Activity 2: Gather area intelligence (Ezamokuhle)

Activity 2.4: Updated Area Intelligence Report for Year 2024

Document by:

ARM
AIR RESOURCE MANAGEMENT

Final Report

27th March 2024

Activity 2.4: Updated Area Intelligence Report for Year 2024	ARM AIR RESOURCE MANAGEMENT

Document Title

Client	**Eskom**
Title	**Activity 2.4: Updated Area Intelligence Report for Year 2024**
Our Reference	**ESKPMV-2024-A2GAI04**
Issued to Client	**27th March 2024**
Classification	**Company Confidential**

Document Change Record

Revision Number	Date	Description of Revision
00A	24th February 2024	Creation of Document
00B	18th March 2024	Peer Review of Document
00	20th March 2024	Draft Document issued to Eskom
01	27th March 2024	Final Document issued to Eskom

Document Approval

	Name	Designation	Date
Prepared by	Elizabeth Masekoameng, Anesu Shamu	Air Quality Specialists	26th March 2024
Reviewed by	Fred Goede	Executive Head: Air Quality	27th March 2024
Approved by	Fred Goede	Executive Head: Air Quality	27th March 2024

Table of Contents

LIST OF TABLES

LIST OF FIGURES

TABLE OF ABBREVIATIONS

ANC	African National Congress
AQA	Air Quality Act
AQMP	Air Quality Management Plan
ARM	Air Resource Management
BNG	Breaking New Grounds
CBO	Community-Based Organization
DEFF	Department of Environment Forestry and Fisheries
DPKISLM	Dr Pixley ka Isaka Seme Local Municipality
GSDM	Gert Sibande District Municipality
IDP	Integrated Development Plan
KPA	Key Performance Area
LM	Local Municipality
MES	Minimum Emission Standards
NACA	National Association for Clean Air
NDP	Net Domestic Product
NGO	Non-Governmental Organisation
NSDP	National Spatial Development Perspective
PM	Particulate Matter
PMV	Planning, Monitoring and Verification
SDF	Spatial Development Framework
SWOT	Strengths, weaknesses, opportunities, and threats

1 EXECUTIVE SUMMARY

1.1 Study Objective

In accordance with the scope of work, Activity 2: "Gather Area Intelligence" requires collation & evaluation of area intelligence information for Ezamokuhle. The purpose of gathering area intelligence is to provide a better understanding of the study area, including environmental and socioeconomic aspects that presents threats and opportunities to the successful implementation of offsets. Area intelligence gathering is a continuous process and an area intelligence (AI) report is produced annually for the duration of the PMV Lead Implementation Phase (5 years). The 1st edition of AI report for this project was produced and submitted in February 2021, the 2nd edition in March 2022 and the 3rd edition in April 2023. For this 4th edition the aim of the review was to update existing information and identify any new data that is relevant for Eskom AQO Project in Ezamokuhle.

1.2 Study Approach

For the study both high level regional, social and local geographical information & development plans conducted in Ezamokuhle were collated. This information was subsequently analysed and synthesised. Therafter a SWOT analysis was undertaken. Figure i) illustrates the study approach undertaken herein.

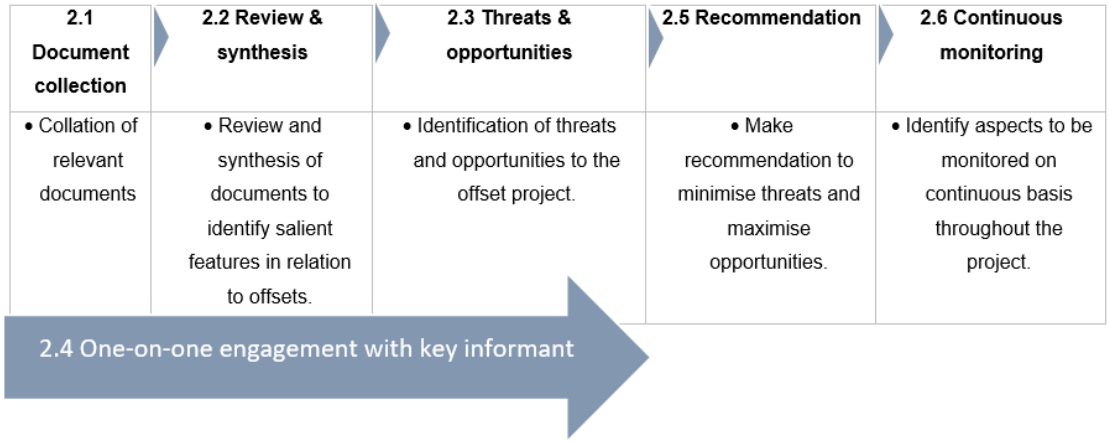


Figure i): Area Intelligence assessment study process flow

1.3 Study Results

Table i provides an overview of all documents collated and reviewed whilst Table ii sumarises the key updates. Whereas Table iii presents a SWOT analysis for the roll out, implementation, execution risks of the air quality offset interventions in Ezamokuhle. This is illustrated in Figure ii).

Table i: Overview of documents collated and reviewed

Document name or type	Publication year	Updated version (or new documents) available for 2024 4th edition AI report
Gert Sibande District Municipality's (GSDM) Integrated Development Plan (2021-2022)(GSDM, 2021).	2021	Yes
Pixley Ka Seme Local Municipality's (DPKISLM) Integrated Development Plan (IDP)(DPKISLM, 2022)	2022	Yes
Dr Pixley Ka Isaka Seme SDF review (MCOGTA, 2020)	2020	Yes
GSDM Waste By-laws (GSDM, 2017)	2017	No
Public participation meeting reports	Various	No
Media reports and articles	Various	Yes
Previous studies related to air quality and offsets	Various	No
Eskom published and unpublished reports	2023	Yes
National legislation	Various	Yes
Stats SA 2022 Census	2022	Yes

Table ii: High level overview of key updates

Year	Key Update
2021	Baseline
2022	Two new political entries; African People's Movement (APEMO) and Forum 4 Service Delivery (F4SD)
	Ezamokihle infrastructure challenges such as untarred roads can result in dust emissions which contribute to deterioration of air quality
	High unemployment rate (61%) in Ezamokuhle
	Many households in Ezamokuhle have established back-yard shacks within their yards
2023	Increase in the DPKIS LM population size between 2011 and 2022
	Increase in the DPKIS LM population density between 2011 and 2022
	Only 58% of youths aged 15-24 are attending school, while 42% are not attending any form of education. Thus education levels in Ezamokuhle are very low . These profiles suggest that socioeconomic conditions in Ezamokuhle are less likely to improve over time. Such situations perpetuate poverty whilst increasing population size, which consequently threatens the sustainability of offsets.
	Most households in Ezamokuhle are in the indigent to low-income groups and may not be able to afford high-end clean fuels for their energy needs.
	In instances where waste is not collected at Ezamokuhle, 38% of the household burn the waste whilst 24% takes the waste to the waste dump.
	The results of household survey undertaken as part of this project showed that most households (48%) in Ezamokuhle use electricity as their main energy source for cooking compared to coal (24%), wood (16%) and LPG (4%)
	The results of household survey undertaken as part of this project showed that most households (38%) in Ezamokuhle use electricity as their main energy source for heating in comparison to coal (26%), wood (14%) and LPG (8%).

Table iii: SWOT analysis for implementing offsets in Ezamokuhle

SWOT	Description
Strengths	*Dwelling types* The majority of houses in Ezamokuhle are formal. This is favourable for air quality offsets because the proposed interventions such as gas stoves and ceilings would be difficult or unsafe to implement if the houses were made of informal structures. *Community development workers* Ezamokuhle has resident community development workers whose responsibility is to link the community with relevant departments and support projects. These community development workers are best suited to provide guidance on household dynamics throughout the implementation of the offsets project.
Weaknesses	*Quality of housing:* Houses in Ezamokuhle have different structural qualities. Especially houses that were built under the first batch of RDP, have structural defects that may pose a challenge in offset implementation. Poor construction of RDP houses makes it difficult to install insulation structures in the houses.
Opportunities	*Municipal plans to improve roads infrastructure:* The Municipality is planning to upgrade internal streets in Ezamokuhle (from gravel to interlock paving). This can substantially improve PM levels in the township which often masks the efficacy of offsets.
Threats	*Social unrests:* Social unrests have been common in South African township areas where there is poor service delivery and competition for jobs and other resources. In 2013 there was social unrest in Ezamokuhle where local residents were protesting against employment of immigrants. A man was quoted saying that "*People from outside take our jobs and we locals, we are left with nothing. If you take a closer look most people working at Eskom Majuba Power Station are not from Amersfoort"*. During the engagements with local informants, it was also indicated that community uprisings do occur where community members demonstrate their dissatisfaction with immigrant who are "stealing"/taking over local township businesses. More often than not, this protest can result in locals anger and vandalism which may have negative impacts on offsets implementation schedules, theft of offsets monitoring equipment, etc.
	Affordability and availability of fuel: As indicated earlier, Ezamokuhle is a poverty stricken township with high unemployment rates. Thus, the ability of households to

SWOT	Description
	afford continued gas supply for gas stove offset interventions may hinder the success of such an intervention. Affordability drives energy carrier selection and if the current offsets interventions are not affordable than the current fuels (wood & coal), the interventions may not be sustainable. Over the last year all coal, wood and LPG all increased in price. The cost of both wood and coal increased by R30 to a new cost of R150 per bag whilst LPG increased by R60 to a revised cost of R380. This is a significantly higher entry point than coal or wood.
	Political instability: The most dominant political parties in Ezamokuhle are ANC and EFF with some DA prominence. The informants indicated that there is some animosity between members of these parties which can present a threat to the offsets project. They noted that while the community may see the project as beneficial, political party leaders may sway the community in a different direction (against the project), in order to prove a point or to drive a particular political agenda. Thus, it is important to ensure that there is buy in from all political parties prior to the implementation of the project.
	Theft (burglaries, vandalism and mugging): Theft was highlighted as major crimes during our discussions with informants and during community survey. The informants indicated that the high levels of theft (in the form of house break-ins) and vandalism in associated with drug abuse by youth who feed their addiction by stealing anything that looks like they can sell. This requires that any equipment and infrastructure designed for offsets intervention should be well secured and guarded against vandalism and theft.
	Informal backyard shacks: Majority of household stands in Ezamokuhle have two types of dwellings (main house and a backyard shack). The use of coal in these dwelling types is not fully understood pending the planned household survey. Eskom's offset interventions involve swapping a coal stove (usually from the main house) for a cleaner gas stove. In the event that there is high rate of coal use in these informal shacks (using imbawula rather than coal stove), Eskom's offset interventions may not be able to address emissions from these dwelling units. This unaccounted emission sources will impact ambient PM air quality levels in Ezamokuhle

Strengths	Weaknesses
• *Dwelling type:* Most/all households are formal which will make it easier for implementation of offset intervention's such a s gas stoves and ceiling retrofits • *Presence and visibility of community development workers*	• *Quality of houses in some cases:* Old RDP houses not adequate for insulation offsets. May require fixing.
Opportunities	**Threats**
• Plans by municipality to improve gravel roads.	• Social unrest (sporadic) • Affordability of interventions • Political instability • Theft and vandalism • Backyard shacks

Figure ii): Summary of SWOT Analysis

1.4 Conclusion

There are currently no known projects (planned or under implementation) in Ezamokuhle that may have negative implications for Eskom's AQO Project. Whilst this report will only be updated annually, it should be noted that ARM is continuously monitoring and reporting on any new developments (legislative, policy, media reports, etc.) that may potentially impact the: roll out; implementation; execution or success of air quality offset interventions promptly to the Eskom AQO PMV Project team.

2 BACKGROUND

The Department of Forestry, Fisheries and the Environment published in 2013 the regulations regarding Listed Activities and Minimum Emission Standards (MES) in terms of section 21 of the Air Quality Act (AQA) (GN 893 of 2013). These regulations list activities that result in atmospheric emissions which may have detrimental impacts on the environment. The said regulations also prescribe emission limits that these listed activities must not exceed. Listed activities must comply with prescribed limits at different timeframes i.e. existing/old plants (operational before 2010) must comply with old plant standards by 2015 and comply with new/stricter plant standards by 2020. The same regulations (GN 893 of 2013) stipulated (prior to recent amendments) that an existing plant can apply for postponement of compliance timeframes, meaning delaying the timeframe of compliance by sending an application to the National Air Quality Officer. Eskom embarked on a process to apply for postponements of the 1st April 2015 compliance timeframe for some of Eskom's MES listed activities. The National Air Quality Officer (NAQO) in concurrence with the Gert Sibande District Municipality licensing authority granted postponements to Eskom and stipulated conditions to be upheld for the period of postponement. A postponement of timeframes to comply with the limits set in the regulation was granted to Eskom in 2015 to allow time for Eskom to invest in technological and other measures to reduce emissions towards meeting the set limits.

One of the conditions of the granted postponements included the requirement to submit and implement an air emission offset plan to reduce particulate matter pollution in the receiving environment. The condition specifically required that Eskom identifies and implement offset projects that will reduce Particulate Matter (PM) in the ambient / receiving environment.

An environmental offset is an action(s), designed to compensate for a negative environmental impact of resource use, a discharge, or emission from an activity. In other words, environmental offsets are alternative actions (investments or initiatives) implemented to mitigate the residual negative environmental impacts of an industrial activity. In relation to air quality, the Department of Environmental Affairs (DEA) Air Quality Offsets Guideline (Notice 333 of 2016) defines air quality offsets as an intervention, or interventions, specifically implemented to counterbalance the adverse and residual environmental impact of atmospheric emissions in order to deliver a net ambient air quality benefit within, but not limited to, the affected airshed where ambient air quality

standards are being or have the potential to be exceeded and whereby opportunities and need for offsetting exist.

2.2 Eskom's Air Quality Offsets

Eskom is implementing air quality offsets projects in various communities such as Ezamokuhle and Kwazamokuhle. These projects are implemented as part of Eskom's multi-pronged approach to improving ambient air quality, which also includes: reducing emissions at the existing coal-fired fleet; investing in power generation from renewables and nuclear. Eskom's air quality offsets are designed to reduce a community's exposure to harmful levels of air pollution by reducing emissions from local sources such as domestic coal burning and waste burning. Examples of air quality offsets implemented by Eskom are:

- switching households from coal to cleaner energy sources,
- improving thermal comfort of houses in order to minimise the need for coal-based heating in winter, and
- improving waste collection and recycling.

Such interventions have the potential to counterbalance the effect of emissions from power stations on the air quality in localities near Eskom's power stations.

2.3 Scope of work

As part of implementation of a series of offsets projects, Eskom is undertaking continuous monitoring and verification of the effectiveness of such projects in improving ambient air quality. To this end, Eskom appointed Air Resource Management (Pty) Ltd (*herein referred to as* ARM) to support the Planning, Monitoring and Verification (PMV) services in support of the Phase 1: Lead implementation at: KwaZamokuhle; Ezamokuhle and Sharpeville. In order to achieve this, Eskom has included sixteen targeted work package Activities (Table 1) for these respective communities.

Table 1: Eskom PMV Activity Schedule

Activities	Kwazamokuhle	Ezamokuhle	Sharpeville
Activity 1: Preliminary air quality assessment		✓	
Activity 2: Gather Area intelligence		✓	
Activity 3: Rapid in situ assessment		✓	
Activity 4: Obtain ethical clearance		✓	
Activity 5: Census	✓	✓	✓
Activity 6: Community source survey		✓	
Activity 7: Fuel source survey		✓	
Activity 8: Household surveys		✓	
Activity 9: Annual (household/community) surveys and monitoring of project effectiveness	✓	✓	✓
Activity 10: Ambient air quality monitoring	✓	✓	✓
Activity 11: Conduct indoor air quality monitoring	✓	✓	
Activity 12: Atmospheric Dispersion Model	✓	✓	✓
Activity 13: Design of Intervention		✓	✓
Activity 14: Development of Database Reporting	✓	✓	✓
Activity 15: Strategic Assistance and offsets methodology	✓	✓	✓
Activity 16: Research and Development	✓	✓	✓

This report is an output of Activity 2: *Gather Area Intelligence* for Ezamokuhle. The purpose of gathering area intelligence is to provide a better understanding of the study area, including environmental and socioeconomic aspects that presents threats and opportunities to the successful implementation of offsets. Area intelligence gathering is a continuous process and an area intelligence (AI) report is produced annually for the duration of the Lead Implementation Phase (5 years). The 1st edition of AI report for this project was produced and submitted in February 2021, the 2nd edition in March 2022 and the 3rd edition in April 2023. This report is the 4th edition comprising of updates to the prior editions.

3 METHODOLOGY

In accordance with the scope of work and the schedule above, Activity 2: "Gather Area Intelligence" requires collation & evaluation of intelligence information for Ezamokuhle. This includes gathering relevant high level regional, social and geographical information from current and past studies conducted in Ezamokuhle and local development plans. High-level regional and local geographic and social information was obtained from various government plans, and local media reports. This information was analysed and synthesised into this report. The process followed in gathering area intelligence is depicted in Figure 1. The subsequent sections (2.1 to 2.6) provide the details herein.

