HEALTH IMPACT ASSESSMENT FOR THE PROPOSED PLATREEF UNDERGROUND MINE

PLATREEF RESOURCES (PTY) LTD

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This document has been prepared by **Digby Wells Environmental**.

Report Title: **Health Impact Assessment for the Proposed Platreef Underground Mine**

Project Number: **PLA1677**

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EXECUTIVE SUMMARY

INTRODUCTION AND PROJECT DESCRIPTION

Platreef Resources (Pty) Ltd (Platreef) are proposing to develop an underground platinum mine on the farms of Turfspruit 241 KR; Macalacaskop 243 KR; and Rietfontein 2 KS (see Plan 1 and Plan 2, Appendix A) located near the town of Mokopane, in the Limpopo Province of South Africa. Platreef, which is a subsidiary of Ivanplats Limited, legally holds exclusive prospecting rights for base and precious metals on the Turfspruit and Macalacaskop Farms.

The proposed Project site is located approximately 8 km northwest of the town of Mokopane (previously known as Potgietersrus), which is situated in the magisterial district of the Mogalakwena Local Municipality and within the Waterberg District Municipality. The proposed Project Area is accessible all year-round by the N11 national highway, and a developed rail network goes through Mokopane, the closest railhead to the project.

Platreef plans to mine Platinum and other Platinum Group Metals (PGMs) such as Palladium (Pd); Rhodium (Rh); Iridium (Ir); Ruthenium (Ru); and Osmium (Os) with the Life of Mine (LoM) expected to be 30 years, with the potential to extend this period by another 30 years.

HEALTH IMPACT ASSESSMENT METHODOLOGY

A Health Impact Assessment (HIA) is a practical, multi-disciplinary process, combining a range of qualitative and quantitative evidence in a decision-making framework. An HIA seeks to identify and estimate the lasting or significant changes of different actions on the health status of a defined population. The methodology of this HIA was based on the Good Practice Note (GPN) for HIAs as supported by the International Finance Corporation (IFC). The IFC has published a set of Performance Standards (PS) for large projects that will require international funding. PS4 which deals specifically with Community Health, Safety and Security, recognises that project activities result in both positive and negative impacts to communities. The GPN has been developed specifically to provide guidance on community health for this Standard.

IFC Performance Standard 4 "Community Health, Safety and Security"

"The client will evaluate the risks and impacts to the health and safety of the Affected Communities during project life-cycle and will establish preventive and control measures consistent with Good International Industry Practice (GIIP), such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognised sources. The client will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favour the prevention or avoidance of risks and impacts over minimization."

This approach was supported by a systematic and consistent approach to collecting and analysing baseline health data through the Environmental Health Areas (EHA) framework. Twelve different EHAs are described, which provide a linkage between project-related activities and potential positive or negative community-level impacts. This incorporates a variety of biomedical and key social determinants of health. Through this integrated analysis, cross-cutting environmental and social conditions that contain significant health components are identified instead of focusing primarily on disease-specific.

Specific Potentially Affected Communities (PACs) and health impacts related to different activities of the Project have been described.

COMMUNITY HEALTH IMPACT ASSESSMENT ACTIVITIES

The specific activities of the community HIA (cHIA) included:

- A desktop literature review outlining the host country and community health profile;
- Collecting primary data by participatory means with the use of semi-structured questionnaires and key informant interviews with relevant stakeholders;
- Collecting additional secondary information that was not available in the public domain that is available in published and grey data;
- Understanding proposed Project designs, present and planned work activities, project schedule and location of PACs;
- Considering the potential future health impact that the proposed Project will have on the health of the respective communities;
- Determining the existing health needs of the community based on health strategies, infrastructure, programmes, service priorities, delivery plans and challenges; and
- Developing evidence-based recommendations to avoid/mitigate negative and enhance positive impacts resulting from the proposed Project at the relevant project stage.

The field work was performed by cHIAs specialists from Digby Wells, supported by Community Development Workers (CDWs) employed by the Mogalakwena Municipality and mobilised by Platreef. CDWs then mobilised individuals from the proposed Project affected communities to assist with distributing questionnaires within their respective communities. The desktop work was completed in May 2013. The field work took place from the 3rd to 11th of September 2013.

The cHIA team consulted a broad range of stakeholders. Key informant interviews were conducted with district health authorities and medical personnel at the local health facilities and hospitals. A total of 1 032 questionnaires were distributed to 17 villages that are in close proximity to the proposed Project. Seven hundred and thirty seven (737) questionnaires were received from the following villages:

- Extensions;
- Kgubudi ;
- Machikiri;
- Magongoa;
- Mahwelereng (Unit C and Zone 1);
- Malepetleke;
- Masehlaneng;
- Masenya;

- Masodi;
- Mokaba;
- Moshate;
- Polar Park;
- Sandsloot;
- Sekgakgapeng; and
- Sekgoboko.

KEY FINDINGS AND RECOMMENDATIONS

Access to the Healthcare facilities is a challenge for the rural communities in the proposed Project area as many reside more than 5 km from a health service point and have to rely on public or private transport to access care. In the area surrounding the proposed Project footprint healthcare provision is mainly in the form of mobile clinics which visit the communities once a week. Emergency services are limited, especially after clinic operating hours (4 pm). Services are free substantiated by more than 90% of respondents claiming not to pay for medical services. The communities have a relatively high dependency ratio due to the high levels of poverty and unemployment.

Under the light of Healthcare services and infrastructure, the proposed Project impacts need to be considered in two tangents. One, being a positive impact whereby there is the potential for the proposed Project to support the development of improved health services through direct and indirect interventions; and the second, being a negative impact whereby the proposed Project may stretch the already burdened capacity of the Healthcare services in the Mokopane and communities in the vicinity of the proposed Project area.

