/2/7/A230/D17/Z1/P280. -Reports of Average technical transmission and distribution losses for providing electricity. Eskom annual reports. -Total investment to implement the project and total cost to operate the project. OPEX and CAPEX. <p>CAR 4 - Parameters of section D.2 of the MR are not in accordance with the approved PDD, for instance, $T_{EG,m}$, $EC_{PJ,j,y}$, the description, $ECBL,k,t$, the parameter is not in the MR.</p> <p>Appendix 4 summarizes the findings found during the verification process and how they were closed.</p>
Conclusion	<p>The last version of the monitoring report is in compliance with the approved PDD. The applied methodology has been properly implemented and followed by the PP and all management and operational system parameters have been sufficiently monitored and updated.</p> <p>According to paragraphs 363 and 364 of the CDM validation and verification standard for project activities version 02.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • The monitoring has been carried out in accordance with the monitoring plan in the approved PDD. • The monitoring has been carried out in accordance with the applied methodology ACM0001 version 15.0.

	All parameters required by the monitoring plan have been measured/determined without material misstatements and in line with all applicable standards and relevant requirements.
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E.6.3. Implementation of sampling plan

Means of verification	Not applicable
Findings	Not applicable
Conclusion	Not applicable

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	AENOR has verified the information stated in all the calibration certificates of the different equipment installed in the project and also their technical specifications from manufacturers in the current verification process. The following information summarizes the assessment:																		
	The <u>volumetric fraction of greenhouse gas i in a time interval t on a wet basis</u> is measured continuous in-situ gas analysers. The details of gas analysers are the following:																		
	Flare 2: GIR 5000: Serial Number – I-02177 Tag no:3449-E-172. .																		
	Flare 1: Guardian NG: Serial Number – CH4 – 13983 Tag No: 3092-E-172. .																		
	These analysers are calibrated on a weekly basis using the below listed of certified portable span gas which measures gas composition in % (CH4, CO2 and O2) by a portable gas meter.																		
	Span Gas Traceability Certificates /30/ details are the following:																		
	<table><tr><th>Site</th><th>Serial Number</th><th>Validity</th></tr><tr><td>Chloorkop</td><td>11307-01</td><td>01/05/2014 – 30/05/2015</td></tr><tr><td></td><td>112076-03</td><td>01/06/2016 – 30/06/2017</td></tr><tr><td></td><td>112405-01</td><td>30/06/2017 –30/06/2018</td></tr><tr><td></td><td>112739-01</td><td>01/07/2018 – 31/07/2019</td></tr><tr><td></td><td>CAN-4682</td><td>10/09/2019 – 30/09/2021</td></tr></table>	Site	Serial Number	Validity	Chloorkop	11307-01	01/05/2014 – 30/05/2015		112076-03	01/06/2016 – 30/06/2017		112405-01	30/06/2017 –30/06/2018		112739-01	01/07/2018 – 31/07/2019		CAN-4682	10/09/2019 – 30/09/2021
	Site	Serial Number	Validity																
	Chloorkop	11307-01	01/05/2014 – 30/05/2015																
		112076-03	01/06/2016 – 30/06/2017																
	112405-01	30/06/2017 –30/06/2018																	
	112739-01	01/07/2018 – 31/07/2019																	
	CAN-4682	10/09/2019 – 30/09/2021																	
The Analysers are calibrated using the above span gas on a weekly basis. A delayed calibration for the period from 31/07/2019 to 10/09/2019 has been applied in the workbook reducing the CH4 value by 2% due there being a delay in the supply of a replacement snap gas cylinder over this period. The instrument was over-reading by 1.6% and the accuracy of the span gas is 2% so the higher value is applied in order to be conservative.																			
The <u>quantity of fuel type i combusted in process j during the year y</u> is measured by a ruler gauge which is part of the daily tank. The fuel is supplied from a small daily tank, so a ruler can be used to determine the volume of the fuel consumed. The Ruler is calibrated annually, and the fuel consumption quantities are cross-checked with the diesel register on site for the bulk tank /20/.																			
There is delay in calibration for all the monitoring period since the ruler calibration was made on 12/08/2020 /28/. The result of delayed calibration is within permissible limit; thus the values have been adjusted to 4.55% which is the difference in the confidence level in order to be conservative. This has been applied for the complete monitoring period as a conservative value.																			
The <u>temperature of the flare</u> and the <u>flame detection of flare in the minute m</u> are measured by the thermocouples which are calibrated by means of a check done every 3 months using a portable temperature probe and monitor /29/.																			
The equipment is maintained and calibrated in accordance with manufacturer's recommendations and as required in the monitoring plan.																			
The thermocouple on flare 1 was replaced, as show in the internal instrumentation																			

worksheets and as per table below, as it had failed. There were no replacements of thermocouples on flare 2.