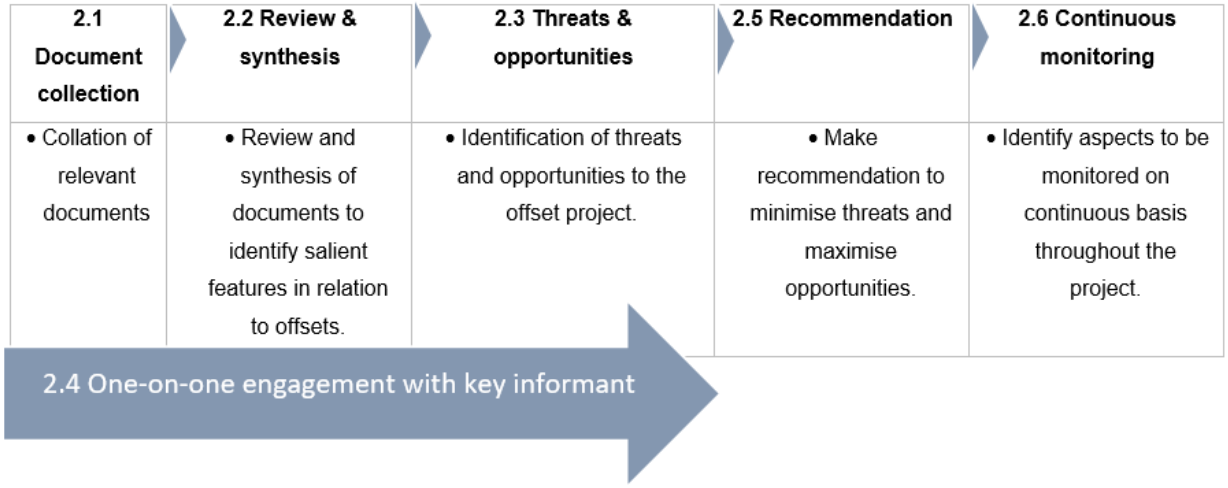


Figure 1: Area Intelligence Assessment Process Flow

For this 4th edition, the same approach used for the first edition was used, wherein any new regional and local geographic, social, environmental and government planning documentation was searched, solicited and reviewed. The aim of the review was to update existing information and identify any new data that is relevant for offset projects.

3.1 Document Collection & Collation

We used search engines to search for any updated reports similar to the ones used in the prior editions of the AI report. This included updates to government plans social and economic statistics, previous studies and media reports, among others. Table 2 below shows types of documents that were used in the compilation of AI reports and any updates in the current year.

Table 2: Previous and current types of documents collected for the purpose of AI gathering

Document name or type	Publication year	Updated version (or new documents) available for 2024 4th edition AI report
Gert Sibande District Municipality's (GSDM) Integrated Development Plan (2021-2022)(GSDM, 2021).	2021	Yes
Pixley Ka Seme Local Municipality's (DPKISLM) Integrated Development Plan (IDP)(DPKISLM, 2022)	2022	Yes
Dr Pixley Ka Isaka Seme SDF review (MCOGTA, 2020)	2020	Yes
GSDM Waste By-laws (GSDM, 2017)	2017	No
Public participation meeting reports	Various	No
Media reports and articles	Various	Yes
Previous studies related to air quality and offsets	Various	No
Eskom published and unpublished reports	2023	Yes
National legislation	Various	Yes
Stats SA 2022 Census	2022	Yes

All the above documents collected were reviewed and synthesised in order to derive their relevance to offsets implementation. The review considered the following:

- Document objective;
- Salient features as they relate to the offset project; and

- In case of policy and planning documents, key activities planned in Ezamokuhle and surrounds, as they relate to offsets.

The following sections provide details on how the information contained in the documents listed above was used for the purpose of intelligence gathering. Only information that is relevant for offsets implementation was considered.

3.1.1 Gert Sibande Integrated Development Plan (IDP)

The GSDM IDP is a document that outlines the objectives and strategies to guide the allocation and management of resources within the municipality's jurisdictional area. The objective of the IDP is to improve coordination and integration of planning, budgeting and development within the Municipal area. As a five (5) year budgeting, decision-making, strategic planning and development tool, the IDP is used by the Municipality to fulfil its role of 'developmental local governance'. Table 3 summarises salient contents of the IDP that can potentially impact the roll out, implementation, execution or success of air quality offset interventions.

Table 3: GSDM IDP information relevant for offset implementation

Section	Relevant section of the IDP	Relevance
Chapter 1		
1.3.3	SWOT analysis for GSDM municipality.	This was important for identifying opportunities and threats to offsets project implementation projects in the district.
1.3.6	GSDM Strategic goals, Statements, Outcomes and alignment to KPA's	Important for aligning offsets objectives with IDP strategies and KPAs.
1.4.4	Community issues raised	Important for understanding pertinent issues commonly raised by communities, with the focus on issues raised in Ezamokuhle or Dr Pixley ka Seme Local Municipality. These can provide insight on issues that may favour or challenge offsets projects in these areas.
Chapter 2	Context: population and statistics: dwellings projections, employment,	Important for initial assessment of Quality of Life (QoL) and other socioeconomic indicators

	educations levels, access to services etc.	that affects offsets implementation and sustainability.
Chapter 3	Key Performance Indicators (KPIs)	Important for identifying programmes that may be complementary or antagonistic to Ezamokuhle offsets project.
	KPA 2: Basic Service Delivery & Infrastructure Development	Important for identifying service delivery programmes that may be complementary or antagonistic to offsets projects.
	KPA 3: Local economic development	Important for identifying local economic development programmes that may be complementary or antagonistic to offsets projects.
Chapter 5	GSDM strategies, sector plans and policies	Important for identifying IDP programmes that may be complementary or antagonistic to offsets projects
Chapter 8	Sector departments projects	Important for identifying EPWP programmes that may be complementary or antagonistic to offsets projects.

3.1.1 Dr Pixley ka Isaka Seme Local Municipality IDP

The DPKISLM IDP is an overarching strategic tool that guides and informs the planning and development, and decisions taken regarding planning, management and development within the Municipality. It is the primary strategic plan that documents the critical development needs of the municipal area (external) and the organisation (internal). Table 4 outlines the salient contents of the IDP which can potentially impact the roll out, implementation, execution or success of air quality offset interventions.

Table 4: DPKISLM IDP information relevant for offset implementation

Section	Relevant section of the IDP	Relevance
Chapter 1	Situational analysis	Important for identifying demographics and key challenges in the municipality

	Demographic profile, community needs	Important for initial assessment of Quality of Life (QoL) aspects, health situation, living conditions, and other socioeconomic indicators that affects offsets implementation and sustainability.
Chapter 2	KPAs	Lists proposed achievements, challenges and proposed interventions. Proposed interventions in relation to air quality are listed in this section
Chapter 3	Projects	Specific projects to be implemented in different local municipalities and wards that have implications for offsets

3.1.2 Dr Pixley ka Isaka Seme Local Municipality SDF

DPKISLM Spatial Development Framework (SDF) aims to provide the required spatial planning guidelines and focus areas to support the drive towards the creation of equitable and sustainable development opportunities within the district. Table 4 summarises the salient contents of the IDP which can potentially impact the roll out, implementation, execution, or success of air quality offset interventions.

Table 5: Pixley ka Seme Local Municipality SDF information relevant for the offset implementation project

Section	Information to be reviewed	Relevance
Chapter 2	Spatial challenges and opportunities at Ward level	Highlights challenges and opportunities at Ward level such as paving of roads in ward 7 (which includes Ezamokuhle and Amersfoort).
Chapter 9	Projections, housing backlocks and planned activities to address such.	Outlines plans for housing development in Ezamokuhle on a portion of state land previously known as a Portion of Portion 1 of the farm Amersfoort Town & Townlands 57-HS, which can accommodate 1,000 erven.
Chapter 13	Secondary Nodes: Amersfoort / Ezamokuhle, Perdekop / Siyazenzela and Wakkerstroom / Esizameleni	Provides and explanation of Ezamokuhle as a secondary node and key economic sectors to be prioritised in the node. As the economic situation of

		the area improves, the shift to cleaner energy sources may increase.
	Amersfoort / Ezamokuhle Growth Pattern 2010-2019	Shows how Ezamokuhle township has grown between 2009 and 2019. This has a bearing on potential for new settlements that may affect the efficacy of offsets.

3.1.3 Census Data

ARM collected population statistics data from recently published census documents including[1]:

i. national census (2011)
ii. community survey (CS) (2016) and
iii. subplace (Ezamokuhle Sub Place 863001001) census (2017) published by Stats SA.
iv. Census 2022

From these datasets, the team was able to gather information such as population age distribution, income levels, and service delivery statistics.

3.1.4 Review of Public Participation Reports

ARM has reviewed various reports that document public participation activities by Eskom and municipalities in Ezamokuhle. These reports provided information on the pertinent issues raised by the community which included:

- challenges faced by the community;
- key priorities for the community and
- issue/s that some community members may raise during the implementation of offsets with a view to mitigate and manage these.

[1] Note that the most recent census statistics (2022) have not yet been published for sub-places

3.1.5 Review of Media Reports & Articles

Media reports were reviewed to provide a better understanding of community dynamics. The aim was to identify local issues that can potentially impact the roll out, implementation, execution, or success of air quality offset interventions. For this, the following search words in the google search were used:

- Eskom
- Highveld pollution
- Ezamokuhle
- Amersfoort
- Eskom Majuba power station
- Air quality Offsets
- Health impact of air quality
- CER
- Groundworks

3.1.6 Review of Previous Studies on Air Quality Offsets

ARM reviewed information from previous research studies undertaken in Ezamokuhle in order to support any information collected in the preceding sections.

Table 6: Historical studies reviewed

Author/Forum	Title
Mchunu & Nkambule, (2019)	An evaluation of access to adequate housing: A case study of Ezamokuhle township, Mpumalanga; South Africa.
Nkambule, 2016	A critical analysis of housing Provision, livelihood activities and Social reproduction in urban Communities in South Africa: The case of Ezamokuhle, Mpumalanga.
Eskom (2017,2018)	Eskom Ezamokuhle offset pilot project documents including the report on the health impacts by MRC.
Bondamakora et al (2019)	Air Quality Offsets in South Africa's Low-Income Settlements
Langerman (2019)	Options for residential emission management in South Africa; 2019 DEA NACA Workshop on Emission Reduction Options for South Africa.

NACA Offsets Workshop (2020)	A technical workshop on Air Quality Offsets was hosted at the 2020 NACA Annual Conference. Speakers and organizations at this session included: • Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs – Air Quality Management • Eskom • Sasol • North West University • University of Johannesburg • Community organizations
Shamu et al (2021)	A baseline air quality modelling assessment for a South African township: A case study of the Ezamokuhle township, Mpumalanga; South Africa
Ramandh et al (2021)	A novel application of using Unmanned Aerial Vehicles (UAVs) for air quality management
Gode et al (2021)	Diffusive Sampling of Trace Gases for A South African Township: Ezamokuhle, Mpumalanga
Ramandh et al (2022)	A Winter Status Quo Air Quality Assessment in A South African Township: Ezamokuhle, Mpumalanga

3.2 ENGAGEMENTS WITH LOCALS

In the compilation of the 1st edition AI reports, ARM had one-on-one engagement with informants who had key insight & intelligence for Ezamokuhle. The purpose of this engagements was to gather more information about unwritten social township dynamics and how these dynamics could potentially impact the offset project. The team met with three key informants in Ezamokuhle on 18/03/21. One of our team members who is fluent in Zulu language facilitated the discussion where required.

The names of the persons interviewed remain anonymous but included:

1) a member of the local business forum,
2) a community development worker and
3) a member of community policing forum.

Table 7 outlines the questions that were utilised to guide the discussions with the informants.

Table 7: Interview engagement guide

Focus Area	Question
General	*Tell us about Ezamokuhle: the type of community, how the place got inhabited and challenges*
Political landscape	*Which political organisations are dominant in the area?* *Which community structures (CBOs and NGOs) are dominant?* *Please share the names of the political structure*
Socio-economics	*What are the pertinent social challenges faced by the community? Provide examples* *Is crime a concern (elaborate)* *What are the key economic activities in the township?* *Which sectors and firms employ key sources of employment in the area* *What is the perceived level of crime?*
Service delivery	*What are the key service delivery challenges faced by the community? (Elaborate)* *Are all houses fitted with a sewage system (more precise- long drop vs french drain vs sewerage water reticulation system. Only the former should result in significant air quality (odour) issues.* *How many times does waste get collected and what are the challenges?* *Are all houses electrified?* *How much free basic electricity is offered to residents* *Confirm various sections of 2.6; 3.9 on infrastructure and service delivery*
Environmental	*What are the pertinent environmental problems that the community is concerned about?*
Housing	*In 2014 there was a proposed Breaking New Grounds (BNG) development planned near the Roestein section of Ezamokuhle, how far is it in terms of progress?* *Was there anything done to rectify the quality of housing in Eza?*
Gender	*According to GSDM IDP all municipalities should have a gender desk. Is there such a desk?*

For the review and compilation of this 4th edition Area Intelligence report, the project team had one-on-one interviews with only one informant. The interview was done telephonically on 9th March 2024. The aim was to obtain updates on the political and socioeconomic changes experienced by the community since our last engagement.

4 FINDINGS

4.1 GEOGRAPHIC PROFILE

Ezamokuhle (meaning ‘to make it beautiful’) is a township located near a town of Amersfoort which is approximately 42km north of Volksrust at the intersection of the N11 highway and the R35 from Bethal. It is located within Dr Pixley Ka Isaka Seme (DPKISLM) of Gert Sibande District Municipality (GSDM), Mpumalanga Province (Figure 2). The township consists of 6 sections (China 2, Roestein, Jabavu, Phumula and Smallville) is bordered by Amersfoort town (which includes China 1) on the south-western side and veld around the remainder of the township.

Figure 2: Municipalities in Gert Sibande that surround Dr Pixley ka Isaka Seme Municipality

Figure 3: Locality map for Ezamokuhle

4.2 POLITICAL PROFILE

4.2.1 Municipal overview

The ruling party in Mpumalanga is the African National Congress (ANC). At local municipal level, the DPKIS LM council is also led by the ANC. The LM council consists of twenty-one members elected by mixed-member proportional representation. Eleven councillors are elected by first-past-the-post voting in eleven wards, while the remaining ten are chosen from party lists so that the total number of party representatives is proportional to the number of votes received.

The current political seats composition from August 2021 elections is shown in Table 8 below. This configuration presents a loss of 3 seats by the ANC and a gain of 2 seats by the EFF relative to the previous election year (2016).

Table 8: 2021 Political party seats won in DPKIS LM

Total seats	
African National Congress (ANC)	13
Democratic Alliance (DA)	2
Economic Freedom Fighters (EFF)	3
African People's Movement (APEMO)	1
Forum 4 Service Delivery (F4SD)	1
Inkata Freedom Party (IFP)	1
	21

4.2.2 Political demarcation

The DPKIS LM covers an area of comprises of approximately 5227, 98km² divided into 11 Wards as per the municipal demarcation, and 4 administrative units as shown in Table 9. Ezamokuhle falls under ward 7 and ward 8.

Table 9: Administration units and wards in DPKIS LM

Administrative Unit	Ward Number
Perdekop	6
Wakkerstroom	5
Amersfoort (and Ezamokuhle)	7;8 • Ward 7 is located in Amersfoort and made up of Amersfoort town, a portion of Ezamokuhle which is dominated by RDP houses with basic necessities such as water, sanitation and electricity. It also has informal settlements. • Ward 8 is in Amersfoort, comprises of the old portion of Ezamokuhle location. Majuba power station falls under this ward.
Daggakraal	9,10,11
Volksrust	1,2,3,4

4.2.3 Ezamokuhle political environment

As shown in the previous paragraph, Ezamokuhle comprises ward 7 and ward 8. Both wards were won by ANC candidates in the 2021 local government elections. The candidate for ward 8 withdrew and a new candidate (also from the ANC) was elected during the 16th March 2022 bi-elections. The relationship between the selected candidate and the community is important because offsets projects and any other community development project is seen as contribution from the councillor. Thus, where councillor-community relations are strained, the acceptance of projects can be affected. During our interview with one of the informants, it was reported that the relationship between the recent councillors is relatively good. However, this is not true for all, especially for EFF community members.

In the previous years, the most dominant political parties in Ezamokuhle were ANC and EFF with some DA prominence. Following the 2021 local government elections, there are two new entrant parties i.e. African People's Movement (APEMO) and Forum 4 Service Delivery (F4SD) with prominence in Ezamokuhle.

Our informants had earlier indicated that there is some animosity between members of political parties in the area parties which can present a threat to the offsets project. They noted that while the community may see the project as beneficial, political party leaders may sway the community in a different direction (against the project), in order to prove a point or to drive a particular political agenda. Thus, it is important to ensure that there is buy in from all political parties prior to the

implementation of the project. This point was re-emphasised in the recent engagements with one informant.

4.3 History of Amersfoort Town

According to Nkambule (2016) and DPKIS LM (2017) IDP, Amersfoort was established in 1888 around a Dutch Reformed Church which was constructed in 1876. The area was first settled in 1876 when two farmers in the area contributed land for the construction of a church. Reverend Frans Lion Cachet proceeded to construct a Dutch Reformed church. Thereafter a new village (now Amersfoort town) was formed around the church. The village (Amersfoort) was named after the hometown (in the Netherlands) of the Dutch farmers. The area was officially proclaimed a town in 1888.

