MINIMUM EMISSIONS STANDARDS (MES)

JOINT OFFSET IMPLEMENTATION PLAN

SASOL SASOLBURG OPERATIONS AND NATREF

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Glossary

Air quality offsets guideline – the Air Quality Offset Guideline published in terms of section 24J(a) of the National Environmental Management Act, 107 of 1998 as GN 333 in Government Gazette 39833 of 18 March 2016.. The Air quality offsets guideline has informed the development of SO and Natref's offset implementation plan

Ambient standard – The maximum tolerable concentration of any outdoor air pollutant as set out in the National Ambient Air Quality Standards in terms of Section 9(1) of the NEM:AQA.

Criteria pollutants – Section 9 of NEM:AQA provides a mandate for the Minister to identify a national list of pollutants in the ambient environment which present a threat to human health, well-being or the environment, which are referred to in the National Framework for Air Quality Management as "criteria pollutants". In terms of Section 9, the Minister must establish national standards for ambient air quality in respect of these criteria pollutants. Presently, eight criteria pollutants have been identified, including sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), particulate matter (PM_{10}), particulate matter ($PM2_{.5}$) and benzene (C_6H_6). In this document, any pollutant not specified in the National Ambient Air Quality Standards (NAAQS) is called a "non-criteria pollutant".

Minimum emissions standards (MES) – Prescribed maximum emission limits and special arrangements for specified pollutants and listed activities, published in terms of Section 21 of the NEM:AQA (Act No. 39 of 2004) and entitled '*List of Activities which Result in Atmospheric Emissions which have or may have a Significant Detrimental Effect on the Environment, Including Health and Social Conditions, Economic Conditions, Ecological Conditions or Cultural Heritage'* These standards were published in Part 3 of GN 893, in GG 37054 of 22 November 2013, as amended by GN 551 in GG 38863 of 12 June 2015, GN 1207 in GG 42013 of 31 October 2018 and GN 687 in GG 42472 of 22 May 2019;

Hydrogen Sulfide (H_2S) – a colourless gas with the characteristic odour of rotten eggs. A by-product of oil refining and burning, as well as other sources including sewage treatment plants, and household solid fuel burning. Toxic at high concentrations.

Nitrogen Dioxide (NO_2) – one of a group of highly reactive gases known as "oxides of nitrogen," or "nitrogen oxides (NOx)." NO_2 forms quickly from emissions from cars, trucks and buses, power plants, and off-road equipment. In addition to contributing to the formation of ground-level ozone, and fine particle pollution, NO_2 is linked with a number of adverse effects on the respiratory system, including airway inflammation in healthy people and increased respiratory symptoms in people with asthma.

Particulate matter (PM) – a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

The size of particles is directly and inversely linked to their potential for causing health problems, i.e. the smaller the particles, the more harmful they potentially are to one's health. Particles that are 10 micrometers in diameter or smaller generally pass through the throat and nose and enter the lungs. Once inhaled, these particles can affect the heart and lungs and cause serious health effects. PM is generally placed into two categories:

- "Inhalable coarse particles" are larger than 2.5 micrometers and smaller than 10 micrometers in diameter.
- "Fine particles" are 2.5 micrometers in diameter and smaller.

Point source – A single identifiable source and fixed location of atmospheric emission, and includes smoke stacks.

Postponement – A postponement of compliance timeframes for existing plant standards and new plant standards and their associated special arrangements, in terms of Regulations 11 and 12 of the MES.

Priority area – means an area declared as such in terms of Section 18 of NEM:AQA.

Priority area air quality management plan – means a plan referred to in Section 19 of NEM:AQA.

Sulfur Dioxide (SO_2) – one of a group of highly reactive gases known as "oxides of sulfur." SO_2 is linked with a number of adverse effects on the respiratory system, bronchoconstriction and increased asthma symptoms.

List of Abbreviations

AEL – Atmospheric Emissions Licence

CO – Carbon Monoxide

DEFF – Department of Environment, Forestry and Fisheries

H_2S – Hydrogen Sulfide

IPCC – Intergovernmental Panel on Climate Change

MES – Minimum Emissions Standards

NAAQS – National Ambient Air Quality Standards

NAQF – The 2017 National Framework for Air Quality Management in the Republic of South Africa

NAQO – National Air Quality Officer

NEM:AQA – National Environmental Management: Air Quality Act 39 of 2004

NO_2 – Nitrogen Dioxide

NOx – Oxides of Nitrogen

OIP – Offset Implementation Plan

PM – Particulate Matter

$PM_{2.5}$ – Particulate Matter with radius of less than 2.5 µm

PM_{10} – Particulate Matter with radius of less than 10 µm

SO_2 – Sulfur Dioxide

SO – Sasol South Africa Limited, Sasolburg Operations

1 Introduction

SO and Natref applied for postponement to the compliance timeframes for new plant standards to be effected 1 April 2020. The National Air Quality Officer, in consultation with the Fezile Dabi District Municipality Air Quality Officer granted SO and Natref's postponement requests however included a requirement that SO and Natref must implement an Offsetting initiative where particulates (PM) and SO_2 are targeted. After some discussions with the National Air Quality Officer regarding specific time frames for implementation, she indicated that SO and Natref also need to obtain public comment and input on the Offset plans.