	Flare 1	Flare 2
Instrument tag number	3092-E-151 (T _{Combust})	3449-E-151 (T _{Combust})
	02/10/2015 /33/ 24/07/2017 /33/	None replaced

The calibration test results of the thermocouples are made every three-month period, as show below:

Flare Thermocouple Functionality Test	
Flare 1 /26/	Flare 2 /27/
10/04/2015	19/03/2015
08/07/2015	13/06/2015
12/10/2015	14/09/2015
15/01/2016	12/01/2016
06/04/2016	06/04/2016
04/07/2016	01/08/2016
10/10/2016	02/11/2016
24/01/2017	02/02/2017
24/04/2017	02/05/2017
24/07/2017	02/08/2017
24/10/2017	02/11/2017
22/12/2017	02/02/2018
22/03/2018	16/05/2018
16/05/2018	
22/06/2018	
26/09/2018	
20/12/2018	
25/03/2019	
25/06/2019	
25/09/2019	
18/12/2019	

The mass flow of the gaseous stream in time interval t on a wet basis is measured by the flowmeter. The typical accuracy of the thermal mass flowmeters is $\pm 1.5\%$ of reading, $\pm 0.5\%$ of full scale.

	Flare 1	Flare 2
Instrument tag number	3092-FM-118	3449-FM-118
Change in monitoring equipment	YES	YES
Serial number	A309FA02000	A604B902000
1 st Calibration date	26/07/2012 /22/	09/05/2014 /24/
Taken into service	22/11/2012	03/10/2014
Replaced on	Replaced on 21/11/2015 Thermal Mass flow meters Type: E&H Proline T mass 65l Accuracy: is $\pm 1.5\%$ of reading, $\pm 0.5\%$ of full scale. Calibration frequency: every three years as per manufacturer's	Replaced on 02/10/2017 Thermal Mass flow meters Type: E&H Proline T mass 65l Accuracy: is $\pm 1.5\%$ of reading, $\pm 0.5\%$ of full scale. Calibration frequency: every three years as per manufacturer's

		specifications Serial No: A309F902000 1 st calibration date 20/07/2015 /21/ Valid from 20/11/2015 to 19/11/2018 as per manufacturer's specifications	specifications Serial No: 99047602000 1 st calibration date 16/05/2017 /25/ Valid from 02/10/2017 to 01/10/2020 as per manufacturer's specifications
	Replaced on	Replaced on 21/11/2018 Thermal Mass flow meters Type: E&H Proline T mass 65l Accuracy: is $\pm 1.5\%$ of reading, $\pm 0.5\%$ of full scale. Calibration frequency: every three years as per manufacturer's specifications Serial No: 99047702000 1 st calibration date 31/07/2018 /23/ Valid from 21/11/2018 to 20/11/2021 as per manufacturer's specifications	
<p>The Flare 1 flow meter with Tag number 3092-FM-118 had a delay in the replacement of the unit by two days between the 19/11/2018 and the 21/11/2018. The error was 0.19% for this meter when it came back from calibration and was lower than the 1.5% tolerance in the OEM specification sheet. As a result, an adjustment was made of the values for these two days down by the 1.5% value in line with the rules of delayed calibration.</p> <p>The verification team has checked the calibration records of the measuring equipment that has an impact on the claimed GHG emission reductions in order to verify if it is conducted by the project participants at a frequency specified in the applied methodologies, the applied standardized baselines and/or the revised monitoring plan.</p> <p>The audit team verified that the equipment's used for monitoring is adequate and is controlled and calibrated in accordance with the revised monitoring plan.</p>			
Findings	No specific CARs/CLs/FARs raised regarding this issue.		
Conclusion	<p>In accordance with paragraph 366 a) of the VVS, AENOR concludes that provided the following conservative approach is adopted in the calculation of GHG emission reductions by applying the maximum permissible error of the instruments to the measured values taken during the period between the scheduled date of calibration and the actual date of calibration, since the results of the delayed calibration do not show any errors in the measuring equipments.</p> <p>In accordance with paragraph 367, AENOR confirms that the error has been applied in a conservative manner, such that the adjusted measured values of the delayed calibration shall result in fewer claimed GHG emission reductions and for all measured values taken during the period between the scheduled date of calibration and the actual date of calibration.</p> <p>In accordance to paragraph 371 of the CDM validation and verification standard for project activities version 02.0, AENOR verification team confirms that the calibration is conducted at the frequency specified by the methodology and the registered monitoring plan.</p>		