Dr. Pixley ka Isaka Seme, one of the founders of the African National Congress, had law offices in Amersfoort and spent time there doing legal and political work for the community at Daggakraal, for the Native Farmers Association, and for the Mswati royal family in Swaziland. Hence the local Municipality DPKIS LM (which includes the towns of Amersfoort, Volksrust, Wakkerstroom, Perdekop and Daggakraal) is named after him.

4.4 Population Profile

According to Stats SA (2011) sub-place statistical data, Ezamokuhle has a population of 10 293 which is just above 10% of DPKIS LM population (Table 10). There is a total of 2 956 households.

Table 10: Demographics of Ezamokuhle

Parameter	DPKIS LM (StatsSA, 2011)	DPKIS LM (StatsSA, 2022)	Ezamokuhle (StatsSA, 2011)	Ezamokuhle (StatsSA, 2022)
Population size	83 235	115 304	10 293	-*
Population growth	0.3%	3.2%		-*
Number of households	19,838	32 972	2 956	-*
Population density (people per square kilometre)	16 persons/ km²	22 persons/km²	1,657.64 persons/ km²	

* Data not available at subplace level

4.4.1 Age distribution

In terms of age distribution, there is currently no data on the age distribution of Ezamokuhle population. However, at local municipality level (DPKIS), it can be deduced that the majority of the population are youth and children (Figure 5). The population pyramid (Figure 5) shows a broad base, indicative of high birth rate, and a narrow tip indicative of a shorter life expectancy. It can also be seen that a large proportion of the population in the area are between the ages of 0 and 35. This is typical of an industrial area where there is an influx of job seekers from the economically and active cohorts into an area.

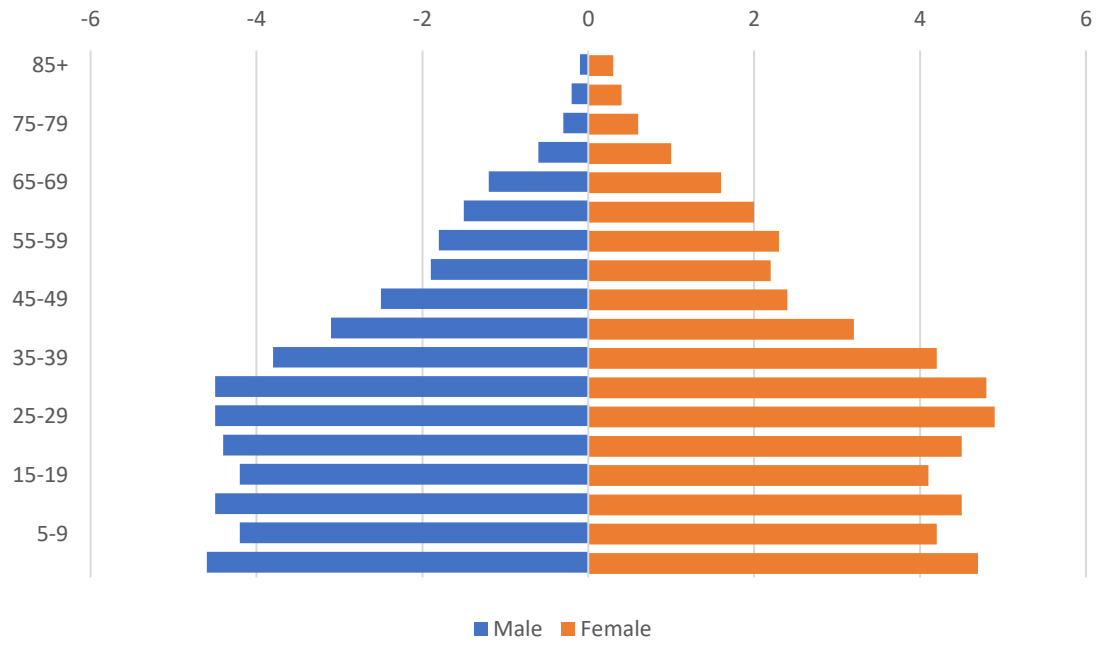


Figure 4: Population pyramid of DPKISLM (Stats SA, 2022)

The shape of the age distribution is an indication of both current and future needs regarding educational provision for younger children, health care for the whole population and vulnerable groups such as the elderly and children, employment opportunities for those in the economic age groups, and provision of social security services such as pension and assistance to those in need.

4.4.2 Gender

In terms of gender distribution, the ratio of females in DPKIS LM is marginally higher than for males (Figure 6). This is an important dimension to note in terms of energy-related offsets because women have a primary role in household energy needs as they are generally responsible for cooking.

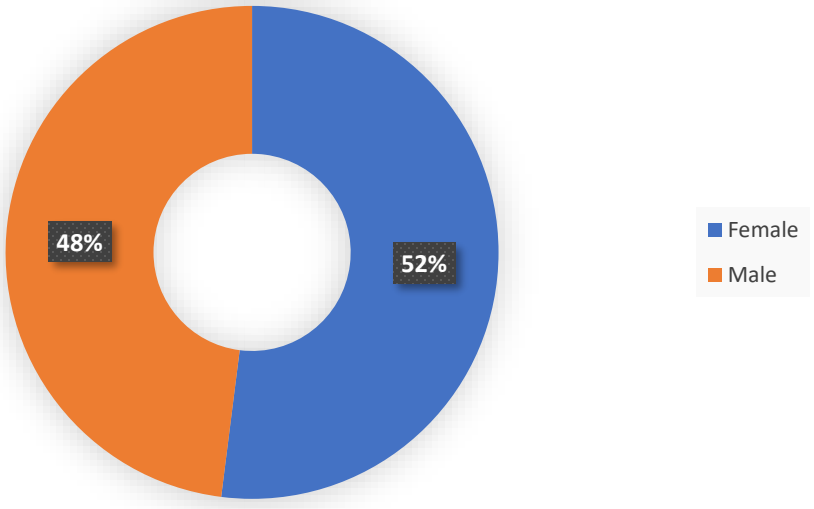


Figure 5: Ratio of males to females in DPKISLM (StatsSA, 2022)

As part of Activity 8 of this project, an analysis of the age distribution for female headed households was undertaken. The results showed that of the over 400 households surveyed, ~45% are headed by young female adults (20 to 39 years old); with ~32% headed by middle aged female adults (40 to 59 years old) and 19% headed by old female adults (60 to 99).

GSDM has developed a Gender Mainstreaming Policy which should be cascaded down to all the local municipalities. The district endeavors that gender mainstreaming should be incorporated into all the programs and projects within the district. Of particular relevance to offsets is that the policy notes that lack of access to electricity creates additional labour for women and young girls, also reducing their available time for family and income generating activities. Key issues set out in the policy pertaining to gender include among others the following:

- Ensuring involvement of all sectors and response of their programs to gender mainstreaming;
- Paying more attention to issues affecting women;
- Harnessing the access of economic opportunities to women in the district;
- Mainstreaming of women in the development initiatives of municipalities;
- Prioritising a number of women empowerment issues and find ways of mainstreaming them in all the decision making, planning and budgeting processes of the district;
- Ensuring that men are also involved in gender mainstreaming issues; this will enable them to understand what gender mainstreaming is.

Given the above, there may be political interest in incorporating gender mainstreaming into offsets implementation projects. ARM ensured female representation during the household survey phase of this project. ARM employed field workers from Ezamokuhle community to undertake household surveys and seven out of eleven of these were female.

According to GSDM IDP, the district municipality is to ensure that there are Women's Desks at all the local municipalities in order to effectively coordinate and facilitate women's issues at local level. In our conversation with local informants, such a desk is not known to exist in DPKISLM. Instead, only the youth desk is known to exist.

4.5 EDUCATION PROFILE

Education levels affect income for households, which subsequently affect their choice of energy carriers. The level of education is also an important indicator of possible future socioeconomic conditions on the community. When the youth is not equipping themselves with education, they are setting themselves up to perpetuate poor living conditions into their futures. Consequently, all poverty-related aspects of energy use (such as the use of cheap and dirty fuels) continue.

4.5.1 Municipality-wide Education Profiles

According to Stats SA, only 15% of DPKIS LM population have completed secondary education (which means having matric qualification) (Figure 6). What is also alarming in that only 58% of youths aged 15-24 are attending school, while 42% are not attending any form of education (Stats SA, 2022).

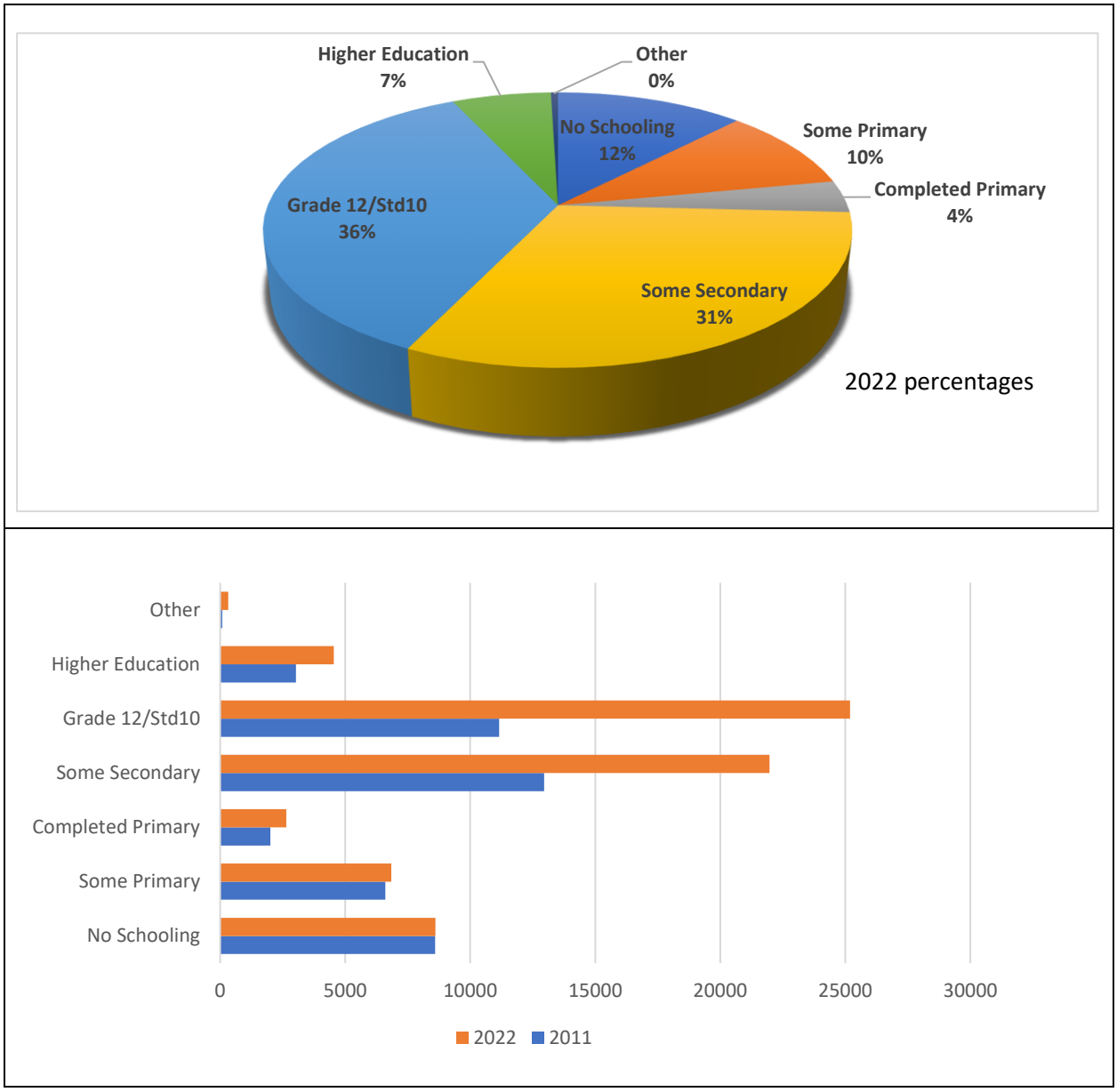


Figure 6: Education Profile in DPKISLM (Stats SA, 2011, 2022)

4.5.2 Ezamokuhle education profile

In 2016, data from a sample of 100 households in an Ezamokuhle case study (Nkambule, 2016) suggested that 25% of the respondents have a primary level education, 15% have a lower secondary level education, 46% a higher secondary level education and 7% have tertiary education; while 7% of the respondents have no formal education whatsoever. The study reported

that a significant number of school dropouts were females and this was because of pregnancies and the difficulties of returning to school after giving birth to a child.

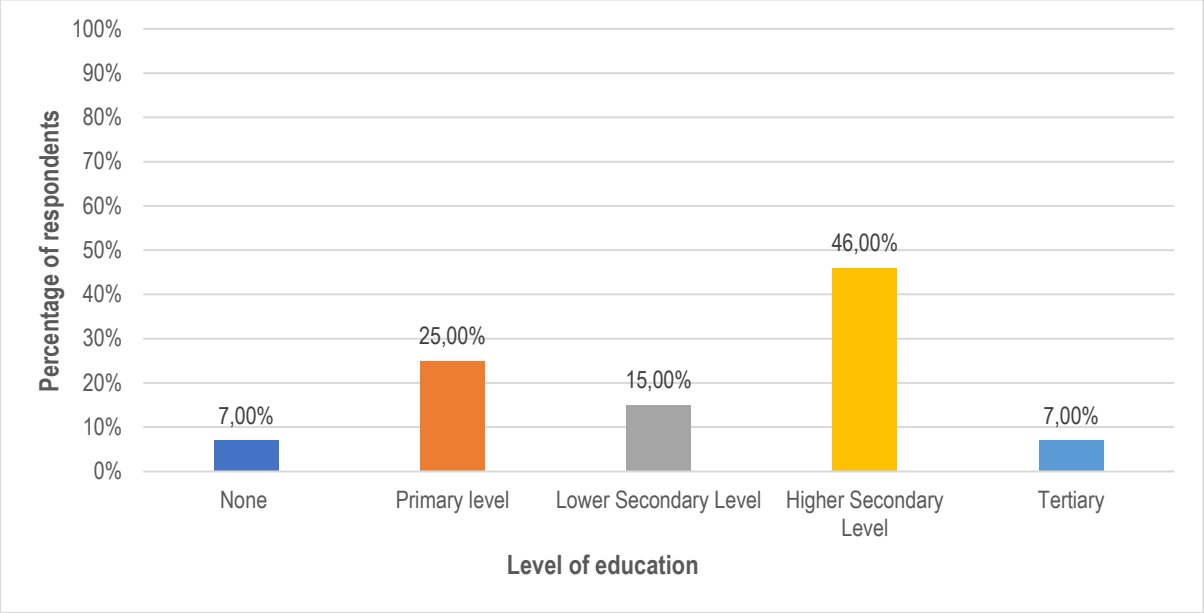


Figure 7: Level of education for Ezamokuhle adult population (Nkambule 2016)

As part of Activity 8 of this project, an analysis of adult education levels in Ezamokuhle was undertaken through a survey on 409 households. The results are presented in Figure 7 below.

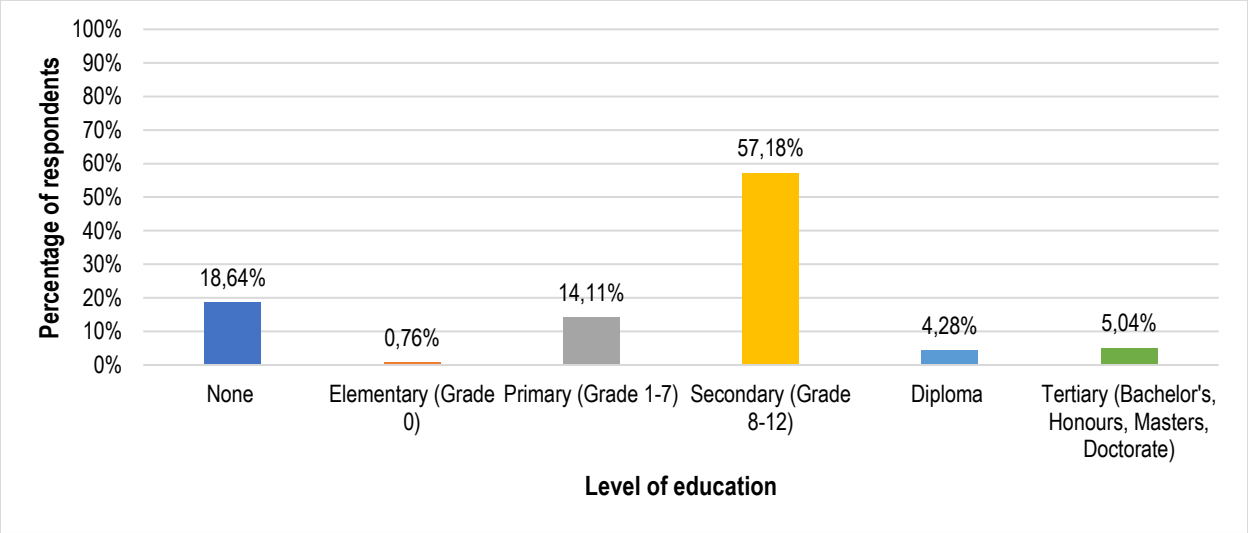


Figure 8: Level of education for Ezamokuhle adult population (this project)

The above graphs shows that education levels in Ezamokuhle are very low[2]. These profiles suggest that socioeconomic conditions in Ezamokuhle are less likely to improve over time. Communities with uneducated youth are also associated with teenage pregnancies (also supported by our informants who indicated that most female teens don't return to school after pregnancy). Such situations perpetuate poverty whilst increasing population size, which consequently threatens the sustainability of offsets. Thus, it is important that offsets implemented in this area should take into account long term sustainability of the interventions under these conditions.