In developing the plan, it must be emphasised that SO and Natref value engagements with their stakeholders and have bi-annual meetings with the residents of Zamdela to provide feedback and listen to concerns raised from members of the community regarding the implementation of the offset projects. Therefore, some of the requests received from the members of the community, have already been incorporated within the new offset plan. Concerns or challenges raised during other external processes such as the Vaal Triangle Priority Area Source Apportionment Study as well as the review of the Vaal Triangle Priority Area Air Quality Management Plan were also considered as input into aspects of the next phase of the Offset Plan.

SO and Natref have developed this offset implementation plan jointly and propose to implement it in a coordinated, collaborative manner, as with the plan submitted in 2015, in order to realise synergies through scale, to pool resources and limit the intrusion/imposition on community members through an aligned engagement approach.

The purpose of this document is to provide detail on the offset implementation plan referred to above.

It should be noted that SO and Natref have detailed the elements of the offset implementation plan to the extent possible, based on the level of the current definition of proposed programme activities. Refinement and detailed scoping of programme activities will be ongoing, and will be shared with, and informed by, stakeholders through the engagement approach.

2 SO's and Natref's Air Emissions Offset Objectives

2.1 Offset objective in terms of air quality outcomes

SO and Natref's offset plan seeks to demonstrate improvements in ambient levels of PM and SO_2 in the greater Zamdela area. Ongoing monitoring of ambient PM and SO_2 will continue to measure the improvements in these pollutant levels and the extent to which these can be directly attributed to the implementation of offsets by SO and Natref, over time.

2.2 Offset objective in terms of broader socio-economic outcomes

SO and Natref's position is that offsets may deliver sustainable and tangible ambient air quality improvements with socioeconomic benefits. To this end, ambient air quality improvement is not the sole measure of success. Rather, it is one of a suite of measures or metrics aligned with

the goal of “quality of life” or “well-being” improvement, which may also include other environmental improvements, such as reduction in greenhouse gas emissions.

2.3 Measurement of offset outcomes

Due to the variables and external factors that influence ambient air quality, no quantified ambient air quality improvement goals have been set for specific programme outcomes. Rather, the offset implementation plan outlines the various metrics along which SO and Natref will aim to quantify the beneficial impacts of their offset programme of activities. The aim is to have improvements on ambient air quality around the areas where initiatives will be implemented with the ultimate aim to have a measurable improvement relative to the baseline at the end of the 5 year period.

2.4 Focussed geographical area

Considering the Air Quality Offsets Guideline which requires interventions to be targeted near the facility, the focus area for the SO and Natref Offset implementation plan has been identified as Zamdela, a large community in the proximity of both SO’s and Natref’s facilities.