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	<p>According to the applied methodology the baseline emissions are calculated as follow:</p> $BE_{CH4} = ((1 - OX_{top\ layer}) \times F_{CH4,PJ,y} - F_{CH,BL,y}) \times GWP_{CH4}$ <p>Where:</p> $F_{CH4,PJ,y} = F_{CH4,flared,y} + F_{CH4,EL,y} + F_{CH4,HG,y} + F_{CH4,NG,y}$ <p>Values used for the above two formulas:</p> <p>$F_{CH4,BL,y}$ = 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;</p> <p>$F_{CH4,EL,y}$ = 0, as there was no use of LFG for electricity generation during this monitoring period</p> <p>$F_{CH4,HG,y}$ = 0, as there was no use of LFG for heat generation.</p> <p>$F_{CH4,NG,y}$ = 0, as there was no supply of LFG into the natural; gas network</p> <p>Therefore:</p> $F_{CH4,PJ,y} = F_{CH4,flared,y}$ <p>Calculation of $F_{CH4,flared,y}$</p> $F_{CH4,flared,y} = F_{CH4,sent_flare,y} - \frac{PE_{flare,y}}{GWP_{CH4}}$ <p>$PE_{flare,y}$ is 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.</p> <p>The project activity involves the installation of one enclosed flare. The calculation procedure in the applied tool "Project emissions from flaring" (Version 02.0.0) /34/ 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 ($F_{CH4,RG,m}$).</p> <p>The mass flow of methane in the residual gaseous stream 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) /35/ as described above.</p> <p>The flare efficiency used is 80% (90% less 10% as described in the paragraph above) when the following two conditions are met to demonstrate that the flare is operating:</p> <ol style="list-style-type: none"> 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 the manufacturer's specification for the flare ($SPEC_{flare}$) in minute m; and 2. The flame is detected in minute m ($Flame_m$). <p>Otherwise $\eta_{flare,m}$ is 0%.</p> <p>Project emissions from flaring are calculated as the sum of emissions 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:</p>
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	$PE_{flare,y} = GWP_{CH4} \times \sum_{m=1}^{525600} F_{CH4,m} \times (1 - \eta_{flare,m}) \times 10^{-3}$ <p style="text-align: right;">Flaring Tool Eq. (15)</p> <p>Where:</p> <p>$PE_{flare,y}$ Project emissions from flaring of the residual gas in year y (tCO₂e) GWP_{CH4} Global warming potential of methane valid for the commitment period (tCO₂e/tCH₄) $F_{CH4, RG, m}$ Mass flow of methane in the residual gas in the minute m (kg) $\eta_{flare, m}$ Flare efficiency in minute m</p> <p>The audit team has verified the spreadsheet with the calculations and found that the correct formulae have been used and the source of data are in accordance with the information provided in the monitoring plan of the approved PDD.</p> <p>Therefore, the baseline emissions result for the monitoring period, from 19/01/2015 to 31/01/2020 are the following:</p> <p>BE_y = 283,495 t CO₂</p>
Findings	No specific CARs/CLs/FARs raised regarding this issue.
Conclusion	<p>It is AENOR opinion that the calculation made by the PP is deemed appropriate and consistent with the evidence provided and cross-checked by the audit team. Appropriate methods and formulae for calculating baseline emissions, project emissions and leakage have been followed, and assumptions and the ex-ante emission factor are correctly applied and justified.</p> <p>According to paragraphs 373-374 of the CDM validation and verification standard for project activities version 02.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • A complete set of data for the monitoring period is available. • Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources. • Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • There are no assumptions in emission calculations.