4.6 Employment Profiles & Individual Income

Employment profiles and income levels are indicative of the ability of households to afford their needs, including their ability to afford certain types of energy carriers/fuels. Generally, cleaner sources of energy are relatively expensive, hence low-income households are often found with no choice but to resort to cheaper fuels that are often dirty and polluting.

4.6.1 Municipality-wide Employment Profiles

Employment status is an indicator that relates to numerous aspects important in the assessment of quality of life of communities. Table 11 shows employment status of DPKISLM (Stats SA, 2011). The table shows that 21 885 people (44% of the population) were economically active (employed or unemployed looking for a job), and only 28% are actually employed. Approximately 8% are discouraged work seekers and 47% are economically inactive. According to this dataset, the area (DPKIS LM) has an unemployment rate of more than 70%.

Table 11: Employment profile of DPKISLM (Stats SA, 2011)

Employment Status	Number	Percentage
Employed	13 979	28,2 %
Unemployed (looking)	7 906	15.98 %
Discouraged Work Seeker	4 184	8.5%

[2] The results should not be compared year on year because the methodologies used in the two studies were different.

Not Economically Active	23 383	47.3%

The recent employment statistics for DPKISLM have not been released. However, the recent municipal IDP notes the following regarding employment and poverty:

- The share of population in Dr Pixley Ka Isaka Seme below the lower bound poverty line (LBPL) deteriorated from 51.3 % in 2016 to 56.0% in 2020.
- In 2020, Dr Pixley Ka Isaka Seme's share of population below the LBPL was the 7th highest (unfavourable) among the municipal areas.
- In 2020, the number of people below the LBPL was 47 688.
- In the calculation of the Local Government Equitable Share (LGES), National Treasury estimates that Dr Pixley Ka Isaka Seme has 15 747 poor households.

4.6.2 Ezamokuhle Employment Profile

Previous studies have reported that some 39% of adults in Ezamokuhle were employed and 61% were unemployed (Nkambule 2016). Of those employed, just over half were full-time workers, while the others were either seasonal workers or part-time workers. The fulltime-workers were located in diverse occupation categories, including professionals (such as electricians, teachers and police officers), farm and domestic workers, taxi drivers and store assistants. The seasonal workers consisted of general workers and farm labourers, and the part-time workers were domestic workers, car washers, Community Workers Programme workers, Expanded Public Works Programme workers and merchandisers in the neighbouring towns of Standerton, Ermelo, Volksrust and on nearby farms.

Many of the people who are employed on a formal basis are working in the nearby Eskom Majuba Power Station. Most jobs there, however, are not permanent as they are part time, temporal and seasonal. During the "shutdown" (a period when equipment and cooling towers used to generate electricity are being serviced) different specialised contractors employ people from Ezamokuhle township on a temporary basis in cleaning and servicing the equipment at Majuba. During the site visit, the project team also noticed Eskom-labelled buses used to transport personnel in Ezamokuhle.

As part of Activity 8 of this project an analysis of income sources of Ezamokuhle residents was undertaken. The source of income and the amount of income received per month are presented in respectively.

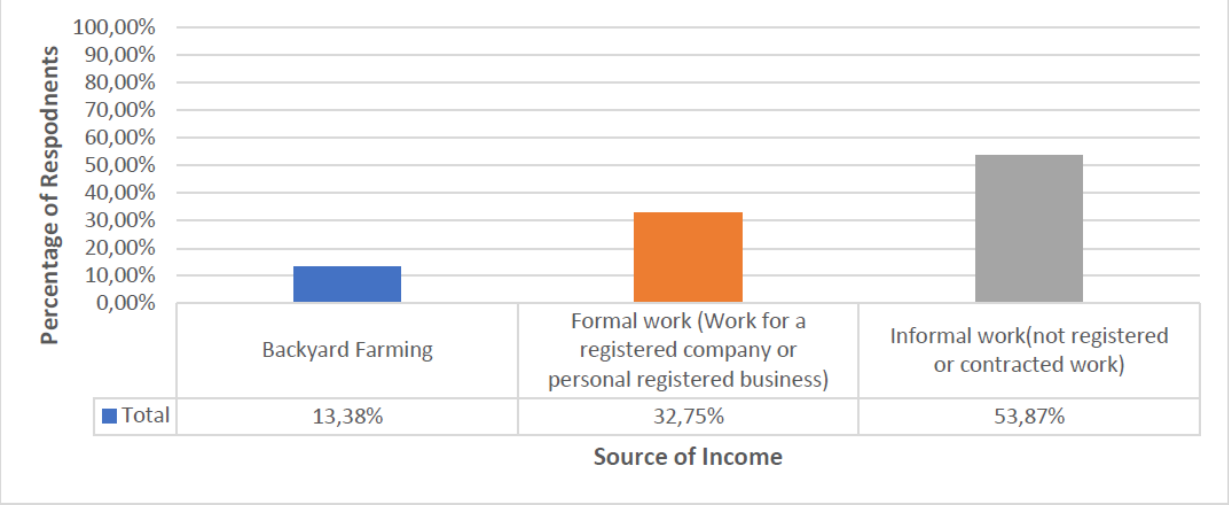


Figure 9: Sources of income according to respondents (this project)

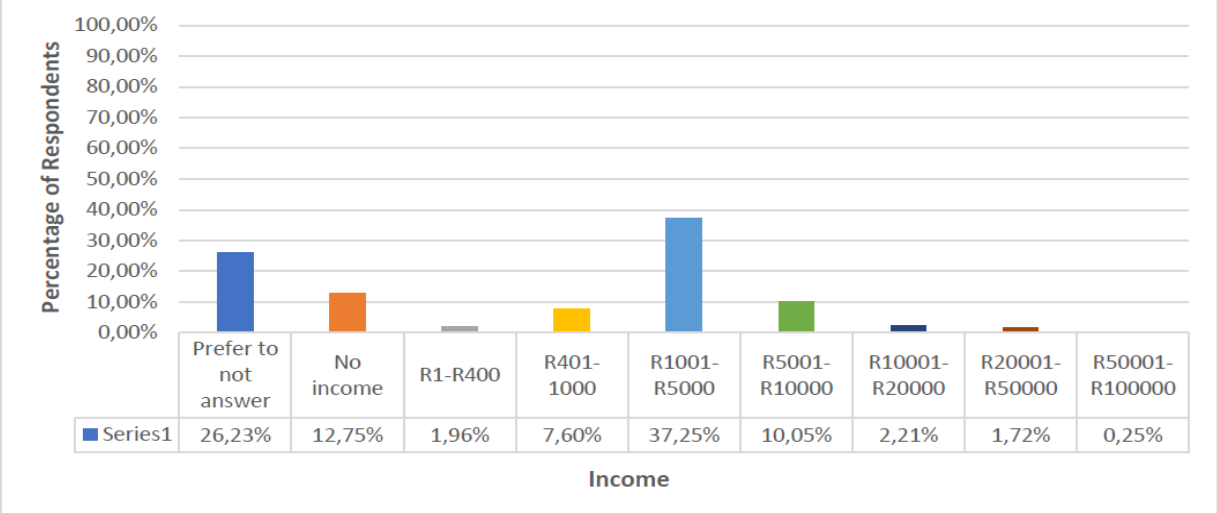


Figure 10: Levels of household income (this project)

Nkambule's (2016) study reported that most men and women from Ezamokuhle who work on the farms (for instance weeding), and women who are employed as domestic workers, complain that

they face extremely exploitative and discriminatory employment conditions because they work long hours at low pay. In his study, most participants reported that they earn between R1,500 and R1,800 per month. They would also walk every day to and from work in order to minimise travel-related expenditures. The study also indicated that even people who are employed are heavily indebted.

Meanwhile, some households rely on basic income grants from the government (including old age grants, childcare and foster grants). In most cases, these grants are used not only to benefit the registered recipient (for instance, the child recipient) but often the entire household.

Based on the above, it is clear that most households in Ezamokuhle are in the indigent to low-income groups and may not be able to afford high-end clean fuels for their energy needs. This situation is similar to what was found in the Kwazamokuhle pilot where the community is largely indigent (Eskom, 2017). Thus, most of the learnings from Kwazamokuhle pilot, can be transferred to Ezamokuhle, especially those relating to issues of affordability of certain energy carriers.

4.7 Key Economic Sectors In The Local Municipality & Township

The nature of economic activities in an area can influence the type of fuel used by households. For example, communities living next to coal mines tend to use coal as fuel, especially during winter months because coal would be available to them at cheaper price. Similarly, communities living near large plantations are likely to use wood for heating and cooking.

At municipal level, economic activity in DPKIS LM is driven by Trade (~ 20%), Agriculture (19%), Community services (17%) and Construction (13%) as shown in Figure 9.

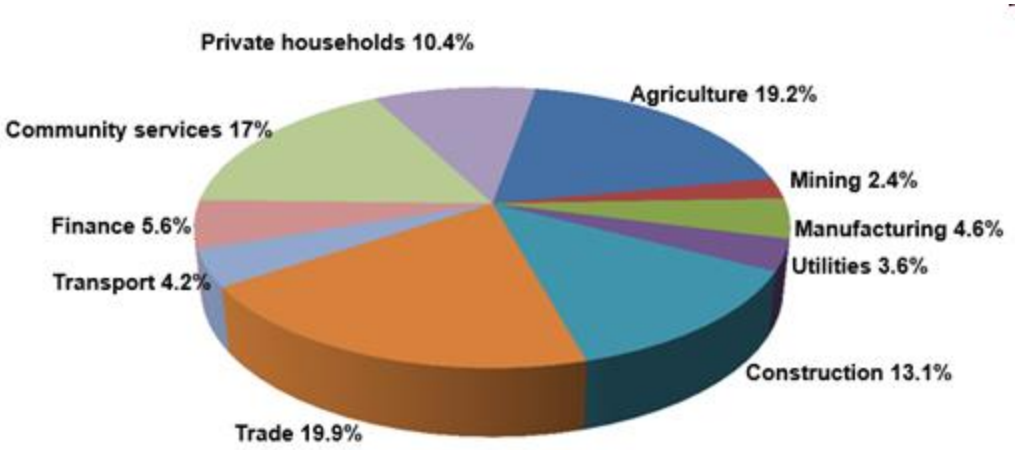


Figure 11: Key economic activities in DPKISLM

However, in Ezamokuhle, drivers of economic activity also include economic activities that are characteristic of what is referred to as township economy. These are highly informal activities and enterprises that are diverse and sometimes using households as sites of production. The following are key economic activities in Ezamokuhle township.

Table 12: Local "township" economic activities in Ezamokuhle

Economic activity	Description
Taxi industry	Some community members are owners and drivers of taxis that commute community members between home, work places and town. These taxis could be noticed in people's yards.
Home-based enterprises	• Some community members sell merchandise within their yards e.g. sale of livestock and chickens for weddings and funerals, sale of firewood and coal (mainly coal than wood). • Others undertake scrap metal recycling where they collect metals which they store in the yards before they are taken to a designated collection point. • Others own taverns and chisanyamas (braai meat vending) and tuck-shops within their yards.
Nodal enterprises	Some community members sell fruits & vegetables, clothes and small electronics at specific nodal points such as taxi ranks and in Amersfoort town.

Other	There have been reports of income being generated through illegal gambling activities and sex work in the area.

* Some of these enterprises (like chisanyamas and coal sales) are direct contributors to local air pollution

Community members are complaining that the involvement of locals in these economic activities is dwindling as immigrants are taking over or (in the words of local informants) “stealing” the township business. They said that “immigrants have stolen our Chisanyamas”, they have taken over spaza shops and anything that locals used to trade on as a means of survival. The immigrants are able to do that because they have more buying power than locals and therefore are able to sell things cheaper. The informants expressed great animosity towards immigrants on this issue and explained that there used to be several community uprising to challenge this but the challenge is that during such uprisings, the police then arrest locals.

These local dynamics are important for consideration in Eskom’s offsets because the implementation of offsets may require a shift in micro-economic activities in the community. For example, as offsets aim to shift households from coal to gas, the micro-economic activity may have to shift from coal sales to gas sales. The implications of these for small businesses can be significant considering that gas requires special handling and storage requirements that some merchants my not have. Details on the potential implications of offsets on coal merchants are reported as part of activity 7 (Fuel source survey) report.

4.8 Safety & security

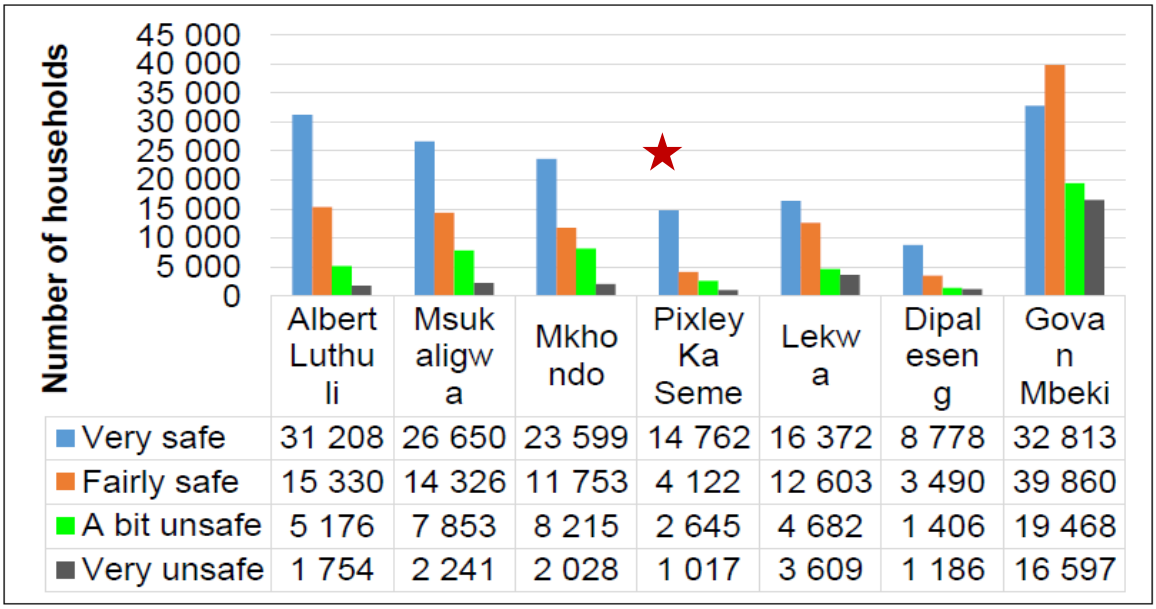
Safety & security is important for offset projects because it limits the type of offsets that can be implemented. For example, installation of alternative energy (such as solar energy installations) as an offset intervention will be limited by the possibility that the panels and other equipment associated with such installations may be stolen. Thus, it is important to understand issues of safety and security in the area before implementing offsets. The next sections provide an overview of safety and security issues at district and local level.

4.9 District-wide safety & security issues

The GSDM IDP highlights the following as key issues pertaining to Safety and Security in the district at large:

- Poorly designed human settlements which increases the response time;
- RDP houses constructed with minimal or zero consideration of safety and security aspects for the inhabitants or their belongings;
- High number of liquor stores and their location in relation to other community amenities, of which more licenses, are still awaiting approval;
- Poor planning of taxi ranks across the district, with particular emphasis on location of local taxi ranks as compared to long-distance ones;
- Poor lighting in some of the areas coupled with conditions of roads particularly in rural areas;
- Lack of sufficient support by communities to community safety programs;
- Insufficient or lack of support by communities to provide evidence, report crime or information on crime;
- Lack of duty of care by some communities or taking precautions to prevent crime;

GSDM IDP states that GSDM together with the Department of Safety, Security and Liaison are continuously working together in ensuring safe neighbourhoods. The IDP reports that when community members in GSDM were asked about how they feel about their level of safety, DPKIS LM had the lowest number of households that felt very unsafe (Figure 12). Overall, communities in DPKISLM feel the safest compared to all other municipalities in the district.