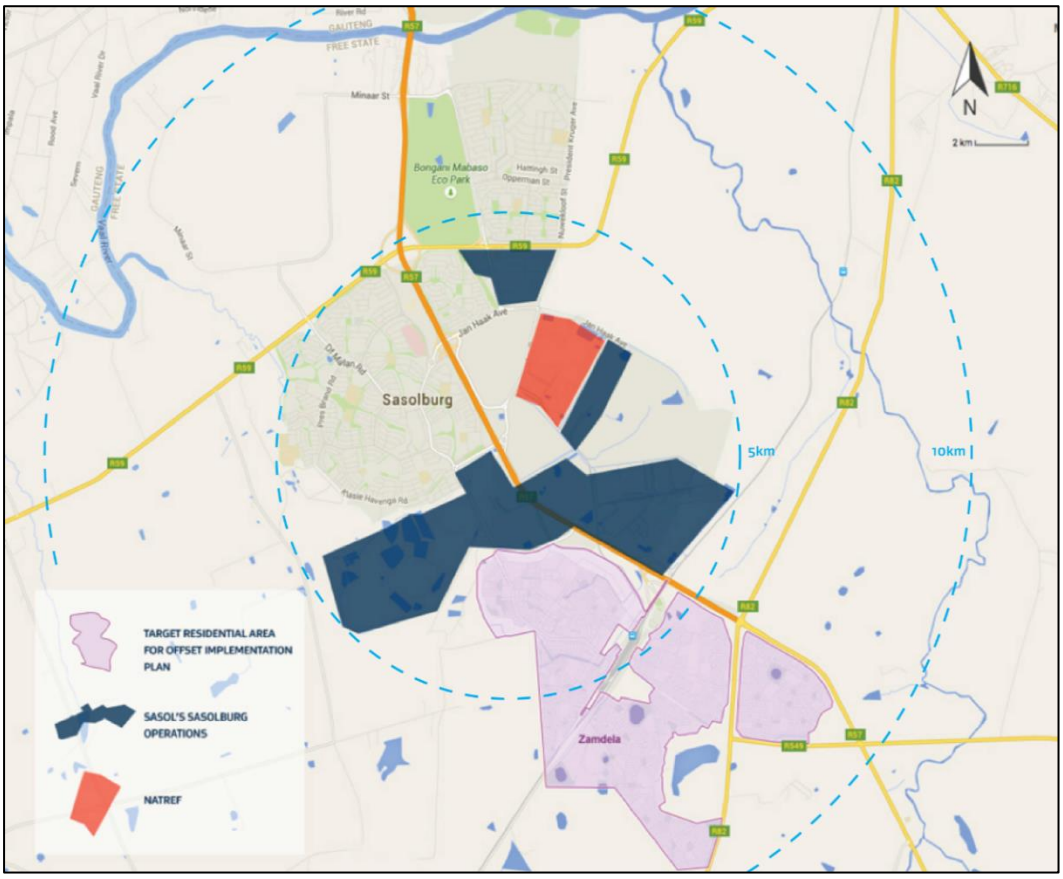

Figure 1: Location of Zamdela in relation to SO and Natref facilities

The Atmospheric Impact Report (AIR) prepared as part of SO’s and Natref’s postponement applications confirmed that the area within a 5 km radius of the facilities account for the highest modelled concentrations from SO and Natref. While these concentrations lie well within the NAAQS, offsets are nevertheless logically focused in Zamdela.

3 Sasol's and Natref's Air Emissions Offset Implementation to date

SO and Natref's 2015 postponement decision included a similar offset requirement. During the initial Offset Project the intention was also to gain further knowledge and understanding of the offset potential within Zamdela as well as to gain knowledge and experience in the implementation of offset initiatives. The focus areas were:

1. Obtain a baseline of pollutants through a source apportionment and quality of life study within Zamdela.

2. Reduce veld fire related emissions by enabling the Metsimaholo Local Municipality (MLM) to:

    a. Cut grass and remove bio-mass prior to the dry winter/veld fire season and

    b. Quickly respond and extinguish fires by making use of a Rapid Intervention vehicle together with a 6 000 litre support vehicle which is able to provide quick water refills.

3. Reduce non-recyclable waste related emissions by burning of waste through waste removal within non-serviced areas of Zamdela by enabling the MLM to collect and remove waste through:

    a. The utilisation of waste skip bins placed throughout the community and

    b. A compactor/collection vehicle that will be able to collect the waste and discard it at a landfill site.

4. Reduce recyclable waste related emissions by burning of waste through waste removal by means of circular economy.

SO and Natref have delivered on all the aspects of the plan with the exception of the recycling initiative mainly due to municipal processes for the approval of properties that were delayed within the Metsimaholo Local Municipality (MLM). Approval of two properties was obtained during the latter part of 2019, however due to the registration of the properties at the Department of Environment, Forestry and Fisheries (DEFF), the implementation and construction of the facilities will probably not be in time as the registration process is estimated to take three months. It is however SO and Natref's intention to still execute this objective, albeit in the next postponement period.

3.1 Improvements identified within the 2015 Offset project

The purpose of the baseline assessment and source apportionment study conducted during the first round of offset projects, was to inform SO and Natref of possible projects and initiatives that could be implemented in the future to further improve ambient air quality within the Sasolburg air shed.

The following information was highlighted within the quality of life assessment which has been used to shape the 2020 to 2025 offset project.

1. There are approximately 31 000 households within Zamdela (both formal and informal).

2. Approximately 1 000 households are reliant on coal for heating and cooking purposes and consume approximately 1 000 tons of coal per annum.

3. Approximately 7 000 households are reliant on wood for heating and cooking purposes and consume approximately 10 000 tons of wood per annum.

4. Waste fire emissions are a large contributor to poor ambient air quality in conjunction with wood and coal burning, although Zamdela's contribution to coal and wood related emissions are relatively low compared to the import of emissions across the boundary from Gauteng.

5. Dust was identified as a larger concern than waste and coal related fires, although the exact source of dust emissions could not be identified.

6. Biomass burning in addition to vehicle emissions was also identified as a large contributor to poor air quality.

7. Municipal waste collection service delivery failure in serviced areas of Zamdela was identify to be quite high.

SO and Natref believe that the implementation of the grass cutting and rapid intervention vehicle is yielding the desired outcome, provided that MLM continue to use the equipment as intended. Some areas of improvement have been identified which will form part of the proposed 2020 to 2025 plan to be discussed below.

SO and Natref were successful in the roll-out and implementation of the removal of non-recyclable waste in the non-serviced areas of the greater Zamdela. The desired sustainability of the project has however not been achieved due to the Municipality which is unable to deliver the service yet. The Municipality staff require training on how to handle skips with the compactor truck. Importantly though, the baseline assessment indicated that there are instances where the waste service delivery does not take place and not all areas within the greater Zamdela are fully serviced by Municipal waste removal services. This is evident in the number of illegal dumpsites which can be seen around parts of Zamdela. Therefore, there is a marked difference in visible cleanliness between the serviced area of Zamdela and the non-serviced area where SO and Natref implemented the first Offset project. In order to achieve a measurable improvement in ambient air quality from a waste burning perspective, this also poses an opportunity to work with the municipality in improving service delivery in the serviced areas.

Another concern identified during the rollout of the education and awareness program within the schools, was that schools, even though in serviced areas, do not dispose of their waste through municipal services, but either dump it or burn it within the school premises. This is causing a disconnect between the education and awareness campaign and the practises that are happening on the property of the school. The 2020 plan therefore aims to address this disconnect and correct it.