E.8.2. Calculation of project GHG emissions or actual net anthropogenic GHG removals by sinks

Means of verification	<p>Project emissions are calculated according to the baseline methodology ACM0001 - Version 15.0, Project Emissions:</p> $PE_y = PE_{EC,y} + PE_{FC,j,y} = PE_{EC,y}$ <p>Project emissions from distribution of compressed/ liquefied LFG using trucks is not applicable as all the LFG captured are flared on-site.</p> <p>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).</p> $PE_{EC,y} = \sum_j EC_{PJ,j,y} \times EF_{EF,j,y} \times (1 + TDL_{j,y})$ <p>The use of diesel in the onsite generator contributes towards project emissions in accordance with the "Tool to calculate project or leakage CO₂ emissions from fossil fuel combustion" (Version 02).</p> $PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$
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	<p>The CO2 coefficient is calculated using Option B of the “Tool to calculate project or leakage CO2 emissions from fossil fuel combustion”, which makes use of the net calorific value and CO2 emission factor of the fuel type, as follows:</p> $COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$ <p>The values of the parameters monitored with the required frequency are included in the spreadsheet, where the PEy are calculated by the project participant. The total value of the project emissions obtained for the monitoring period has been 2,145 tCO_{2e}.</p> <p>PEy = 2,145 tCO_{2e}</p>
Findings	<p>CAR 3 - In the excel spreadsheet calculation the following issues shall be resolved:</p> <ul style="list-style-type: none"> - Quantity of fuel consumption for 2020 has not been included in the MR - Version of the methodology has to be updated. - The value of NCV diesel is not in accordance with the approved PDD. - The Volumetric fraction of greenhouse gas, flare 1 and 2 does not coincide with the excel provided. - The electricity consumption of the MR does not coincide with the excel. <p>Appendix 4 summarizes the findings found during the verification process and how they were closed.</p>
Conclusion	<p>Data included in the Monitoring Report and in its annexed spreadsheet were checked against the evidence provided. AENOR confirms that data included in the ERs calculation regarding the project emissions are accurate and there are accounted for this monitoring period.</p> <p>According to paragraph 373-374 of the CDM validation and verification standard for project activities version 02.0, AENOR verification team confirms that:</p> <ul style="list-style-type: none"> • A complete set of data for the monitoring period is available. • Information on the project GHG emission calculation provided in the monitoring report has been cross-checked with other sources. • Calculations of project emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology. • There are no assumptions in emission calculations. • Appropriate emission factor, IPCC default values and other reference values have been correctly applied. • No errors, miscalculations, omissions, misstatements or incomplete information has been identified.

E.8.3. Calculation of leakage GHG emissions

Means of verification	According to the applied baseline methodology, Project Participants do not need to consider leakage (Ly=0).
Findings	N/A
Conclusion	N/A

E.8.4. Summary calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	<p>The verification team has checked if the MR includes a summary table of the emission reductions calculation specifying separately:</p> <ul style="list-style-type: none"> - Total baseline emissions - Total project emissions - Total leakage - Total emission reductions. <p>It has been assessed whether the values are correct or need to be revised. According to the applied methodology, the emission reduction is calculated as follow:</p>
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	<div>ER_y = BE_y – PE_y – LE_y</div> <div>The project participant has developed a spreadsheet called “Chloorkop Consolidated Report 19 Jan 2015 - Jan 2020 - Final V3”, in order to calculate the baseline emission, project emissions and emission reductions. After reviewing the spreadsheets and all the documents referred to in this report, AENOR was able to verify the emissions reductions, for the monitoring period, 19/01/2015 to 31/01/2020, in the Chloorkop Consolidated Report 19 Jan 2015 - Jan 2020 - Final V3 /4/</div> <div>Emission reduction calculation are summarized below:</div> <table><tr><th>BE_y (tCO₂)</th><th>PE_y (tCO₂)</th><th>LE_y (tCO₂)</th><th>ER_y (tCO₂)</th></tr><tr><td>283,495</td><td>2,145</td><td>0</td><td>281,350</td></tr></table>	BE _y (tCO ₂)	PE _y (tCO ₂)	LE _y (tCO ₂)	ER _y (tCO ₂)	283,495	2,145	0	281,350
BE _y (tCO ₂)	PE _y (tCO ₂)	LE _y (tCO ₂)	ER _y (tCO ₂)						
283,495	2,145	0	281,350						
Findings	No specific CARs/CLs/FARs raised regarding this issue.								
Conclusion	<div>In AENOR’s opinion, the monitoring process carried out during the current period is deemed appropriate and consistent with the Monitoring Plan of the approved PDD and the relevant guidance provided by the CDM Executive Board. Assumptions, emission factors and default values that were applied in the calculations have been justified.</div> <div>According to paragraphs 373-374 of the CDM validation and verification standard for project activities version 02.0, AENOR verification team confirms that:</div> <div><ul style="list-style-type: none">• A complete set of data for the monitoring period is available.• Information on the baseline GHG emission calculation provided in the monitoring report has been cross-checked with other sources.• Calculations of baseline emissions have been carried out in accordance with the formulae and methods described in the monitoring plan and the applied methodology.• There are no assumptions in emission calculations.• Appropriate emission factor, IPCC default values and other reference values have been correctly applied.• No errors, miscalculations, omissions, misstatements or incomplete information has been identified.</div>								