	Albert Luthuli	Msukaligwa	Mkhondo	Pixley Ka Seme	Lekwa	Dipalesseng	Govan Mbeki
Very safe	31 208	26 650	23 599	14 762	16 372	8 778	32 813
Fairly safe	15 330	14 326	11 753	4 122	12 603	3 490	39 860
A bit unsafe	5 176	7 853	8 215	2 645	4 682	1 406	19 468
Very unsafe	1 754	2 241	2 028	1 017	3 609	1 186	16 597

Figure 12: Perceived level of safety by households in GSDM and DPKISLM (StatsSA Community Survey, 2016)

4.10 Crime in Ezamokuhle

A report by Nkambile (2016) indicated that that crime is a problem in some sections of Ezamokuhle in particular China 2 and Phumula sections. The major forms of crime seem to be theft and vandalism which should be noted for the implementation of offsets and associated monitoring devices. Residents attributed high levels of crime with the absence of streetlights. One participant was mentioned saying:

"*This place is not safe; in order to protect my car, I bought two big lights and I installed one in front of the house and the other one at the back. This makes it hard for the hooligans to tamper with my car or any other property*" (Nkambule 2016)

Theft and vandalism were also highlighted as major crimes during our discussions with informants. They indicated that the high levels of theft (in the form of house break-ins) and vandalism in associated with drug abuse by youth. They noted the high rate of drug abuse by the so called "*nyaope boys*". These are youth that abuse the drug called nyaope – which is a mixure of heroin and other odd substances. In order to feed their addiction, they break into other people's houses, and they vandalise community projects in order to derive anything that they can sell. So

far, the *nyaope boys* have vandalised a community hall and a stadium on that same account. The informants also attributed the high crime rates with lack of police visibility in the township.

Some residents rely on the indirect lighting coming from their neighbours' lights and/or the inadequate light from high mast lighting from other sections as a security measure. Respondents also pointed out that the crime rate and associated vandalism increases when there is electricity load shedding. Despite this, most households don't have burglar bars or secure fencing.

During Activity 8 of this project (household survey), most participants indicated that they were feeling generally safe (77%) in the area. That notwithstanding, 33 people reported being a victim of crime in the past year. Burglary was the highest crime experienced in Ezamokuhle, followed by muggings.

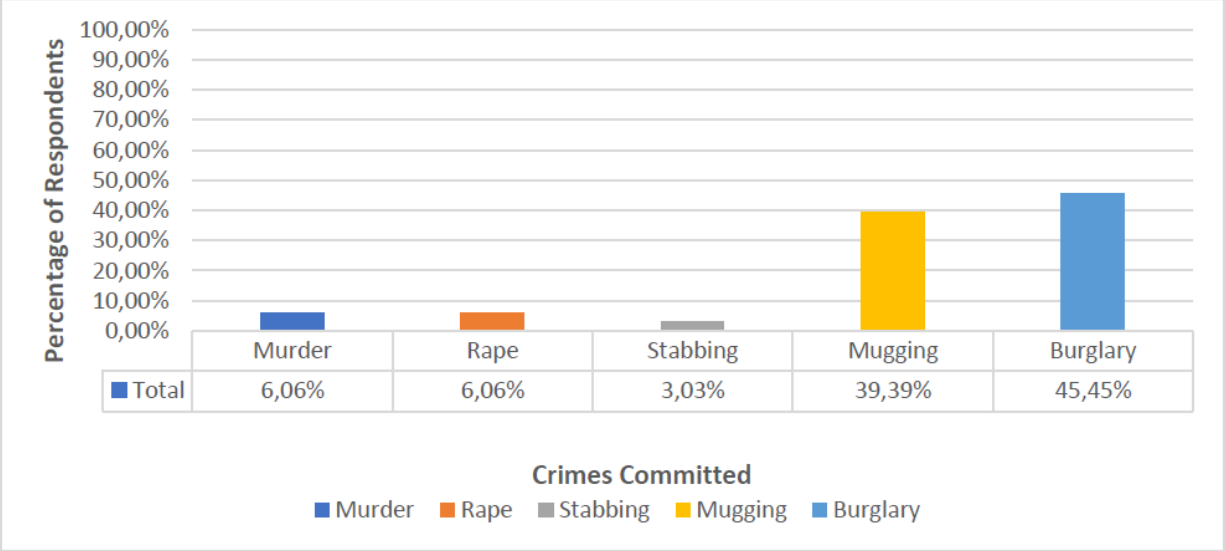


Figure 13: Crimes committed against households members in Ezamokuhle

Given the above, it is important that where Eskom's offsets consider the inclusion of expensive equipment, the safety of such equipment should be taken into consideration. However, given the fact that so far, Eskom is only considering installation of ceilings and gas stoves, there should be no safety concerns in this regard.

4.11 Human Settlements & Infrastructure

The type of human settlements and infrastructure has relevance for offsets in two ways. Firstly, where dirty fuels are used by the community that lives mainly in informal dwellings or shacks, it will not be easy to provide offsets interventions such as ceiling retrofits and provision of alternative energy stoves (e.g. gas stoves). Secondly, infrastructure challenges such as untarred roads can result in dust emissions which contribute to deterioration of air quality, which is counter to the impacts of offsets. In the following sections, the municipality-wide infrastructure and Ezamokuhle infrastructure profiles are provided.

4.12 Municipality-wide Infrastructure Overview

According to the GSDM IDP, the rate at which human settlements planning and development is taking place in the district is slower than the spread of informal settlements. Furthermore, human settlements planning in the district is mostly reactive than proactive. The majority of established townships are informal settlements that were subsequently formalised (formalizations) as opposed to being planned greenfield developments. In order to address these challenges, the district is supporting municipalities with technical studies to investigate the suitability of development sites to support the NDP outcome 8 program of transforming human settlements. Figure 14 below shows the number of households in the district that are in informal dwellings.

The district IDP notes that the bulk of the service delivery backlogs across the district coincide with informal settlements. This happens mainly in unplanned areas or land invasions in areas not planned for residential development.

Meanwhile at local municipality level (DPKISLM), according to the 2016 Community Survey statistical data, 81% (69 756 people) reside in a formal dwelling or house made up of bricks/ concrete block structure and 8% reside in a traditional dwelling, hut or structure made up of traditional materials whilst 0.4% resides in a flat or apartment located in a block of flats (Figure 14).

Number of households in informal dwellings		Share of total households	
2011	2016	2011	2016
1 448	578	7.3%	2.6%

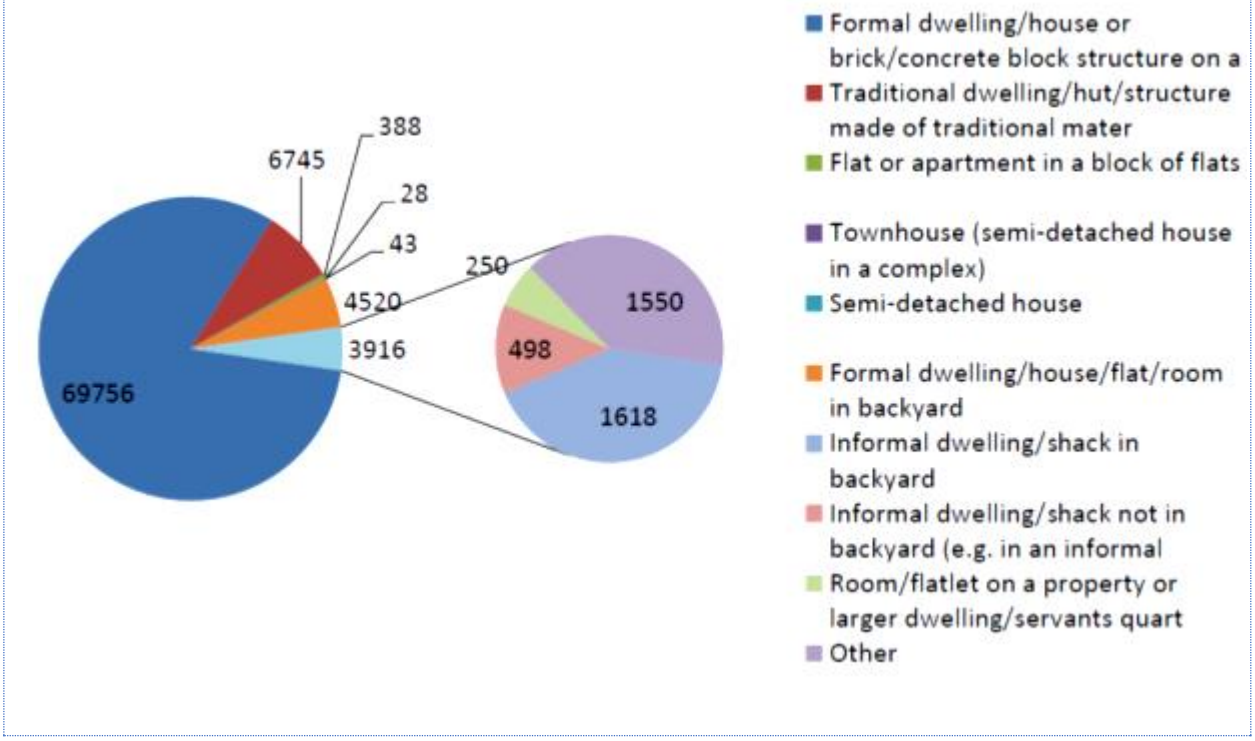


Figure 14: Dwelling types in DPKISLM (StatsSA 2016 community survey)

Amersfoort area has seen remarkable progress in the eradication of informal settlements. Phumula section used to be an informal settlement (called Emavarhini, meaning “in the shacks”) until 2013. There are now no informal settlements in Ezamokuhle.

4.13 EZAMOKUHLE INFRASTRUCTURE

- *Household dwellings & dwelling types*

The type of dwelling/housing structure determines the type of offsets that can be implemented in the area. For example, it has been established in the previous Eskom pilot studies that the majority of offsets interventions cannot be implemented in informal dwelling structures or shacks.

Physical observations from ARMs rapid in-situ assessment suggests that Ezamokuhle township comprises mainly of formal housing which accounts for approximately 97% of the entire housing stock, and are detached houses made of brick and cement. Formal housing in Ezamokuhle was built at different points in time with different building materials.

- **Houses built before 1994** under the apartheid regime for civil servants like teachers, prison warders, nurses etc. 4 roomed, asbestos and red bricks. These are located in the Roestein section of Ezamokuhle.
- **Houses built pre-1994 by residents.** These are houses made out of stone and cement. They have non-aesthetic designs but strong built. These are located in Madala site (which is part of Jabavu section).
- **First batch houses built by government post 1994 under the Reconstruction and development programme (RDP).** These are brick and mortar houses with corrugated iron sheet roofing. These houses are one room structures which were not finished according to the original plan as it is believed that government officials squandered the building funds designated for housing. These houses are mainly in Jabavu section.
- **Second batch of houses under the RDP.** These houses are better than the first batch of RDP houses, and they have 2 rooms. They are found mainly in China 1 and China 2 sections.
- **Houses built under the Breaking New Grounds (BNG) programme.** These are 4-roomed houses which represent an improvement to the RDP houses. They generally comply with most building requirements and they are found in Phumula section of Ezamokuhle.

As indicated, houses built as part of the initial RDP scheme were of poor quality and have cracks in the walls. Some households managed to fix the houses but most cannot afford to do so. The houses are also exceedingly hot in summer and very cold in winter because the building construction was compromised and the use of metal sheets compounding the problem. The extreme temperature conditions present an opportunity for insulation-based offsets that will negate the use of coal in winter for heating.

- *Backyard shacks*

Many households in Ezamokuhle have established back-yard shacks within their yards (Figure 15). The backyard shacks are generally made of corrugated iron sheets but there are also some made of stick, mud and plastic. Backyard shacks are used for two purposes, namely, shelter and generation income through rent. They may also used to accommodate visitors or as a store room for tools and old furniture. Indeed, some family members (especially male adult children) establish backyard shacks when they grow up. This is mainly because the living space in smaller RDP houses does not afford space and privacy as children grow older.

Figure 15: Example of backyard shacks

As part of Activity 3 (Rapid In-situ assessment) ARM flew an Unmanned Aerial Vehicle (UAV/drone), which provided very nuanced details of the dwelling types in Ezamokuhle. These are presented in Table 13 below.

Table 13: Descriptions of dwelling types in Ezamokuhle from UAV imagery

Ward	Zone	RDP houses	Stand-alone RDP Houses	RDP Housing with backyard dwelling	Mud Houses	Self-built Houses	Stand alone Big House	Big Houses with backyard Dwelling	Informal dwellings	Stand-alone informal dwelling	Informal with backyard	Houses with Satellite dish's	TOTAL
China 2	1	328	119	209	1	90	6	84	272	14	258	177	**692**
	3	276	66	210	1	62	15	57	286	22	286	145	**597**
Jabavu	9	5	0	5	16	70	2	68	227	18	227	65	**318**
Phumala	2	213	39	174	2	42	7	35	250	14	250	135	**507**
Roestein	5	11	0	11	0	132	6	126	119	10	119	59	**255**
	6	228	74	154	7	139	29	110	268	4	268	78	**642**
	7	50	10	40	9	210	17	193	144	17	144	75	**421**
	8	0	0	0	2	58	1	57	95	5	95	19	**151**
Smallville	4	24	0	24	0	104	3	101	129	6	129	62	**257**
TOTAL		**1138**			**38**	**887**			**2663**				**4726**

Overall, this table suggests that the majority (more than 50%) of formal household dwellings in Ezamokuhle have an additional informal dwelling in their backyards. This was also confirmed during the recent household survey. This is important for offsetting because if both the main house and the informal dwelling are using coal during winter, then providing a household with a gas stove and heater as part of offsets will only solve half of the problem. Similarly, where informal backyard dwellings are burning coal but the main house is not, the rollout of gas stoves and heaters in the main house will not solve the coal use problem. Hence it is important that the household survey (Activity 8) is done prior to the full rollout of offset interventions. Alternatively, a detailed household questionnaire must be completed by the household prior to retrofitting or stove swop.

- *Roads and transport system*

Bree street is the main tarred road that gives access into Ezamokuhle. The majority of the other minor roads are gravel but allow access to the stands. During our engagements with local informants, they indicated that while some roads are looks untarred, they are actually tarred roads that are poorly maintained by the municipality. Consequently, the quality of the streets is poor and unconducive for walking as there are no footpaths or pavements. As shown in Figure 16, when it rains it is hard to walk around because the roads become very muddy. Furthermore, during dry and windy periods, these roads generate dust which can aggravate local pollution /dust levels.

Drawing from the Sharpeville experience, the complications that dust levels on offsets interventions should be understood and considered in implementing offsets (Eskom, 2018).

Figure 16: Road conditions in Ezamokuhle

In terms of transport, the main form of transportation used by Ezamokuhle residents is minibus public transport which enables residents to travel to and from Amersfoort town/business district. This transport service also connects residents to other surrounding transport routes to areas such as Eskom Majuba Power Station, Volksrust and Ermelo. The main taxi rank is along Bree Street behind KwaSimelane shopping complex. Despite the fact that there is road transport infrastructure, many people in the study area walk to the CBD (Amersfoort town) in order to save money.

- *Health care facilities*

There is only one clinic in Ezamokuhle township and a hospital which is found in Amersfoort town called Elliot Ballot Hospital. The clinic is reportedly under-resourced such that, quite often, there is no medication available. This means that people suffering from even basic health problems, for instance cold and flu, are simply turned away without any medical attention (Nkambule, 2016). During the site visit, construction activities for a new private clinic were observed.

- *Education facilities*

There are three schools in Ezamokuhle - Amersfoort Combined Primary School (grade 1 to grade 7), Phumula Primary School (grade 1 to grade 4) and Hlelimfundo High School (grade 8 to grade 12). As indicated earlier, there is a very high dropout rate from school in Ezamokuhle and this perpetuates the poverty conditions in the community.

- *Community hall*

There is one community hall which is next to the local taxi rank in Bree Street, and which is used for public meetings and public events such as weddings and entertainment. Importantly, it was also used as a social grant payment point including for child support grants and old age pensions.

- *Shopping facilities*

There is a well-known shopping complex called kwaSimelane next to Bree Street. It comprises a bottle store, night club, tavern, fast food restaurant and a grocery store. Besides buying groceries here, residents also use the complex as a place for socialising. There are other bottle stores, taverns and spaza shops in different sections of Ezamokuhle.

This shopping complex can become a strong competitor to informal local merchants when, as part of this offset project, households switch from coal (which they normally buy from informal coal merchants) to gas. As the community move from coal to gas, the local coal merchants may not have capacity to fully transform their business to meet the new needs, making them less competitive in the sale of fuel. A fuel merchant survey was conducted by ARM indicated that competitive prices were charged by merchants for coal and wood, ranging from R100 to R160 per bag of coal, and R30 to R65 per bag of wood (ARM, 2022). Alternative fuels than coal and wood (such as gas and electricity) are perceived to be very costly but does not consider the poor coal quality and the unreliable supply of poor-quality coals to merchants, that provides fertile ground for change towards improved fuel quality. Eskom should note that any interventions that dissuade the consumption of coal may meet with resistance from this grouping. Substitution of economic activity of this group with for example. LPG supply and distribution will assist in building social cohesion and avoid potential resistance. To however achieve change, careful consideration is required to develop suitable financing models (such as credit) for fuel supply and to communicate benefits of insulation and cleaner fuels to the community.

- *Sports facilities*

There are only two playgrounds found in the study area. One is found between Roestein and Jabavu sections adjacent to the railway line and the mountain. This playground used to be fenced and there were change rooms and toilets, but all these have been vandalised. The other playground is in China 2 next to the taxis' main stop. The playground is not covered with grass; such that when it is windy there is dust and when it is raining the field becomes muddy. Both playgrounds are not well maintained. There is an opportunity via the offsets intervention roll-out to potentially reduce fugitive dust emissions herein.