A waste source in Sasolburg which is severely impacting the ambient air quality in a negative manner, is the MLM landfill site which frequently, especially during winter periods, is set alight by landfill site dwellers. Due to the magnitude and duration of such fires, as well as the difficulty associated with extinguishing them, the entire Sasolburg, including the greater Zamdela is affected by poor air quality which not only poses a health risk but also a safety risk as the smoke restricts visibility in certain areas. The landfill site is also close to the end of its life. Due to the magnitude of this emission source, it will be addressed during the next round of Offsets. The

full extent of the impact will only be beneficial to the area after the Offset period ends in 2025 due to the interventions' long lead time.

Part of the 2015 Offset project was regular (bi-annual) feedback to the local community on the progress with the Offset program as well as to obtain feedback from the community on improvement initiatives and perhaps any concerns relating to the project. By and large the community is happy with the implementation and the serviced areas are requesting similar interventions in their areas as was implemented within the non-serviced areas. Dust emissions is a point of concern for the residents of Zamdela and is frequently brought up as a source that needs to be addressed, especially dust from unpaved roads. These aspects were considered in the development of the 2020 to 2025 Offset plan.

3.2 Projects for implementation during the 2020 to 2025 Offset period

Based upon the improvements to the current Offset project identified and discussed under Section 3.1 above and the developments noted in the Vaal Triangle Priority Area Air Quality Management plan, the objective is to have a measurable improvement in the ambient air quality based upon the Offset initiatives. The following projects are therefore proposed for implementation during the period 2020 to 2025:

1. Expand the waste removal initiative to the serviced area of Zamdela, including schools and eradicate illegal dumps on street corners.
2. Development and implementation of alternative cooking and heating methods, to reduce the impact of coal and wood burning, aligned with community requirements.
3. Enabling MLM to construct a new landfill site and the closure of the existing one.
4. Expand grass cutting to further reduce biomass burning with a focus on measurement and reporting.
5. An extended Education and Awareness campaign.
6. Construct transfer stations for recyclable waste.
7. Paving and/or sealing of gravel roads to reduce dust.

The abovementioned project objectives, aims and implementation periods are expanded upon in Section 4 below.

4 Sasol's and Natref's Offsetting Plan (2020-2025)

4.1 Expand the waste removal initiative to the serviced area of Zamdela including schools and the eradication of illegal dump sites

Brief description:

The baseline assessment and source apportionment study indicated that waste service delivery and the burning of waste is a concern within the greater Zamdela. This, together with the service delivery challenges encountered by MLM, supported by the requests from various community members that the concept of waste skips that were placed in un-serviced areas must also be implemented in serviced areas, indicates the need for a larger intervention from a non-recyclable waste removal perspective. The aim, therefore, is to expand the waste

removal initiative and enablement of MLM to deliver waste removal services to the greater Zamdela.

There will be a focus on the following activities:

- Target illegal dump sites on street corners, clean the areas and place skips which could be used when waste collection services within the greater Zamdela fails.
- Implement waste management programs in schools supported by waste removal services to remove waste from schools aligned with the Education and Awareness Program.
- Enable a regular and reliable waste removal service within the greater Zamdela by providing the services of an Industrial Engineer to develop, and make available for implementation, an optimised logistical and fleet management system that will enable the municipality to deliver scheduled services and conduct maintenance on its existing fleet.

Timeframe of activities:

Due to the COVID-19 pandemic, this portion has not commenced as planned. Initial assessments and repairs will be done between July 2020 and June 2022, where after a full rollout of the plan will commence.

Table 1: Timeframe of Activities for the waste removal initiative

Up to June 2021	**July 2021 to June 2022**	**July 2022 to June 2023**	**July 2023 to June 2025**
Servicing of existing skips to remove waste within schools and the community.	Commence with vehicle repairs.	Cleaning of illegal dumps, placement and servicing of skips if/as required.	Assist with service delivery where required and embed the sustainability of the project
Evaluation of the vehicle fleet, repairs and scheduling of vehicles for repairs.	Industrial engineering evaluation recommendations of logistical system requirements completed.	Embed the logistical system at MLM to ensure its sustainability.	
	Servicing of skips.	Monitor and support MLM while phasing in of skip servicing.	

Metrics to measure the impact of the initiative:

The impact will be determined by means of two measures:

1. The amount of waste removed and
2. The modelled impact based on the Zamdela specific emission factors that are currently being developed by the Desert Research Institute.

The baseline, DEFF and Sasol monitoring stations within Zamdela will be used to track whether a measurable improvement in ambient air quality can be observed.

Sustainability of intervention:

The sustainability of the intervention will be determined by how effectively MLM implement the logistical system and operate according to its parameters. If the system is fully implemented by MLM, this initiative should be sustainable well beyond the period of Offset requirements.

4.2 Development and implementation of alternative cooking and heating methods to replace coal and wood burning, aligned with community requirements

Brief description:

Coal and wood burning within Zamdela remains a concern. Since coal and wood as a fuel source are relatively inexpensive, addressing emissions from these sources should be done, taking into consideration the dynamics within the community and the availability of funds in households for fuel. The update of the Vaal Triangle Priority Area Air Quality Management Plan also takes cognisance of the fact that the burning of coal and wood will probably not cease, which means that some intervention is required to reduce emissions from these sources.