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	The actual emission reductions achieved during the current monitoring period are lower than the emission reductions stated in the approved PDD, due to waste input reductions and an aging waste mass that yields less gas per year.		
	Item	Values estimated in ex ante calculation of registered PDD	Actual values achieved during this monitoring period
	Emission reductions (tCO2e)	368,511	281,350
Findings	No specific CARs/CLs/FARs raised regarding this issue.		
Conclusion	In AENOR's opinion, the comparison between estimated ERs in the PDD and ERs of this monitoring period has been correctly detailed in section E.5 of the final version of the Monitoring Report. The emissions reductions for the monitoring period have been correctly determined in the calculation spreadsheets, as well. According to paragraph 266 of CDM project standard for project activities version		

	<p>02.0, AENOR verification team confirms that:</p> <p>A comparison of actual GHG emission reductions or net anthropogenic GHG removal of the project activity achieved during this monitoring period with the estimates in the PDD has been provided. The verification team considers that the calculation of the comparison is correct.</p>
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E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	<p>The verified emission reductions are lower than the estimated value in the PDD for the current monitoring period.</p> <p>On the basis of the above comparison of actual values of the monitoring period with the estimations in the PDD the verification team has checked that it is not necessary to include in the MR an explanation of explain the cause of any increase in the actual GHG emission reductions achieved by the project activity during this monitoring period.</p>
Findings	No specific CARs/CLs/FARs raised regarding this issue.
Conclusion	AENOR confirms that the emissions reductions for the monitoring period have been correctly determined in the calculation spreadsheets.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	<p>The verification team has checked section E.4 of the MR and the emissions reduction calculation Spreadsheet.</p> <p>The MR in section E.4 includes a summary table of the ER breakdown which states that the GHG emission reductions have completely been generated from 1 January 2013 onwards.</p>
Findings	No specific CARs/CLs/FARs raised regarding this issue.
Conclusion	AENOR confirms that all the ERs achieved during this monitoring period correspond to the period from 1 January 2013 onwards.

E.9. Assessment of reported sustainable development co-benefits

Means of verification	The PP has neither developed sustainable development co-benefits nor monitored sustainable development co-benefits of the project activity; the section is therefore not applicable in this verification period.
Findings	N/A
Conclusion	N/A

E.10. Global stakeholder consultation

Means of verification	There were no comments received with regard to the stakeholder consultation conducted after the publication of the first monitoring report in accordance with the "CDM project cycle procedure for project activities", the section is therefore not applicable in this verification period
Findings	N/A
Conclusion	N/A

SECTION F. Internal quality control

Following the completion of the assessment process by the verification team, all documentation undergoes an internal quality control through a technical review before the request for Issuance of CERs is submitted. The Technical reviewer is a qualified member of AENOR, independent from the team that carried out the verification of the project activity. The technical reviewer or the team appointed for the technical review is qualified in the technical area(s) and sectoral scope(s) of the project activity.

SECTION G. Verification opinion

AENOR has performed the verification of the emission reductions of the “EnviroServ Chloorkop Landfill Gas Recovery Project” for the period from 19/01/2015 to 31/01/2020, corresponding to the first monitoring period of the second crediting period.

Verification is performed in accordance with the CDM validation and verification standard for project activities version 02.0, and relevant decisions of the CDM EB and COP/MOP.

AENOR planned and performed the verification by obtaining evidence, the information and explanations that AENOR considers necessary to give reasonable assurance that the reported amount of GHG emission reductions for the period is fairly stated.

AENOR conducted its verification having regard to the monitoring plan included in the approved Project Design Document, and the applied baseline as registered for the project. This assessment included:

- The collection of evidence supporting the reported data.
- Checking whether the provisions of the monitoring plan, were consistently and appropriately applied.

AENOR has verified whether the information included in the latest version of the monitoring report is correct and that the emissions reductions achieved have been determined correctly.

In AENOR’s opinion, GHG emissions reported for the project in the latest version of the monitoring report are fairly stated. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology ACM0001 Version 15.0 and the monitoring plan and formulae provided in the approved PDD.

SECTION H. Certification statement

The verification is based on the monitoring report and the monitoring plan as set out in the registered PDD, the validation report, the ER calculation spreadsheet and supporting documents made available to AENOR by the project participant. AENOR confirms that the project is implemented as described in the revised project design document. Based on the information we have assessed, we confirm that the GHG emission reductions are calculated without material misstatements in a conservative and appropriate manner.