- *Other*

Other pertinent public facilities are telecommunications and cemeteries. There is telecommunication infrastructure for mobile cell phones for private companies notably Vodacom, Cell C and MTN.

4.14 WASTE SERVICES

In Ezamokuhle, door-to-door garbage removal service is provided twice per week. During the household survey undertaken as part of this project, 93% of the surveyed households indicated that they receive municipal waste collection services from outside the house, once a week. They considered the collection service as reliable. However, in instances where waste is not collected for one reason or the other, the homeowner burns the waste or takes the waste to the waste dump Figure 17.

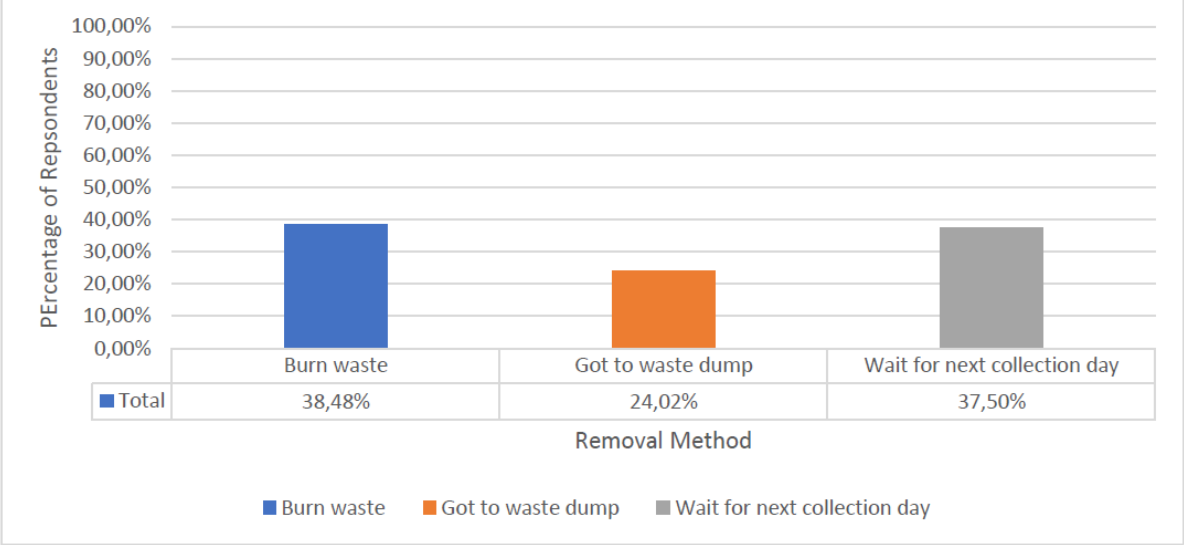


Figure 17: Alternative waste removal methods for uncollected waste

During the rapid in-situ survey and community source survey, the project team noted evidence of littering (Figure 18). The team also observed cases of waste burning. These observations were concerning because both littering and burning of waste are prohibited by the by-law (GSDM, 2017) and they contribute to air pollution.

Local informants indicated that the reason for littering is that sometimes residents forget to place the bin in front of the house for collection; and since they can't keep the dirt in their homes, they dump illegally. The other reason is that the municipality only collect domestic waste and that some of the litter could be from garden or other types of waste not collected routinely by council.

Figure 18: Example of illegal dumping activities in Ezamokuhle

Although illegal dumping of waste and consequential burning of waste is not a regular occurrence in Ezamokuhle, it presents a low-hanging fruit for offsets because remedial interventions can be implemented quickly and at less cost. Eskom can, as part of its holistic approach to offsetting provide skips at one or two dump sites and make arrangements with local municipality to facilitate collection skip collection at regular intervals.

4.15 WATER AND SANITATION

According to the DPKISLM IDP (2017-2022), 97% of households in the municipality have access to sanitation. Similarly, in Ezamokuhle, almost all households have access to sanitation. Despite this, toilets in Jabavu and China 2 though were reported to be faulty (Nkambule, 2016). Most of these toilets were not flushing and residents were required to use a bucket of water in order to flush properly. Local informants indicated that the major challenges that are facing with regard to water and sanitation are that:

- The municipality is dragging feet when it comes to fixing sewage blockages when they occur.
- Sometimes the community experience prolonged water shortages (up to a week) without any explanation from council.

4.16 ENERGY

All houses in Ezamokuhle are electrified. However, lessons from Kwazamokuhle and Sharpville offsets baseline assessments and pilots (Eskom, 2017, 2018) have shown that the availability of electricity does not mean wide use of electricity, especially in winter months. High poverty levels means that most households do not have enough money to buy sufficient electricity to last them all month, especially in winter months when household energy demands are high. During these periods, households use coal and other dirty fuels for cooking and space heating, which result in increased air pollution levels.

The results of household survey undertaken as part of this project showed that most households in Ezamokuhle use electricity as their main energy source for cooking, while only 4% reported that LPG is used as the main source of energy for cooking. Firewood is used more often than LPG for cooking with 16% of households using mainly wood, coal is used by 24% households as the main cooking fuel.

For heating, most households use electricity (38%), firewood (14%) and coal (26%), and only 8% use LPG. Virtually all households (99%) use electricity for lighting, rarely using any other source of energy as an alternative for light.

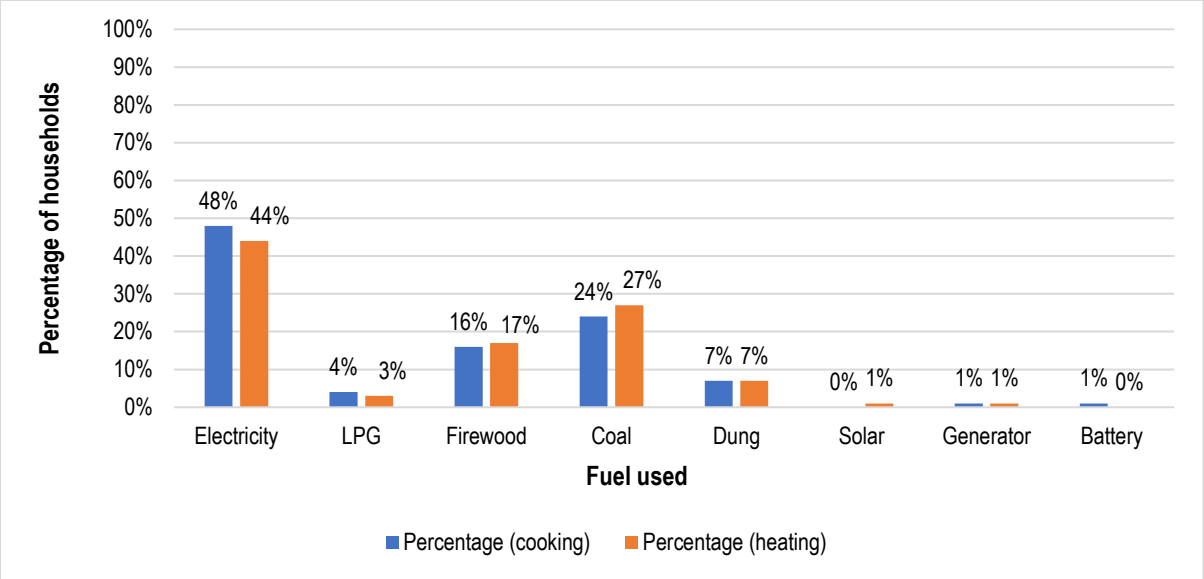
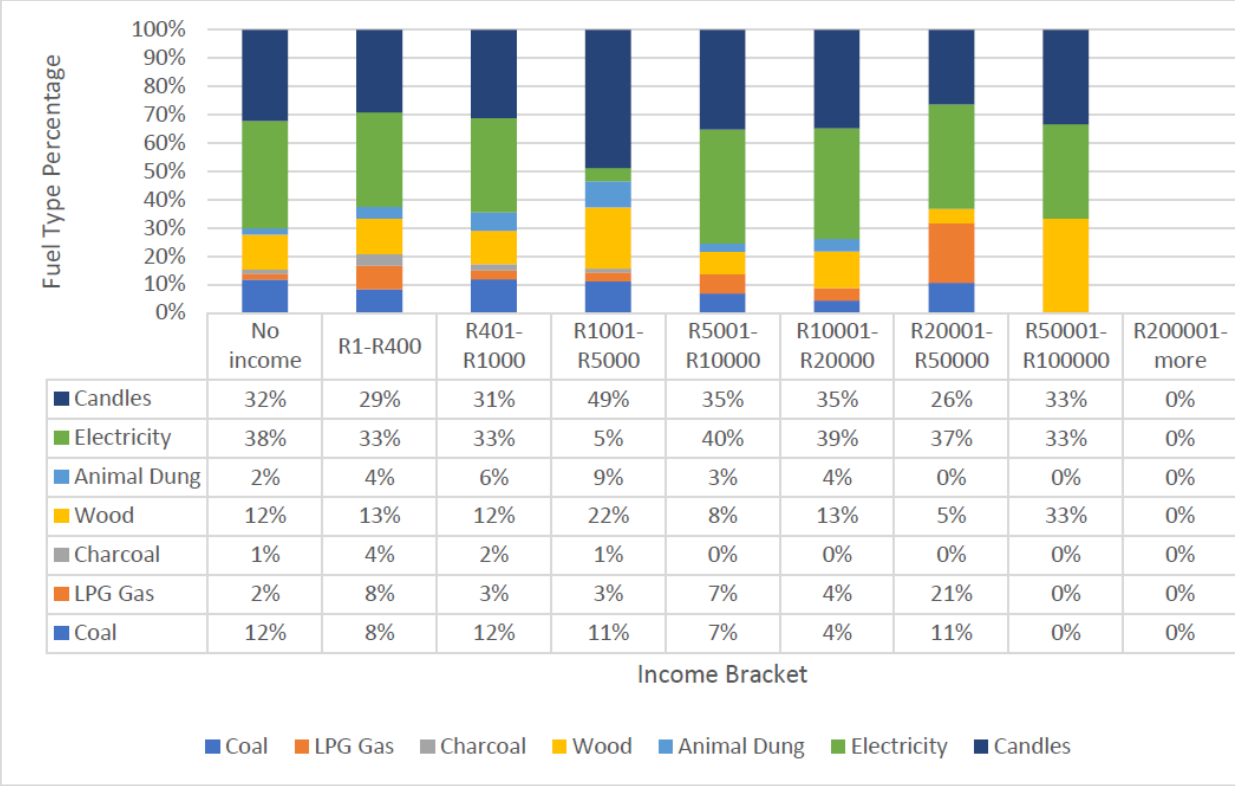


Figure 19: Household energy use for cooking and heating in Ezamokuhle

The choice of energy carrier is often influenced by household income levels. Such that those in the lower income brackets who cannot afford cleaner energy sources such as electricity and LPG tend to use dirtier fuels such as cola, wood and dung. The results of the household survey shows that those in the over R20 000 -R50 000 income bracket use more cleaner energy carriers (electricity and LPG) than those in the lower income brackets Figure 20. Surprisingly, those in the much higher income brackets have much higher usage of wood in their energy mix.



	No income	R1-R400	R401-R1000	R1001-R5000	R5001-R10000	R10001-R20000	R20001-R50000	R50001-R100000	R200001-more
Candles	32%	29%	31%	49%	35%	35%	26%	33%	0%
Electricity	38%	33%	33%	5%	40%	39%	37%	33%	0%
Animal Dung	2%	4%	6%	9%	3%	4%	0%	0%	0%
Wood	12%	13%	12%	22%	8%	13%	5%	33%	0%
Charcoal	1%	4%	2%	1%	0%	0%	0%	0%	0%
LPG Gas	2%	8%	3%	3%	7%	4%	21%	0%	0%
Coal	12%	8%	12%	11%	7%	4%	11%	0%	0%

Figure 20: Energy mix across different household income levels in Ezamokuhle

Since most people in Ezamokuhle are unemployed and some do not have any source of income, they qualify for a limited free basic electricity in terms of government indigent policy. The indigent policy provides basic services for people with an income less than R3,500 per month. Our conversation with local informants revealed that most of the indigent people that are supposed to receive free basic electricity are not getting it. The community development worker indicated that even after several attempts to register indigent households for electricity, the households are still not receiving such.

4.17 Potential Growth Footprint Of The Township

Development of new areas can, depending on their nature, have an impact on air quality. For example, development of new sections of the township in the absence of proper services can result in an increase in the number of households using dirty fuels, which can negatively impact on air quality and regress the progress made in this regard by air quality offsets interventions. Currently, there is no indication of newly planned settlements near Ezamokuhle. However,

drawing from the GSDM IDP, it is known that development can occur informally without any recorded plans (land invasions).

According to the DPKIS SDF (2019), there are currently 60 hectares or land available for development in Ezamokuhle/Amersfoort area. These are the stands that according to the SDF should be made available to address the housing backlogs. The local municipality is trying to determine the ownership status to determine if these have to be bought, in the event of private ownership, or can easily sell these off if they are municipality owned.

In the past 10 years there have been new developments that took place in Ezamokhuhle, while no new developments occurred in Amersfoort town (Figure 21). The area to the north-west and western parts of Bree Street have experienced a few developments of this period. The pattern looks like it has taken a formal township establishment process.

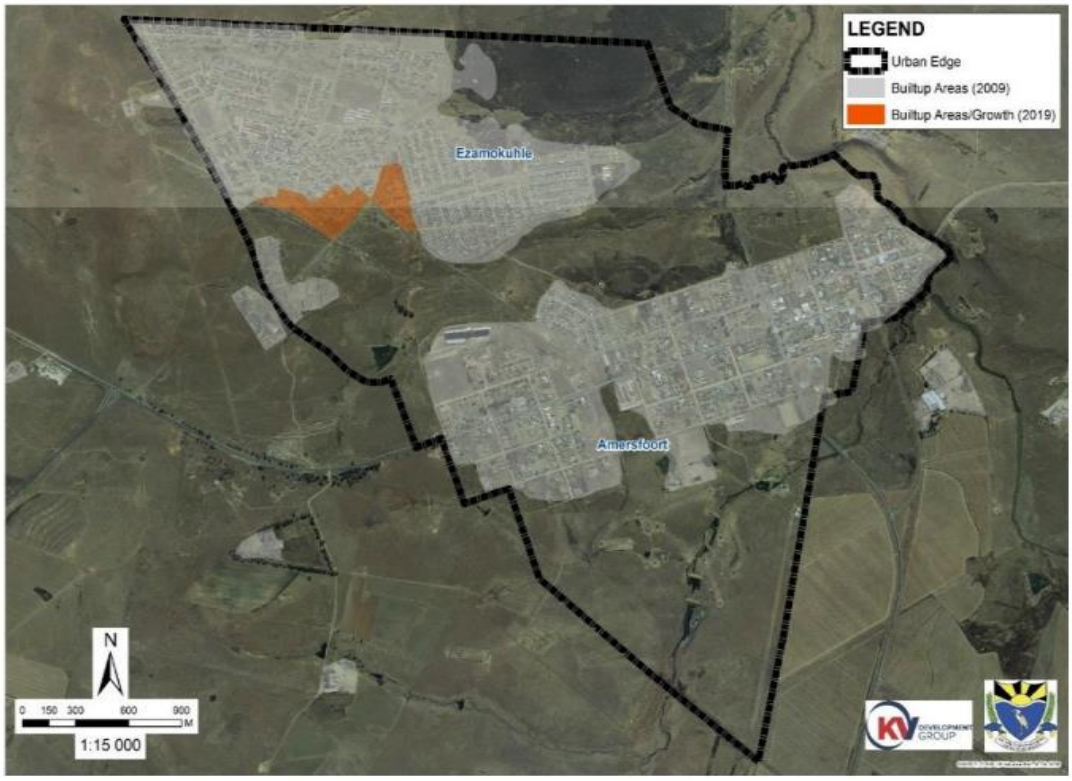


Figure 21: New developments in Ezamokuhle between 2009-2019 (MCOGTA, 2020)

According to DPKISLM SDF, Amersfoort and Ezamokuhle probably have the best opportunity to be fully integrated with each other spatially but unfortunately, the floodline between the two towns greatly restricts full integration. The proposal from the IDP is that future expansion of Ezamokuhle should occur on the eastern part of the township, in line with the proposed activity spine with connection to the N11 road. Other possibilities for future expansion of Amersfoort are in a western direction adjacent to Amersfoort Extension 7 on the western outskirts of the town, but this can only be proposed once the existing vacant stands and densification opportunities in the existing town have been exhausted.

The project team will continue to monitor any developments with regard to informal settlements that may threaten the sustainability of the project. Such developments will be recorded for the duration of the PMV project so that any regress in measured improvements associated with offsets should take into account such developments.

4.18 Key Community Concerns

4.18.1 Municipal-wide community concerns

In implementing offsets in communities, it is important to understand what other community concerns are because such concerns can affect the perceptions and attitude of the community around offsets interventions. At district level, the 2016 Community Survey suggest the 5 leading community concerns in GSDM are as follows:

a) Lack of safe and reliable water supply.
b) Lack of/inadequate employment opportunities.
c) Inadequate roads.
d) Cost of electricity.
e) Cost of water.