SO and Natref propose investigating an alternative means of cooking/space heating that is financially affordable and meet the requirements of the community but will significantly reduce emissions. A partnership between North West University and SO and Natref is in the process of being established to further pilot and enhance an existing low smoke coal stove. The plan is to pilot the coal stove to a small section of the community to confirm the proper operation and acceptability of the stove.

The aim is to reduce the emissions of approximately 11 000 households (depending on the shift in fuel uses between 2016 and 2020) that burn coal and wood toward the latter part of the five-year period.

Timeframe of activities:

Table 2: Timeframe of Activities for the Alternative cooking initiative

Up to June 2022	**July 2022 to June 2023**	**July 2023 to June 2025**
Working with the community and other partners to understand people's needs with the introduction of alternative cooking methods	Piloting and investigate enhancements required for full implementation	Rollout of approximately 11 000 stoves in the Zamdela area and monitor ambient improvements
Preparation for piloting of alternative cooking methods/stoves in a small section of the community.	Continue the investigation into an alternative means for cooking/space heating which could potentially replace the need for coal and wood	Quantify the emission reductions achieved through the intervention
Continue the investigation into an alternative means for cooking/space heating which could potentially replace the need for coal and wood		

Metrics to measure the impact of the initiative:

Since only a few households within the broader number of households will be affected, dispersion modelling based on the amount of coal/wood and emissions specific measurements for the intervention will be used to determine the impact. During the piloting, a number of indoor and outdoor parameters will be monitored for further use to determine the reduction in emissions and subsequent impact on the receiving environment.

The number of households converted will be tracked to ensure that, by 2025, all the identified households have been converted. 11 000 households is a current estimate based on the baseline assessment conducted during 2016 and will be confirmed during the investigative part of the project.

Sustainability of intervention:

The sustainability of the project is dependent on the number of households who consistently and effectively utilise the alternative cooking/space heating methods. With the aim to have minimal negative impact on the current way of living, it is expected that the community will embrace the alternative methods and sustain the reductions achieved.

4.3 Enabling the MLM to construct a new landfill site and the closure of the existing one

Brief description:

Two big aspects of the MLM landfill site are of concern, viz. that it has reached the end of its lifetime and that poor access control results in dwellers living on the landfill site that, during winter months, set fire to the waste to keep warm. This often results in runaway fires which causes large amounts of combustion products and VOCs to be emitted into the atmosphere. This is a major health hazard to the community living around the landfill site as well as the rest of Sasolburg and Zamdela that is sometimes covered under a blanket of smog. In many instances the emissions are so thick that there is virtually no visibility.

Although SO and Natref cannot develop the landfill site and manage/own the site, it can assist with identifying the property for a new site as well as conducting the scoping for the new site and the Basic Assessment for the closure of the existing site. Assistance can also be provided to purchase the property for the new landfill site as well as doing the design of the new site. The design of the closure of the existing landfill site can also be conducted. The requirement from MLM, however, is to do the construction for both the old and new sites.

Timeframe of activities:

Table 3: Timeframe of Activities for the new landfill site initiative

Up to June 2021	**July 2021 to June 2022**	**July 2022 to June 2023**	**July 2023 to June 2025**
Assist with the identification of a new site for the MLM	Conduct EIA and specialist studies on the two sites	Obtain Environmental Authorisations, purchasing of the property and commence with the design of the two landfill sites	Finalise the design of the landfill sites and facilitate MLM to commence with construction activities
Commence with the commercial aspects and appoint the EAPs			

for the closure EIA of the existing site and the EIA for the new site.			

Metrics to measure the impact of the initiative:

The true impact of this intervention will only be seen and experienced post the Offset period of 2025, however the solution will be a permanent closure of a problematic landfill site and the elimination of fires causing discomfort to many residents within Zamdela and Sasolburg.

Sustainability of intervention:

The intervention can be sustainable provided that MLM can secure the necessary funds to construct the new landfill site and close the existing one. Although this will be actively supported by SO and Natref, the success of this will depend on MLM's ability to secure the funds and manage the contractors responsible for the construction and closure.

4.4 Expand grass cutting areas to reduce biomass burning with a focus on measurement and reporting

Brief description:

The grass cutting intervention has already been rolled out, however an improvement opportunity has been identified for enhanced measurement and reporting of the areas cut to determine the impact of the intervention. As part of this SO and Natref will make the services of an Industrial Engineer available to assist, as with the waste project, with fleet management, maintenance schedules, schedules of areas to be cut together with the reporting of the bio-mass removed. This will assist in the accurate reporting and therefore accurate impact determination of the grass cutting initiative.

Timeframe of activities:

Table 4: Timeframe of Activities for the grass cutting initiative

Up to June 2022	**July 2022 to June 2025**
Industrial Engineer to evaluate and develop the logistical system for MLM to accurately report on bio-mass removal	Phase in the logistical system, monitor and support MLM with the delivery of the service making use of the new system.
Perform winter intervention in conjunction with MLM.	Support with winter intervention if required.
Facilitate the continuous cutting of grass from MLM Parks	Facilitate the continuous cutting of grass from MLM Parks

Metrics to measure the impact of the initiative:

The success of this project will be measured as follows:

- The logistical system developed and implemented.
- Effectiveness of the implementation of the system through the quality of reporting.
- Accurate reports available on a monthly basis.
- The impact will be determined through dispersion modelling of the affected areas aligned with emission factors and the quantity of bio-mass removed from the area.