AENOR is able to certify that the emission reductions achieved by the “EnviroServ Chloorkop Landfill Gas Recovery Project” for the period from 19/01/2015 to 31/01/2020 amount to 281,350 tCO₂.

Madrid, January 18th, 2021.



Elena Llorente Pérez
Team Leader



José Luis Fuentes
Climate Change Manager

Appendix 1. Abbreviations

Abbreviations	Full texts
ACM0001	"Consolidated baseline and monitoring methodology for landfill gas project activities" version 15.0
AENOR	AENOR INTERNACIONAL S.A.U.
ASB0001	Standardized baseline: Grid emission factor for the Southern African Power Pool (Version 01.0)
CAR	Corrective action request
CDM	Clean Development Mechanism
CER	Certified emissions reduction
CL	Clarification
DOC	Degradable organic carbon
DOE	Designated Operational Entity
FAR	Forward action request
GHG	Greenhouse Gases
IPCC	Intergovernmental Panel on Climate Change
LFG	Landfill gas
MR	Monitoring Report
N/A	Not applicable
PDD	Project Design Document
PP	Project Participant
SWDS	Solid waste disposal service
tCO ₂ e	Carbon dioxide equivalent tonnes
UNFCCC	United Nations Framework Convention on Climate Change
VVS	CDM validation and verification standard for project activities (version 02.0)
PCP	CDM project cycle procedure for project activities version 02.0
PS	CDM project standard for project activities version 02.0

Appendix 2. Competence of team members and technical reviewers

CERTIFICATE OF QUALIFICATION

Subject: Verification and Technical Review Team for “EnviroServ Chloorkop Landfill Gas Recovery Project”

Madrid, 21/12/2020

Hereby I confirm the following records of qualification, according with AENOR internal instruction “Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities” IE-DTC-039, and in relation with the verification process of the above mentioned project activity:

Name: Elena Llorente Pérez

CDM Team Leader: Yes

CDM Validator: N/A

CDM Verifier: Yes

CDM Technical Reviewer: N/A

External Technical Expert: N/A

Technical areas related with the project activity:

TA 13. Waste handling and disposal



Jose Luis Fuentes
Climate Change Manager

CERTIFICATE OF QUALIFICATION

Subject: Validation and technical review team for “EnviroServ Chloorkop Landfill Gas Recovery Project”

Madrid, 21/12/2020

Hereby I confirm the following records of qualification, according with AENOR internal instruction “Validation, Verification and Certification of Clean Development Mechanism (CDM) project activities” IE-DTC-039, and with regard to the validation process of the above mentioned project activity:

Name: Luis Javier Arribas

CDM team leader: N.A.

CDM validator: N.A.

CDM verifier: N.A

CDM Technical reviewer: Yes

External technical expert: N.A.

TA 13. Waste handling and disposal

A handwritten signature in blue ink, consisting of a stylized 'J' and 'F' intertwined.

Jose Luis Fuentes
Climate Change Manager

Appendix 3. Documents reviewed or referenced

No.	Author	Title	References to the document	Provider
1	PP	PDD approved, version 10	11/05/2020 approved on 11 June 2020.	UNFCCC Website
2	PP	Monitoring report	V01	PP
3	PP	Monitoring report	V05	PP
4	PP	Chloorkop Consolidated Report 19 Jan 2015 - Jan 2020 - Final V3	V03	PP
5	AENOR	Validation, Verification and Certification of Clean Development Mechanism (CDM) Project Activities	IE/DTC/039	AENOR
6	CDM-EB	CDM Validation and Verification Standard for project activities	Version 02.0	UNFCCC Website
7	CDM-EB	CDM project standard for project activities	Version 02.0	UNFCCC Website
8	CDM-EB	CDM project cycle procedure for project activities	Version 02.0	UNFCCC Website
9	CMD-EB	CDM Monitoring report form and the instruction for filling out the MR	Version 07.0	UNFCCC Website
10	CDM-EB	ACM0001: "Consolidated baseline and monitoring methodology for landfill gas project activities"	Version 15.0	UNFCCC Website
11	IPCC	2006 IPCC Guidelines on National GHG Inventories	2006	IPCC
12	PP	the balance spreadsheet , OPEX verification.	2020	PP
13	PP	Fixed assets register	2020	PP
14	PP	Chloorkop Waste Disposal Site Section 20 Permit		PP
15	PP	Chloorkop F1 WB	Jan 2015-Jan 2020	PP
16	PP	Chloorkop F2 WB	Jan 2015-Jan 2020	PP
17	PP	Eskom annual report	2015-2019	PP
18	PP	8 UV Detector 3092-E-150		PP