4.18.2 Ezamokuhle community concerns

As part of the development of the 2022 to 2027 DPKISLM IDP development, the municipality consulted the community of Ezamokuhle to understand their needs. The following are some of the needs are highlighted in the IPD:

- Provision of residential stands for Indigent people and low income earners;
- Water and Sewer reticulation in Amersfoort;
- Paving the road to the DLTC from the main road;
- Water Taps and Toilet Top Structure in ext4 – Ezamokuhle;
- Rehabilitation of roads;
- Fire station or fire extinguishing truck;
- Disposal of vacant sites; and
- Land for Agro-based projects LED.

Some of the issues raised, such as paving and rehabilitation, are of relevance for offsets. The rehabilitation of roads will reduce dust emissions thus contributing to air quality improvements, which is the aim of offsets.

4.18.3 Ezamokuhle concerns regarding offsets

In September 2021 Eskom held a meeting with Ezamokuhle community at 2 community halls in Ezamokuhle township. The purpose of the meeting was to introduce Eskom's offset project to the community and introduce the various service providers that will be responsible for implementation and monitoring of the project. Eskom emphasised that the project will employ locals for all unskilled labour requirements. In the same meeting, ARM presented to the community what the PMV component of the project will entail.

Overall, the community welcomed the project without anyone challenging the need for the project. Community members asked a number of questions for clarity, but the following were relevant questions:

- What happens if a household is using a coal stove in the main house but uses imbawula in the backyard house/shack?
- Whether there will be door-to door registration of participants?
- Whether after the stove is provided, Eskom will provide free or subsidized fuel?
- Whether employment of field workers will only consider the youth (under 35) or everyone eligible for employment.
- Anticipated commencement date of the project

In response to these questions Eskom provided the following clarity:

- Only a coal stove will be swapped, not imbawulas.
- Registration will be through PMO office which will be established.
- Employment of field workers will be transparent.
- There will be no free fuel provided.

5 PLANNED ACTIVITIES

5.1 POTENTIAL FOR LARGE DEVELOPMENTAL INVESTMENT IN DPKISLM

There are currently no big infrastructure investment projects planned in DPKISLM or Ezamokuhle. This is because according to the National Spatial Development Perspective of 1999 (NSDP), DPKISLM is not classified as an area of high economic activity. The NSDP delineates a number of guidelines for infrastructure investment in South Africa. The rationale behind the guidelines is rooted in the argument that instead of investing in physical infrastructure to improve the quality of life of people living in low productivity areas, government should rather invest in people. The logic of the latter argument is that investing in people is a more efficient use of government resources. The argument made is that investing in people potentially results in increased opportunities and choice to relocate to high growth areas. Meanwhile, investing in places can leave people trapped in low growth areas without any guarantee that this will attract new investment into the area. In essence, the NSDP argues that government's social objectives will be best achieved through infrastructure investment in economically sustainable areas with proven development potential.

By applying and contextualising the NSDP in the Mpumalanga Province, and drawing from the Mpumalanga Growth and Development Strategy, the GSDM IDP outlines the following in terms of variations in social need (poverty), economic activity (potential) and environmental sensitivity.

In essence, DPKISLM (which is the municipality where Ezamokuhle is located) is not an area of with potential economic activity and therefore government will invest in its people rather that creating big economic development investment.

Table 14: NSDP Classification for selected municipalities in Gert Sibande in terms of investment

	NSDP Classification	Municipal Name
A	High Levels of Economic Activity (Potential)	Govan Mbeki LM and Lekwa LM
B	High Levels of Poverty Concentrations	Albert Luthuli LM, Mkhondo LM, Pixley Ka Isaka Seme LM, Lekwa LM, Msukaligwa LM, Govan Mbeki LM and Dipaleseng LM
C	Area of Combined Poverty and Economic Activity	Govan Mbeki LM, Lekwa LM, Msukaligwa LM, Albert Luthuli LM Mkhondo LM, Dipaleseng LM and Pixley Ka Isaka Seme LM

5.2 Potential for Development According to GSDM Strategic Objectives

Despite the absence of planned big infrastructure projects, there are planned projects in DPKISLM outlined in GSDM IDP. The GSDM IDP identified strategic objectives, each with key performance areas (KPAs). The most relevant is in relation to offsets are KPA 2: Basic Services Delivery and Infrastructure Development and KPA 3: Local Economic Development. Some of the programmes under these KPAs which are relevant for offsets are:

Electricity:

- Co-ordinate intervention measures in conjunction with LM's and relevant authorities to ensure that all new constructed houses are connected to electricity.
- Assist LM's with planning to provide funding to be allocated on projects that require bulk electrical infrastructure so as to eradicate the remaining backlogs.
- Co-ordinate intervention measures for municipalities to improve revenue collection on electricity services, as well as compel municipalities to budget adequately.
- Co-ordinate intervention measures to assist municipalities to supply reliable electricity with minimal interruptions on electricity infrastructure.
- Co-ordinate intervention measures to reduce non-technical losses within the distribution system.

Roads

- Rehabilitation of paved / tarred roads.
- Patching of potholes in all LMs as per approved funded schedules.
- Implementation of gravel road maintenance programme.
- Continuation of road blading and re-gravelling.

Evaluate merits of incorporating these activities in the EPWP.Waste

- Coordinate and facilitate programs to improve waste management services & implementation of waste sector plans.
- Implement integrated Waste Management Plan throughout District.
- Development of a recycling strategy for domestic and agriculture sectors.
- Purchase additional bulk containers and replace old fleet.
- Reduce incidence of illegal dumping through the enforcement of waste by-laws.
- Monitoring non-compliant landfill sites and discuss waste management measures.

Environment

- Conduct clearing projects in terms of identified invasive flora species.
- Improvement Inter-sectoral collaboration and partnership through the IGR forums.
- Coordinate and facilitate programs to implement environmental sector plans.
- Enforcement of relevant by-laws, specifically illegal dumping.
- Implementation of strict pollution control.
- Monitoring of water quality, air quality management, noise management and improve management strategies.
- Conduct awareness campaigns on environmental issues, including strategies to combat climate change through the mobilisation of environmental groups.

Other strategies include the following:

- Providing resources to assist with the capacitation of local business organizations;
- Developing infrastructure and facilitate establishment of appropriate institutional arrangements to facilitate access to markets;
- Development of the Workplace Skills Plan
- Developing and implement mentorship and incubation programmes for emerging entrepreneurs;

- Entering into strategic partnerships with private sector in order for local business association to leverage on existing resources e.g. SASOL Enterprise Development programmes, Anglo Zimele, ESKOM SMME Hub; and
- Improve support to SMME's and Cooperatives through among others access to finance.

NOTE: No specific projects are planned regarding air quality and pollution control in the IDP. The section on air quality and pollution control programmes (page 57) is left blank.

5.3 Planned Projects For Ezamokuhle As Per GSDM IDP& DPKISLM IDP

The DPKISLM IDP provides a list of planned projects in the local municipality. Only one project was planned in Ezamokuhle in 2022/23 financial year, and it involves Water Reticulation with House Connections. The following projects (Table 15) are planned for implementation in 2022 according to the IDP.

Table 15: 2022 Planned projects as per DPKISLM IDP

NAME OF THE PROJECT	CAPITAL BUDGET 2022/23FY
Provision of Water to Communities in Private Farms Phase 3 (Boreholes)	R2 000 000.00
Water Reticulation with House Connections Ezamokuhle WAR 7&8	R3 000 000.00
Refurbishment of Amersfoort Water Treatment Works	R3 049 060.50
Construction of Sewer Reticulation Networks in Vukuzakhe Ward 1	R2 000 000.00
Sewer Reticulation network Wakkerstroom , Ward 5	R2 000 000.00
Construction of Paved Roads and Storm Water Drainage in Ward 1 and 3- Vukuzakhe	R2 000 000.00
Construction of Paved Roads and Storm Water Drainage in Ward 5 –Wakkerstroom	R1 254 835.93
Construction of Paved Roads and Storm Water Drainage in Ward 11- Daggakraal	R1 254 835.75
Construction of Paved Roads and Storm Water Drainage in Ward 9 - Daggakraal	R1 254 835.75
Refurbishment of the Vukuzakhe Waste Water Treatment Works – Ward 3	R 2 721 531.75
The Development, Upgrading and Refurbishment of Sport Facilities in Vukuzakhe Ward 1, 2 and 3, Ezamokuhle Ward 7 and 8 and Daggakraal Ward 11	R1 5000 000.00
Construction of Toilet Top Structures in Rural Areas	R 2 000 000.00
Construction of Water Reticulation Network Complete with House Connections in Ward 6 –Siyazenzela	R 2 000 000.00
AFR, Construction of Toilet Top Structure with Septic Tank for Hlanganani Trust and Daggakraal	R2 300 000.00

6 SECTOR LANDSCAPE

6.1 DEFF REGULATORY & POLICY LANDSCAPE

As indicated in the introduction section of this report, Eskom was granted a postponement of compliance timeframes and required to implement offset interventions. The postponement was granted as per regulations published in terms of section 21 of AQA i.e. Listed Activities and Minimum Emission Standards. As such, the implementation of offsets is governed by these regulations and other policies and regulations under the AQA. Any developments in such legislation will have an impact on the direction that companies take with regards to offsets. Specifically, the regulations and plans in Table 16 will have a bearing on offsets.

Table 16: Legislation and policies that have impacts on offsets

Legislation/policy	Description and Implications for offsets
National Framework Review and AQA Section 21 MES regulations	AQA Section 21 regulations set MES and set conditions for postponements, which are the basis for offsetting. The revised regulations suggest that no postponement will be granted beyond 2025. The implications of these for offsetting are uncertain. *Implications:* Any revisions to MES regulations may result in changes to offsets requirements. In light of the currently review of the National Framework for Air Quality Management, the project team forsee changes to Section 21 regulations around postponements, alternative limits and therefore offsets.
Revision of Highveld Priority Area (HPA) Air Quality Management Plan (AQMP).	DEFF has developed the draft HPA AQMP (unpublished). The AQMP define interventions that public and private entities must implement in order to improve air quality in the HPA. *Implications:* The AQMP makes specific expectations and requirement for industries. Some of those requirements may be of more priority than offsets requirements. Thus, the type of requirements posed by the AQMP may affect Eskom's resource and financial prioritisation of offsetting vs other emission reduction interventions, or affect prioritisation of location where offset interventions should be implemented.

Legislation/policy	Description and Implications for offsets
Priority are regulations	The DEFF has published the draft Regulations for Implementing and Enforcing Priority Area AQMPs in August 2022. The purpose of the regulations is to ensure that conditions set out in the Priority Area AQMPs are legally binding. *Implications:* As per priority area AQMP above.
Strategy to Address Air Pollution in Dense Low Income Communities	The strategy sets out interventions that government and private sector needs to take in order to improve air quality specifically in low-income communities. Offsets are listed in the strategy as one of the means to achieve this objective. *Implications:* The strategy makes provision and recommendations for partnerships between government and private organisations such as Eskom. If implemented properly, such partnerships could yield up-scaling of existing and planned offsets projects.
Carbon offsets regulations	The regulations sets conditions under which carbon tax rebates can be claimed for implementation of certain carbon offsets. *Implications:* Eskom can consider community offsets projects that enable it to claim carbon tax allowance by implementing offsets that can have both AQM and climate change mitigation benefits.

Overall, the one major sectoral change during 2022-2024 period was the publication of the draft regulations for Implementing and Enforcing Priority Area AQMPs. The implications of these regulations for Eskom will only be fully understood once both the final regulations and the HPA AQMP are promulgated. The DFFE has also initiated the process of reviewing the National Framework for Air Quality Management, which may result in concomitant changes to the AQA Section 21 regulations, and subsequently, the legal standing of offsets.

So far, there was no information that suggests that these changes in legislation will affect Eskom's offsets implementation in Ezamokuhle, Kwazamokuhle or Sharpeville. ARM will continue to monitor any developments on these and any other policies that may influence the implementation of offsets as the project continue.

6.2 Integrated Resource Plan (IRP)

South Africa's Integrated Resource Plan highlights the country's intentions to decommission various units of Eskom power stations (Grootvlei, Arnot, Hendrina, Camden, Komati, Acacia and Port Rex) from 2022. This can have implications for Ezamokuhle community. During our discussions with local informants, it was mentioned that coal merchants from Ezamokuhle travel as far as Ermelo to collect coal for sale to community. This means that there are mines near Ermelo, possibly supplying coal to Camden and Amajuba stations, that are also supplying coal to Ezamukuhle coal merchants.

The decommissioning of power station (like Camden) is therefore likely to results in increased coal availability for community-based coal merchants. This is a threat to offsets because it can lead to much cheaper coal prices which will be more attractive for poor households. When coal is cheap and freely available, the use of offsets interventions such as gas may be compromised.

6.3 Other Organizations Implementing Air Quality Offset Projects

Eskom is not the only organisation that has been given a requirement to implement offsets. Based on ARM's knowledge, over 20 facilities were given postponements of MES, and according to the offset guideline, these companies were supposed to be given a requirement to implement air quality offsets. Currently, it is not clear how many of these industries have been given such a requirement and how many have actually made advances in terms of offset implementation. ARM's investigation shows that there are approximately 8 facilities that have submitted offsets implementation plans that are at various stages of approval by DEFF (Table 17).

Table 17: Implementation of offsets by other companies

Company	Location	Details and status
Eskom	Ezamokuhle Kwazamokuhle Sharpville	Lead implementation phase: **Households:** insulation and stove provision in Ezamokuhle and Kwazamokuhle **Waste management:** planned interventions in Sharpville
Sasol Sasolburg	Zamdela, Amelia and Iraq	**Waste:** Improvement in waste collection through the introduction of more than 70 waste skips. To date in excess of 10 000 tons have been successfully removed from these areas. **Veldfires:** Fire fighting vehicle to assist local authorities with veldfires in the Sasolburg region.
Sasol Secunda	Embalanhle	**Households:** Insulation and stove swap for approx. 1200 homes in Embalenhle Veldfires: Cutting of grass in Embalenhle to reduce grass burning.
Anglo Mortimar	Rustenburg Polokwane	No information found
Terris Chrome Smelter	Waterberg region	No information found
PPC	No information found	No information found
Northern Platinum	No information found	No information found
Impala Platinum	No information found	No information found
Consol	No information found	No information found

This information will be continuously updated as strides are being made to obtain further details. To ARM's knowledge, DEFF was supposed to keep an offsets register which is a compendium of air quality offsets implemented in the country, as well as the implementation status and agent for each offset. Such a register is currently not available (to the public).

Of the companies above, only a few (Sasol and Eskom) presented the outcomes of their offsets in public. Not much is known about the successes and challenges faced by other companies in

the implementation of offsets, and lessons learnt. From Eskom and Sasol's publications and NACA presentations, the following lessons can be learnt regarding offsets and their implementation:

Theme	Lessons learnt
Insulation interventions	- Poor construction of RDP houses poses challenges for installation of insulation. Retrofits require fixing of roofs.
Energy source interventions (Cooking and heating)	- Gas stoves are generally acceptable by beneficiaries - Kitchen king offers a warmer and lower emission alternative to currently used stoves, however the stove cracks over time, reducing its efficiency in terms of emissions. This makes Kitchen King less value (in terms of air quality improvement) for money. - An electricity subsidy without removing coal stove only increases coal use.
Sustainability	- To ensure sustained use of alternatives, households should not pay more after the intervention for the same domestic energy utility (e.g. for cooking, space heating and water heating) than before the intervention. - Air quality improvements associated with offsets may not be sustained if new informal settlements develop near the area of implementation. This may actually reverse the situation. - A post evaluation of a household intervention implemented as part of Sasol Secunda's air quality offset programme intervention was conducted in 2023 and included a survey of a representative sample of 507 participating households. It also included open-ended individual interviews with a selection of household representatives, and a survey of a control group of initially contracted households that had not yet received the intervention. The most important finding is that 97% of intervention addresses remain coal free, three to five years on.
Willingness	- Residents were very willing to participate in all interventions (>80%) and did not want their old coal stoves back at the end of the pilot project (Kwazamokuhle pilot).

General	- Dual interventions (e.g. stove swop AND housing insulation) are needed to reduce domestic coal burning. - A solution is still needed for households that live in informal dwellings. Sasol has made trials with insulation of 24 serviced informal houses/shacks with polyurethane foam which didn't work due to safety and practicality concerns.

6.4 Community Perceptions

Equally important as the scientific robustness of offsets is the acceptability of offsets by users/communities. Given the novelty of air quality offsets, not much has been gathered about offsets from the lens of the community. That notwithstanding, following the implementation of air quality offsets pilot in Kwazamokohle, Eskom and NOVA undertook a follow-up exercise (between October 2016 and March 2017) aimed to understand user opinions about the pilot interventions in 120 households, which comprised of either:

- LPG – basic retrofit
- LPG – full retrofit
- Kitchen King – basic retrofit
- Kitchen King – full retrofit

The impressions gained from the follow-up interviews with households that received interventions were that:

- The general mood is positive to very positive, even where there are certain complaints about aspects of the interventions.
- The ceilings are highly appreciated because of the thermal comfort and the reduction in leakages in the roof, although there are many complaints about technical aspects of the ceilings. A few mention that it keeps the dust out.
- The improvement in indoor temperature is attributed to the ceiling and very seldom to the wall cladding.
- There isn't any difference in the enthusiasm of residents whose houses have received only basic retrofit insulation and those who have received full retrofit.