Sustainability of intervention:

The sustainability of this project is dependent on the implementation by MLM, which SO and Natref will support vigorously.

4.5 An extended education and awareness campaign

Brief description:

SO and Natref were very successful in the roll out of the education and awareness campaign during 2019. Large numbers of community members, teachers and learners in both primary and secondary schools were reached. The objective of the next phase is firstly, to expand the campaign to reach more households as well as all the schools in the greater Zamdela area and secondly, to actively get the learners involved in projects, campaigns and activities where the education and awareness transferred are practically put to action outside the boundaries of the schools.

Due to the COVID-19 pandemic, the interventions for the 2020 academic year had to be suspended. Due to the expected breaching of two academic years during the 2021 academic year, SO and Natref plans to implement a reduced scope Education and awareness campaign for the schools during 2021 and will systematically increase its implementation in both contact and the number of schools towards 2025.

Timeframe of activities:

Table 5: Timeframe of Activities for the Education and awareness campaign

Up to December 2020	**Jan 2021 to December 2022**	**Jan 2023 to Dec 2025**
Education and awareness in schools have been suspended.	Perform education and awareness in the already targeted schools.	Increase the number of schools to cover the Zamdela, Sasolburg and Vaalpark areas.
Limited education and awareness will continue as part of the Waste Chaperones work educating people around the skips on waste disposal.	Education and awareness around the skips to continue	Implementation and continuation of waste stewardship program roll out.

Metrics to measure the impact of the initiative:

The following metrics will be used to measure the success of the outcome:

- The number of schools reached.
- The number of learners and teachers reached.
- The number of interventions and projects completed inside and outside the boundaries of the schools.

Sustainability of intervention:

Lifelong lessons gained from the project will be carried forward by the participants, thus positively influencing the way the environment is treated in the future.

4.6 Establishing transfer stations for recyclable waste

Brief description:

Due to delays experienced within the MLM in allocating properties, this project can only be completed during the second round of Offsets. It is only during the last few months of 2019, that a final decision on two properties could be obtained which will now be registered under the Norms and Standards of the Waste Act.

The plan for implementation remains, even though the project has lost the trust of the Waste Pickers, and will be executed in the next round of offset projects. A continuation of this plan is to create a buy back centre where recyclable material from Sasolburg, Vaalpark as well as Zamdela can be sold to generate income for the waste pickers. As a result of the COVID-19 pandemic, the registration of the properties was delayed and the outcome of the registration is expected during the third quarter of 2020.

Timeframe of activities:

Table 6: Timeframe of activities for the transfer station initiatives

July 2020 to June 2021	**July 2021 to June 2022**	**July 2022 to June 2023**	**July 2023 to June 2025**
Consider options and alternatives to the original transfer stations based on the community dynamics and construct the first transfer station	Support the operations of the transfer station and associated recycling waste initiatives. Resolve teething and operational problems	Construct the next phase of the transfer stations.	Monitor and track activities to report on reductions achieved
Appoint contractors and finalise the commercial aspects around the construction of the facilities	Obtain the next 2 properties and do the registration as waste handling facilities.	Implement the operating model and support the rollout of the waste collection services	
Operate the transfer station and resolve teething problems	Appoint contractors for the next phase of the roll-out	Assist with establishing the buyback centre	

Metrics to measure the impact of the initiative:

- The first assessment is the successful registration of the first two properties as waste handling facilities.
- Monitor and track the amount of waste recycled and establish the emission potential saved through the Zamdela specific emission factors determined by the Desert Research Institute (USA).
- The registration of the next 2 properties and the tracking, reporting and calculating of the impact of the waste removed through them.

Sustainability of intervention:

Although trust is lost, the waste pickers are eager to continue working as per the above, which will ensure sustainability of the offset, provided that they can sustain proper financial control.

4.7 Paving and/or sealing of gravel roads to reduce dust

Brief description:

With dust (particulate matter) being identified as a major pollutant during the baseline assessment and source apportionment study as well as feedback from the community during engagements with them, potential sources of dust will be targeted. SO and Sasol Mining already have programs implemented that are seeing an improvement in fugitive dust emission from their sites. Other potential sources identified, both by the community as well as the Vaal Triangle Priority Area Source Apportionment study, is unpaved roads.

Certain roads with high entrained dust loads to be sealed/paved. The utilisation of a new novel methodology of road building namely with waste plastics, will be investigated. The process sees the laying of a layer of specially prepared waste plastics on a dirt road surface potentially yielding a road equivalent to a tar road. Some of the advantages, additional to waste recycling are that the roads cannot form potholes due to rain, like asphalt roads, and does not have alternative value, like paving. The technology is however new and pre-work needs to be done to establish the processes to be followed. Should road surface construction utilising waste plastics prove not to be feasible, either asphalt or paving will be used to cover problematic dusty roads within Zamdela.