19	PP	13 Thermocouple Display		PP
20	PP	Diesel usage-Chloorkop-Monthly Summary comparison	2015-2020	PP
21	PP	Cert. 3092-FM-118 LFGT	20/07/2015	PP
22	EH	Cert. 3092-FM-118 LFGF	26/07/2012	PP
23	EH	Cert. 3092-FM-118 LFGT	31/07/2018	PP
24	EH	Cert. 3449-FM-118 LFGF	09/05/2014	PP
25	EH	Cert. 3449-FM-118 LFGT	16/05/2017	PP
26	PP	Thermocouple Test Flare 1	2015-2018	PP
27	PP	Thermocouple Test Flare 2	2015-2019	PP
28	TNS	Diesel ruler calibration cert	12/08/2020	PP
29	Sanas	Cert. Thermometer Digital with Probe TE-5988	2014/09/04 2015/10/20 2017/03/17 2019/04/02	PP
30	Specialty Gases	Span Gas Traceability certificates, 11307-01, 112076-03, 112405-01, 112739-01, CAN-4682.	01/05/2014 30/05/2015 01/06/2016 30/06/2017 01/06/2017 30/06/2018 01/07/2018 31/07/2019 10/09/2019 30/09/2021	PP
31	Energy systems S.A	Chloorkop Management Report June 2018.	June 2018	PP
32	Energy systems S.A	Recommissioning certificate	09/12/2019	PP
33	PP	instrumentation worksheets-Instrument replacement form-Flare 1	02/10/2015 24/07/2017	PP
34	CMD-EB	Tool "Project emissions from	Version 02.0.0	UNFCCC

		flaring"		Website
35	CMD-EB	Tool to determine the mass flow of a greenhouse gas in a gaseous stream	Version 02.0.0	UNFCCC Website
36	PP	Sheets record for the volume of diesel based on the ruler	Jan 2015-Jan 2020	PP
37	PP	Raw data records per month	Jan 2015-Jan 2020	PP
38	PP	Videos and pictures of the landfill project	October 2020	PP
39	CMD-EB	Guideline: Application of materiality in verifications	version 02.0	UNFCCC Website
40	PP	Thermocouple test procedures	2020	PP

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1. Remaining FAR from validation and/or previous verifications

FAR ID	xx	Section no.	E.2	Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

Table 2. CL from this verification

CL ID	CL 1	Section no.	E.6.2	Date: 28/10/2020
Description of CL				
The PP shall provide pictures/video of the installed technologies, technical processes and equipments, for instance, electricity meters installed at the electricity consumption sources, flare thermocouples, gas analysers, flow meters.				
Project participant response				Date: 29/10/2020
Please find attached a folder which contains both pictures and video footage of the new facility and the all the instrumentation for the facility.				
Documentation provided by project participant				
File Name: "Chloorkop Images" contained in the shared folder.				
DOE assessment				Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CL 1 has been resolved.				

CL ID	CL 2	Section no.	E.6.2	Date: 28/10/2020
Description of CL				
The PP shall provide the following evidences in order to check the monitoring parameters:				
<ul style="list-style-type: none"> - Waste management licence: number 16/2/7/A230/D17/Z1/P280. - Reports of Average technical transmission and distribution losses for providing electricity. Eskom annual reports. - Total investment to implement the project and total cost to operate the project. OPEX and CAPEX. 				

Project participant response	Date: 29/10/2020
Copy is attached Please find attached the Eskom Annual Reports from the period from 2014 to 2019. The report for 2020 is not available and we have assumed the same value as 2019. As there is only one month of this monitoring period in 2020 we believe that it is conservative to use the 2019 data.	
Documentation provided by project participant	
Please find attached in the shared folder titled "Enviroserv Verification info" a copy of the permit. Please find attached in the shared folder titled Eskom Annual reports. In this folder you will find the annual report for the years from 2013 to 2019. Please find attached in the shared folder titled "Enviroserv Verification Info" File a copy of the capex and opex extracts from the financial accounts for the site.	
DOE assessment	Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CL 2 has been resolved.	