- Although both are seen as positive, there seems to be more enthusiasm for LPG than for the Kitchen King. The LPG stove was regarded as clean and quick, the gas lasts for a long time (in the case of cooking, not heating) and it saves electricity. There is still some fear that LPG is dangerous, and one can run out of gas.
- The general feeling about the Kitchen King is positive, it is a warm stove and the warm water is convenient. There are a variety of problems with one fundamental problem: some Kitchen King stoves have already developed cracks. This is important because the cracks become worse over time and the changed air flow could make the stoves less efficient in terms of emissions.
- After a year (2 winters), maintenance was already required, especially for the ceilings and the Kitchen King stoves.
- LPG could be made more accessible – a local distribution point that accepts all cylinder brands would be welcome.
- There are few indications that residents take ownership of the interventions, implying that individual households do not experience themselves as able to do maintenance.
- There are several indications that residents are, at best, uncertain about who is responsible for maintenance.

In a meeting between KwaZamokuhle residents and Eskom to introduce the Lead implementation phase of the project (04 November 2020), residents were generally welcoming of offsets but noted the following:

- ***Solar-based interventions:*** Community recommended that solar-based interventions must be considered because they have a challenge of not being able to afford gas to fuel gas stoves and heaters. One person mentioned that "*the elderlies cannot use gas and more so, they cannot afford gas that is sufficient to last a month*". Hence, there was a proposal that offsets interventions should consider combination of gas with solar.
- ***Monitoring and evaluation:*** Community members also noted that since the previous service providers left the devices, no one came to check if things are still working in order. They mentioned that they were promised free gas supply for 6 months but after 2 months there was no more free gas.

In addition to the above, community expectations in the Eskom Lead Phase and subsequent phases need to be managed.

In December 2023, ARM conducted *an Annual Household and Monitoring of Project Effectiveness Survey* on 403 households in KwaZamokuhle and 401 households in Ezamokuhle (ARM,2024). All households that were sampled received the full Eskom AQO intervention suite. Whilst ARM is still busy undertaking the relevant statistical analysis for the Ezamokuhle respondent dataset, the results for the Kwazamokuhle households are presented herein. Its was clearly evident from the Project Effectiveness Survey that 99% of the households in Kwazamokuhle viewed the Eskom provided interventions (stove, LPG heater & celling) as of good quality. Additionally, 99% of the households would recommend the LPG heater installation to other households who had not participated as yet in Eskom AQO intervention project. Respondents also provided feedback that it was both cheaper (91%) and quicker (98.6%) to cook on the Eskom provided hybrid stove as opposed to a traditional coal stove. Furthermore, 99% of the respondents indicated that food tasted the same as a meal cooked on a traditional coal stove. From the 403 households surveyed in Kwazamokuhle, only 12 households indicated that they were unsatisfied with the Eskom AQO intervention. An overwhelming majority (84%) responded that were completely satisfied with the Eskom AQO intervention as it improved their quality of life for the household.

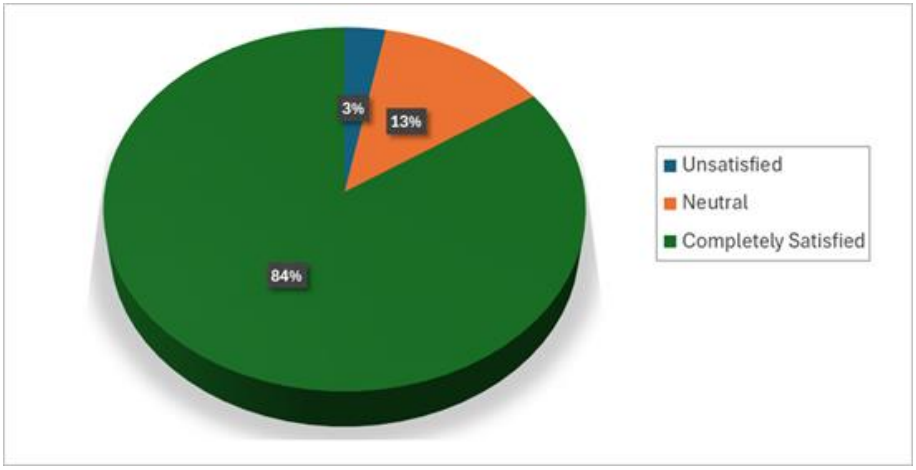


Figure 22: Kwazamokuhle household satisfaction with Eskom AQO intervention

7 SWOT ANALYSIS

7.1 MUNICIPAL-WIDER SWOT OVERVIEW

As part of the Study, a SWOT analysis was undertaken in order to understand different conditions that are favourable or unfavourable for implementation of offsets in Ezamokuhle. At a district level, GSDM had undertaken SWOT analysis as part of their IDP processes. Table 18 outlines the IDP-listed SWOTs that are relevant in the context of offsets.

Table 18: SWOT analysis undertaken by GSDM for the IDP

SWOT	Description
Strengths	• *Capacity:* DM has a well capacitated organisational structure and filled positions. The DM has also appointed an Air Quality Officer, which means all offsets will be recognized against Eskom's Atmospheric License (AEL)
Weakness	• *Capacity:* Inability to attract and retain professionals at the local government • *Monitoring:* lack of monitoring of the work done by and in the municipalities. • *Service delivery*: Insufficient funds to meet all service delivery requirements. Service delivery related funds and not adequately utilised by municipalities. • *Inadequate implementation:* Approved policies (including economic growth strategies) are not adequately implemented. • Inadequate integrated human settlement planning: There is no alignment of strategic documents e.g. IDP and SDF; as such human settlement not properly planned to account for long term requirements.
Opportunities	• Political stability which is good for investment. • Education and skills development: Free education.
Threats	• Informal settlements arising from in-migration from rural areas. Informal settlements and illegal developments are outpacing the capacity for meet all demands in a sustainable manner. • Misinterpretation of the "Land Expropriation Without Compensation" Policy: Uncontrolled land grabs.

	• Loss of revenue by LMs. • High unemployment rates and lack of skills among youth and generally poor economic growth.

7.2 SWOT Analysis: Ezamokuhle

The project team undertook a separate SWOT analysis specifically for Ezamokuhle based on information gathered and presented above in this Area Intelligence report. The focus was on aspects that present SWOTs for the roll out, implementation, execution or success of air quality offset interventions in Ezamokuhle. The analysis is presented in Table 19 below with descriptions. The identified threats will be monitored and reported on regular basis.

Table 19: SWOT analysis for implementing offsets in Ezamokuhle

SWOT	Description
Strengths	*Dwelling types* As indicated in section 4.11 above, the majority of houses in Ezamokuhle are formal. This is favourable for air quality offsets because the proposed interventions such as gas stoves and ceilings would be difficult or unsafe to implement if the houses were made of informal structures. *Community development workers* Ezamokuhle has resident community development workers whose responsibility is to link the community with relevant departments and support projects. These community development workers are best suited to provide guidance on household dynamics throughout the implementation of the offsets project.
Weaknesses	*Quality of housing:* As indicated earlier in section 4.11 above, houses in Ezamokuhle have different structural qualities. Especially houses that were built under the first batch of RDP, have structural defects that may pose a challenge in offset implementation. Based on experience from the pilot in KwaZamokuhle (Eskom, 2017), poor construction of RDP houses makes it difficult to install insulation structures in the houses.
Opportunities	*Municipal plans to improve roads infrastructure:* As indicated in section 5 above, the DPKISLM is planning to upgrade internal streets in Ezamokuhle (from gravel to

	interlock paving). This can substantially improve PM levels in the township which often masks the efficacy of offsets.
Threats	*Social unrests:* Social unrests have been common in South African township areas where there is poor service delivery and competition for jobs and other resources. In 2013 there was social unrest in Ezamokuhle where local residents were protesting against employment of immigrants. A man was quoted saying that "*People from outside take our jobs and we locals, we are left with nothing. If you take a closer look most people working at Eskom Majuba Power Station are not from Amersfoort"*. (Nkambule, 2016). During the engagements with local informants, it was also indicated that community uprisings do occur where community members demonstrate their dissatisfaction with immigrant who are "stealing"/taking over local township businesses. More often than not, these protest can result in locals anger and vandalism which may have negative impacts on offsets implementation schedules, theft of offsets monitoring equipment, etc.
	Affordability and availability of fuel: As indicated earlier, Ezamokuhle is a poverty stricken township with high unemployment rates. Thus, the ability of households to afford continued gas supply for gas stove offset interventions may hinder the success of such an intervention.. Affordability drives energy carrier selection and if the current offsets interventions are not affordable than the current fuels (wood & coal), the interventions may not be sustainable. Over the last year all coal, wood and LPG all increased in price. The cost of both wood and coal increased by R30 to a new cost of R150 per bag whilst LPG increased by R60 to a revised cost of R380. This is a significantly higher entry point than coal or wood.
	Political instability: The most dominant political parties in Ezamokuhle are ANC and EFF with some DA prominence. The informants indicated that there is some animosity between members of these parties which can present a threat to the offsets project. They noted that while the community may see the project as beneficial, political party leaders may sway the community in a different direction (against the project), in order to prove a point or to drive a particular political agenda. Thus, it is important to ensure that there is buy in from all political parties prior to the implementation of the project.
	Theft (burglaries, vandalism and mugging): Theft was highlighted as major crimes during our discussions with informants and during community survey. The informants indicated that the high levels of theft (in the form of house break-ins) and vandalism

	in associated with drug abuse by youth who feed their addiction by stealing anything that looks like they can sell. This requires that any equipment and infrastructure designed for offsets intervention should be well secured and guarded against vandalism and theft.
	Informal backyard shacks: Majority of household stands in Ezamokuhle have two types of dwellings (main house and a backyard shack). The use of coal in these dwelling types is not fully understood pending the planned household survey. Eskom's offset interventions involve swapping a coal stove (usually from the main house) for a cleaner gas stove. In the event that there is high rate of coal use in these informal shacks (using imbawula rather than coal stove), Eskom's offset interventions may not be able to address emissions from these dwelling units. Which means that only half of the problem will be solved through stove swaps.

8 CONCLUSION

This report provides an updated overview of Ezamokuhle from township level to local municipality and district level. Information is provided for population statistics, socioeconomics, settlement and housing types, infrastructure, service delivery etc., which can be summarised as follows:

Location GSDM, DPKISLM; ward 7&8	**Ruling party= ANC**	**2956 households**	**Population size= 10239**	**~7% higher qualifications**
~70% unemployment rate	Majority income bracket **R12 000 to R60 000 p.a**	**Basic services**= Electricity, sanitation, waste.	**Housing** type=**formal**	1618 = **Informal Dwelling in Backyard**

There are currently no known projects (planned or under implementation) in Ezamokuhle that may have implications for offsets. A SWOT analysis indicates the following aspects that supports or threatens offsets implementation in the near future:

Strengths	Weaknesses
• *Dwelling type:* Most/all households are formal which will make it easier for implementation of offset intervention's such a s gas stoves and ceiling retrofits • *Presence and visibility of community development workers*	• *Quality of houses in some cases:* Old RDP houses not adequate for insulation offsets. May require fixing.
Opportunities	**Threats**
• Plans by municipality to improve gravel roads.	• Social unrest (sporadic) • Affordability of interventions • Political instability • Theft and vandalism • Backyard shacks

The following are emerging issues from this fourth edition that require continuous monitoring for impacts on the offsets project:

- Intended publication of the Regulations for Implementing and Enforcing Priority Area AQMPs.
- The Highveld Priority Area AQMP.
- The review of the National Framework for Air Quality Management.

Whilst this report will only be updated annually, it should be noted that ARM is continuously monitoring and reporting on any new developments (legislative, policy, media reports, etc.) that may potentially impact the: roll out; implementation; execution or success of air quality offset interventions promptly to the Eskom PMV Offset Project team.

8 ACKNOWLEDGEMENTS

Air Resource Management would like to thank the following individuals for their assistance in this study:

- Ms. Nokwethemba Khumalo for enabling ARM to engage with the Pixley Ka Seme Municipality &
- Ms Mandisa Kunene from the Pixley Ka Seme Municipality for providing ARM with the key community informants contact details.

9 REFERENCES

1. Dr Pixley Ka Isaka Seme Local Municipality (2013). *Dr Pixley Ka Isaka Seme Local Municipality Final 2017-2022 IDP.* [Online]. *Available at: https://cogta.mpg.gov.za/IDP/2017-22IDPs/Gert%20Sibande/DrPixleyKaIsakaSeme2017-22.pdf [Accessed 20 December 2020]*
2. Eskom, 2017: Household emission offset pilot study in the Highveld Priority Area. Report by NOVA.
3. Eskom. 2018. *Baseline assessment of air quality and air quality drivers in Sharpeville,* Issue 1
4. Frith,A. 2013. *Census 2011: Subplace:Ezamokuhle.* [Online]. Available at:https://census2011.adrianfrith.com/place/863001001 [Accessed 28 December 2020]
5. Gert Sibande District Municipality. (2019). *Gert Sibande District Municipality Final Draft IDP 2019-2020.* [online]. Available at: https://cogta.mpg.gov.za/IDP/2019-20IPDs/Gert%20Sibande/GertSibande2019-20.pdf [Accessed 20 December 2020]
6. Gert Sibande District Municipality. 2017. Gert Sibande District Municipality By Laws, Proclamation 2 of 2017. Mpumalanga Provincial Gazette No 2780.
7. Nkambule, S.J. 2016. A critical analysis of housing provision, livelihood activities and social reproduction in urban communities in South Africa: the case of Ezamokuhle, Mpumalanga. A thesis submitted in fulfilment of the requirements for the degree of Doctor of Philosophy. Rhodes University, South Africa.
8. Mpumalanga Department of Co-operative Governance & Traditional Affairs (MCOGTA), The review of the Dr Pixley ka Isaka Seme Local Municipality's SDF - Phase 3: spatial proposals
9. Sasol,.2018. Presentation to Parliamentary Portfolio Committee on Environmental Affairs (PCEA), Cape Town.
10. Statistics South Africa. 2017. *Community Survey-Provincial Profile Mpumalanga, Report 03-01-13, Pretoria*. [Online]. Available at: http://cs2016.statssa.gov.za/ [Accessed 23 December 2020]

11. Statistics South Africa. 2012. *Employment Profile-Dr Pixley Ka Isame Local Municipality*. [Online]. Available at: http://www.statssa.gov.za/?page_id=993&id=pixley-ka-seme-municipality [Accessed 12 January 2021]
12. Statistics South Africa. 2012. *Highest Education Levels-Dr Pixley Ka Isame Local Municipality*. [Online]. Available at: http://www.statssa.gov.za/?page_id=993&id=pixley-ka-seme-municipality [Accessed 12 January 2021]
13. Statistics South Africa. 2012. *Income Profile-Dr Pixley Ka Isame Local Municipality*. [Digital Image]. Available at: http://www.statssa.gov.za/?page_id=993&id=pixley-ka-seme-municipality [Accessed 12 January 2021]
14. Statistics South Africa. 2012. *Sex and Age Distribution*. [Digital Image]. Statistics South Africa. Available at: http://www.statssa.gov.za/?page_id=993&id=pixley-ka-seme-municipality [Accessed 12 January 2021]

ANEXURE 1

8.2 REPORT DISCLAIMER

Air Resource Management (Pty) Ltd has prepared this report based on an agreed scope of work and acts in all professional matters as an advisor to the Client and exercises all reasonable skill and care in the provision of its professional services in a manner consistent with the level of care and expertise exercised by air quality management professionals.

Reports are commissioned by and prepared for the exclusive use of the Client. They are subject to and issued in accordance with the agreement between the Client and Air Resource Management (Pty) Ltd. Air Resource Management (Pty) Ltd is not responsible and will not be liable to any other person or organisation for or in relation to any matter dealt within this Report, or for any loss or damage suffered by any other person or organisation arising from matters dealt with or conclusions expressed in this report (including without limitation matters arising from any negligent act or omission of Air Resource Management (Pty) Ltd or for any loss or damage suffered by any other party relying upon the matters dealt with or conclusions expressed in this Report). Other parties should not rely upon the report or the accuracy or completeness of any conclusions and should make their own inquiries and obtain independent advice in relation to such matters.

Except where expressly stated, Air Resource Management (Pty) Ltd has not verified the validity, accuracy or comprehensiveness of any information supplied to Air Resource Management (Pty) Ltd for its reports.

Reports prepared by Air Resource Management (Pty) Ltd cannot be copied or reproduced in whole or part for any purpose without the prior written agreement of Air Resource Management (Pty) Ltd.

Where site inspections, testing or fieldwork have taken place, the report is based on the information made available by the client or their nominees during the visit, visual observations and any subsequent discussions with regulatory authorities. The validity and comprehensiveness of supplied information has not been independently verified and, for the purposes of this report, it is assumed that the information provided to Air Resource Management (Pty) Ltd is both complete and accurate. It is further assumed that normal activities were being undertaken at the site on the day of the site visit(s), unless explicitly stated otherwise.

8.3 COPYRIGHT