The specific roads targeted and distances to be covered are at this stage not yet identified, but the aim is to determine the roads and distances during the next year in consultation with MLM and the community and to confirm the utilisation of the plastic road technology. The distances of road to be covered will be communicated and committed to on an annual basis during the feedback of the interventions.

Timeframe of activities:

Table 7: Timeframe of activities for the road dust suppression initiative

Up to June 2021	July 2021 to June 2022	July 2022 to June 2023	July 2023 to June 2025
Focus on obtaining more information around the technology associated with plastic roads and determining the feasibility of the use of it as roads within Zamdela.	Partner with the relevant service provider/Subject Matter Expert regarding plastic roads	Construct the pilot road and monitor the road performance	Implement the covering of identified dirt roads within Zamdela and finalise the project towards the end of 2025.
	Plan and design the pilot	Identify the roads entraining the most dust and design the paving of the roads with plastic surface.	

Metrics to measure the impact of the initiative:

- The first metric to success will be to confirm the method of covering. i.e. whether plastic road technology will be feasible within Zamdela or if asphalt or paved roads should be used.
- Subsequently, the placement of the necessary contracts, as well as the procurement/obtaining of sufficient recyclable plastic material for the roads, if this is identified as the feasible route to follow.
- Next metric will be the identification of roads as well as the targeted distances covered on

an annual basis.
- The impact will be determined by means of dispersion modelling, given the dust entrainment emission factors for roads used within the priority area modelling.

Sustainability of intervention:

There is a concern around the sustainability of plastic roads, not from a durability point of view but rather whether or not they can sustain the heat from protest fires which are quite common in the areas the projects are being executed. This will be technically evaluated.

Should this be a concern, paving or an alternative means of covering will be used. The project is considered sustainable by the nature of its construction and through maintenance activities which will be agreed with the relevant responsible authorities.

4.8 Refinements to the offset plan considering stakeholder engagement processes

Although the plan indicates SO and Natref's proposals and view on the implementation of the processes, this might change due to inputs received from the community and MLM out of public participation process which will be followed. Any material changes will however first be agreed on with both the Fezile Dabi Air Quality Officer as well as the National Air Quality Officer, however the objective of the Offset plan remains to achieve a measurable improvement in the ambient air quality within the Zamdela area.

5 Stakeholder Engagement

As part of SO and Natref's continued engagement with the community, bi-annual meetings are arranged with the community leaders and members of the community. These meetings aim to align the community with the offset projects at large but also provide a platform for members of the community to raise their views which SO and Natref will consider and action where reasonably possible and practicable.

This plan, once approved by the DEFF, will be tabled at the next engagement meeting. Comments or suggestions from the community will be evaluated and could be brought into the project to align the projects with the community's needs. The aim however remains focussed on securing an improvement in the ambient air quality of the area they live in.

6 Success Criteria

6.1 Overview

Ambient air quality manifests because of multiple complex parameters that are highly variable in space and time. Within that complexity, measuring ambient air quality is similarly challenging, especially within residential areas where a small, localised source such as the burning of waste or a veld fire can significantly influence the measurements over short timeframes. In addition, ambient air quality, which falls to be safeguarded by government, is dependent on so many external factors that a single emitter or entity cannot alone take accountability and responsibility for its improvement. To this end, SO and Natref will measure their offset programme of activities using a 'basket of measures' to characterise "improved well-being" aligned with Section 24 of the Constitution and the sustainability principles contained in

the NEMA and that would unambiguously indicate a successful offset, rather than just improved air quality.

The principle of a basket of measures is illustrated in Figure 2. The range of performance parameters under the offsets regime is illustrated, highlighting the manner in which they all contribute to reduced risk of adverse human health effects, as a result of poor air quality, and thereby contribute to improving the Constitutional well-being imperative. It is important to use a 'basket of measures' approach, which assesses the holistic contribution of an offset to well-being, incorporating dispersion modelling and monitoring tools.