Table 3. CAR from this verification

CAR ID	CAR 1	Section no.	E.1	Date: 28/10/2020
Description of CAR				
Section A.1, section A.4, section B.5.2. of the MR does not comply with the Instructions for completing the form. According to the instructions, the MR shall indicate the approval dates and reference numbers of the post-registration changes and refer to the UNFCCC CDM website for the exact reference of the applied methodologies, methodological tools and standardized baselines.				
Project participant response				Date: 29/10/2020
We have included the one PRC-0925-001 which is reflecting on the UNFCCC website				
Documentation provided by project participant				
We have provided a corrected MR titled "Enviroserv Chloorkop LFG MR 19 Jan 2015 to 31 Jan 2020.				
DOE assessment				Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CAR 1 has been resolved.				

CAR ID	CAR 2	Section no.	E.3	Date: 28/10/2020
Description of CAR				
In accordance with the approved PDD, version 10, initially two high temperature enclosed flares were installed. However, since 8 June 2018, only one flare has remained operational due to low gas volumes. Description of section A.1 of the MR it is not in accordance with section A. 1 of the approved PDD.				
Project participant response				Date: 29/10/2020
We have added additional wording in section A.1 subsection C and notes to the project diagram to provide additional clarity.				
Documentation provided by project participant				
We have provided a corrected MR titled "Enviroserv Chloorkop LFG MR 19 Jan 2015 to 31 Jan 2020.				
DOE assessment				Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CAR 2 has been resolved.				

CAR ID	CAR 3	Section no.	E.8.2	Date: 28/10/2020
Description of CAR				
In the excel spreadsheet calculation the following issues shall be resolved:				
<ul style="list-style-type: none"> - Quantity of fuel consumption for 2020 has not been included in the MR - Version of the methodology has to be updated. - The value of NCV diesel is not in accordance with the approved PDD. - The Volumetric fraction of greenhouse gas, flare 1 and 2 does not coincide with the excel provided. - The electricity consumption of the MR does not coincide with the excel. 				
Project participant response				Date: 29/10/2020
Quantity of fuel consumption for 2020 added to MR. Version has been updated in Excel calculation sheet NCV value in excel calculation sheet changed to match PDD, values of the project emissions have changed as a result and we have updated these in monitoring report. We have changed the values in the monitoring report to match the methane % reflected in the consolidated ER calculation sheet. The ER calculation sheet has been fixed to reflect the correct value for the electricity consumption.				

Documentation provided by project participant	
We have provided the amended V2 monitoring report with the above correction. We have supplied an updated Consolidated ER calculation sheet V2 that is now separated to be specific for this monitoring report. This is titled "Chloorkop consolidated report 19 Jan 2015 -31 Jan 2020 Final V2"	
DOE assessment	Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CAR 3 has been resolved.	

CAR ID	CAR 4	Section no.	E.6.2	Date: 28/10/2020
Description of CAR				
Parameters of section D.2 of the MR are not in accordance with the approved PDD, for instance, $T_{EG,m}$, $EC_{PJ,j,y}$, the description, $ECBL,k,t$, the parameter is not in the MR.				
Project participant response				Date: 29/10/2020
We amended the title to TEG,m for the flare temperature. We have change the title $ESPJ,j,y$. With regards to $ECBL,y$ please note: ACM0001 v15 (page 19) states that the parameter $EGPJ,y$ in the methodology is the equivalent of $ECBL,k,y$ in the Tool 5. We have included the parameter $EGPJ,y$ and therefore not included $ECBL,y$. In ether event the value for this monitoring period is zero.				
Documentation provided by project participant				
We have provided a corrected MR titled "Enviroserv Chloorkop LFG MR 19 Jan 2015 to 31 Jan 2020.				
DOE assessment				Date: 11/11/2020
AENOR has reviewed the documentation and considered it correct, therefore CAR 4 has been resolved.				

Table 4. FAR from this verification

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
Project participant response				Date: DD/MM/YYYY
Documentation provided by project participant				
DOE assessment				Date: DD/MM/YYYY

Document information

<i>Version</i>	<i>Date</i>	<i>Description</i>
03.0	31 May 2019	Revision to: <ul style="list-style-type: none"> • Ensure consistency with version 02.0 of the “CDM validation and verification standard for project activities” (CDM-EB93-A05-STAN); • Make structural and editorial improvements.
02.1	11 January 2018	Editorial revision to correct the numbering of appendices in the instructions.
02.0	31 October 2017	Revision to align with the requirements of the “CDM validation and verification standard for project activities” (version 01.0).
01.0	23 March 2015	Initial publication.
Decision Class: Regulatory Document Type: Form Business Function: Issuance Keywords: project activities, verifying and certifying		