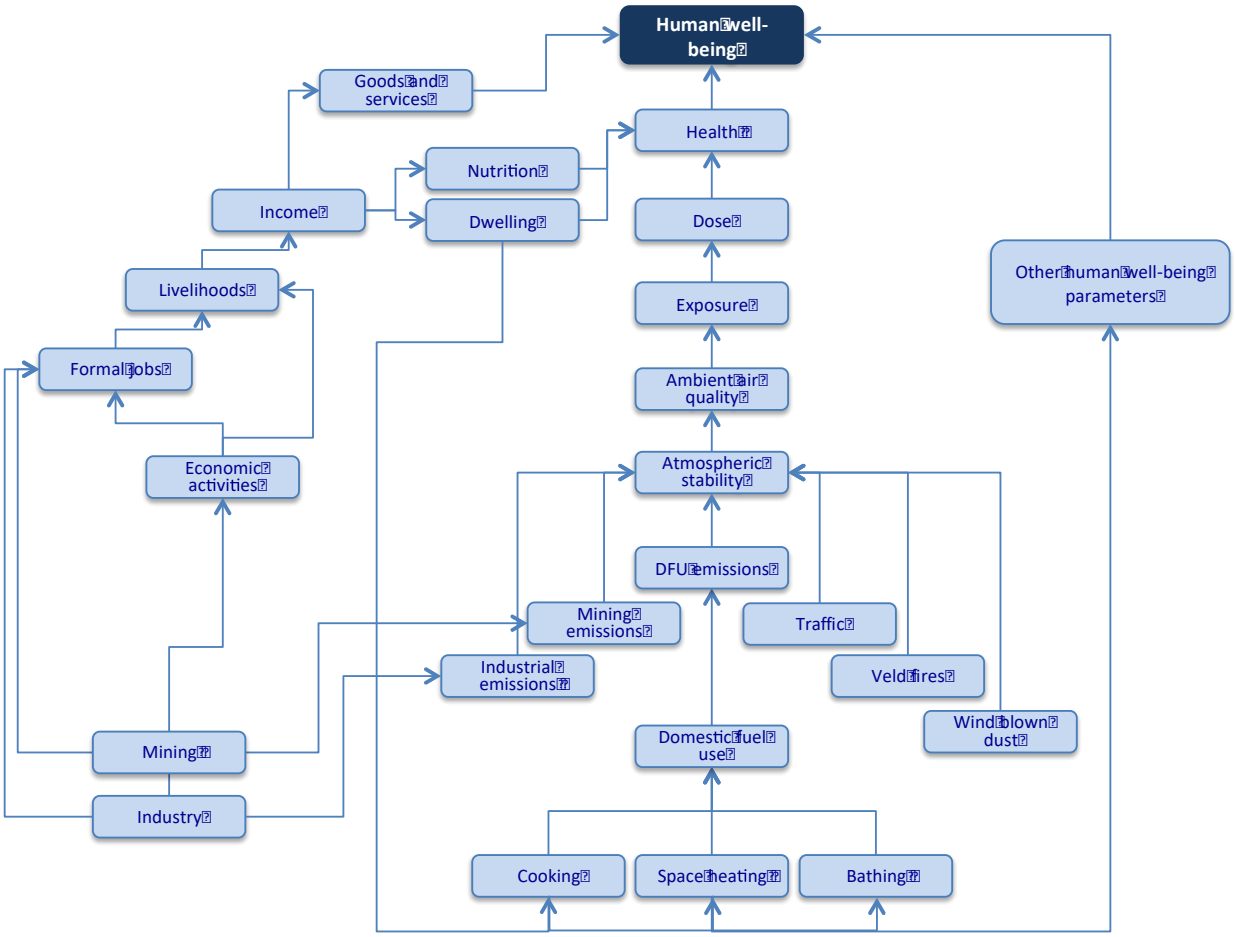

Figure 2: Schematic illustration of the key performance parameters within an offset regime, contributing to the Constitutional right to an environment not harmful to human health or well-being

6.2 A basket of measures

This basket of measures is intervention dependent and must include the various elements that present potential compromises to acceptable health and well-being, including ambient air quality. The measures identified by the SO and Natref to be important, include:

- The extent of ambient air quality improvement in the targeted communities, directly attributable to the interventions and excluding the influence of external factors on baseline variations;

- Measurement of the reduction in solid fuel consumption;
- Reductions in personal exposure of household occupants in the targeted communities based on indoor and ambient pollution exposure;
- Environmental co-benefits, such as avoided greenhouse gas emissions;
- Material improvement in a range of human wellbeing indicators in the targeted communities, including:
    - Economic benefits accruing to the community through payment for services rendered (linked to job opportunities created and procurement of services from local businesses);
    - Economic benefits accruing to the community through savings on energy costs;
    - Thermal comfort improvement for household occupants;
    - Sense of wellbeing arising from general environmental improvements.

Establishing success criteria is important to the principle of sustainable offsets because there must be a measurable set of outcomes defined *prior* to the offset that can be used to determine what has been achieved *after* the offset intervention. The basket of measures chosen for each intervention will reflect risk reductions to human health and wellbeing as well as additional sustainable development benefits that may accrue.

6.3 Risks and exclusions

Since the SO and Natref Offsets are interdependent on the Municipality and community participation, on-boarding of all parties is required to make the Offset projects a success. Destabilisation of the project and a reduction in outcomes predicted due to political, social or any other reason remain a risk.

It should also be noted that in recent months a new informal settlement has been established next to Amelia on the area called Mooidraai. The establishment of this settlement is not acknowledged and is currently opposed by MLM and therefore this area currently falls outside the scope of SO and Natref's offset projects.

Since there are no municipal services delivered in Mooidraai, the area has the potential to reduce the effect of the offset projects. Due to political reasons, the area can however not be included within the proposed plans.

7 Conclusions

SO and Natref's postponement applications were granted with a condition that an offset project must be implemented reducing levels of PM and SO_2 within the ambient air. This revised offset plan is therefore proposed to enable the reduction of these pollutants and is essentially an extension and enhancement of SO and Natref's current offset plan. The offset plan, once approved, will be implemented in parallel with the on-going implementation of the air quality improvement roadmaps outlined in SO and Natref's postponement applications. Progress on the implementation of this offset plan will be shared through a community engagement platform, and reported on to the applicable authorities.