An influx of people into the proposed Project area can be expected and may have specific health impacts. The spontaneous migration and settlement of labourers and their families may introduce a wide range of concerns into the proposed Project area. These include:

- Increased use of and demand for already inadequate community housing, water, sanitation, food, and medical services can mean that health needs go unmet and new health challenges arise (with a likely increase in cost). At this point in time, there is only one informal settlement in the area (Mzumbane) and there is a concern that more settlements of this form and nature could proliferate with related health and social concerns.
- Housing inflation and potential increase in communicable diseases like tuberculosis (TB) and Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS). This can, however, be mitigated by Health Systems Strengthening (HSS) to improve TB case detection and case management in local dispensaries; developing and maintain site based TB policies and programmes; as well as outbreak preparedness and response plans.
- Emergency services are already limited in the area and increase trauma and accidents will place added burdens on the health infrastructure.

- The potential to increase accidents and injuries due to changes in road traffic may significantly and adversely affect levels of accidents in the area.

Poverty and high levels of illiteracy and unemployment play a key role in local social challenges. The youth are especially at major risk for social ills such as alcoholism and drug abuse. These in turn play a major role in domestic violence and high risk sexual behaviour. There is a high degree of hopelessness in communities, which is especially pronounced amongst the youth.

There is the possible impact due to increased demand on limited services and increased potential for environmental contamination. Platreef Resources could support local authorities with sanitation programmes in communities that have experienced extensive growth such as Mahwelereng, the Extensions and Tshamahansi.

A number of determinants can influence the potential for an increase in HIV/AIDS in the proposed Project Area. These are generally as an indirect influence of the project but some direct impacts from the workforce do exist. Develop a HIV/AIDS policy and programme that incorporates both the workplace and community considerations. Some mitigation measures to abate these include: developing a community based HIV and Sexually Transmitted Illness (STI) strategy; HIV/AIDS education programmes; and implementing comprehensive HIV and STI management programmes in the workforce.

An influx of people during construction and operational phases of the proposed Project may result in food inflation, increasing food deprivation, nutrition-related diseases. If long term food inflation occurs, food deprivation may affect susceptible sub-populations such as the children and marginalised groups. Poor food hygiene practices may also increase food-related illnesses. More consumption of fast food related to increased income may increase non-communicable (lifestyle) diseases such as obesity and diabetes. This can be mitigated through curbing food inflation and assisting with food and sanitation awareness materials to local district environmental health officers for educational sessions with food handlers and slaughterhouses, particularly vendors who sell food to construction workers and employees. Education on lifestyle behaviours including eating habits, exercise, etc. would also lessen the health impacts thereof. Share educational materials for use in local clinics. Platreef Resources, together with the communities, can improve food security by assisting with school feeding programmes, including education on food gardens, nutrition, and good nutritional habits.

The proposed Project may lead to increased traffic loads on primary and access roads and has thus the potential to increase the number of traffic accidents. This can be abated through improving road safety by collaborating with the district road-safety unit to establish and maintain pictorial road-safety signage near the site in local language (either SePedi or Shangaan) and English language (if needed); clearly demarcated pedestrian crossings in appropriate places etc. This could be achieved by establishing and implementing at Traffic Management Plan.

While vector borne diseases are not common in the proposed Project Area, uncontrolled digging and the influx of people coupled with poor environmental management may lead to establishment of vector breeding sites in the proposed Project Area, a situation that may lead to emergence and increase in prevalence of vector-borne diseases. Assist in the

controlling of vector breeding sites. Vector control in the local communities using Indoor Residual Spraying (IRS) is possible, however, sustainability issues are extremely important and best practice guidelines should be implemented. Efficient environmental management of surface water is essential, particularly during construction. Coordination with the relevant government departments (i.e. health and social development) in establishing vector awareness programs is also essential.

With regards to the social determinant of health, the expected influx of people and increased income may result in illegal substances being available more freely. It is difficult to speculate whether the prevalence of tobacco smoking and or substance abuse will increase due to the presence of the proposed Project. However, it is likely that it will increase as there will be an increase in the number of young people with decent incomes, who will be in a position to afford these commodities. Platreef resources may be in a position to conduct substance-abuse prevention education programs in the workplace and within the communities.

When discussing the exposure of people to potentially hazardous materials, noise and malodours, one needs to be cognisant of the in-migration of people. An influx of people into the area may increase domestic activities, including the use of domestic fuels. This may result in an increase in air pollution exposure, followed by associated increases in the prevalence of related respiratory illnesses. The clearing of the site (construction phase) and vehicular movement are the main activities and may have potential impacts on the ambient noise levels. Increased activity of vehicles and heavy machinery, and the drilling of rock will all contribute to the increased local noise levels. There is sufficient evidence that noise causes adverse health effects such as cardiovascular effects.

SUMMARY HEALTH IMPACT ASSESSMENT

The major health impacts of concern and outcomes of the impact assessment are presented in the table below.

Table 1: Summary Health Impact Assessment

Impact	Pre-mitigation						Post-mitigation					
	Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
Transmission of communicable diseases due to overcrowding	Beyond project life	Municipal Area	High - negative	Highly detrimental	Highly probable	Moderate - negative	Long term	Municipal Area	Moderate - positive	Moderately beneficial	Probable	Minor - positive
Transmission of STIs and HIV/AIDS	Permanent	Province/ Region	Extremely high - negative	Extremely detrimental	Certain	Major - negative	Long term	Local	Very high - positive	Moderately beneficial	Highly probable	Moderate - positive
Soil-, water- and waste-related diseases	Long term	Local	Moderately high - negative	Moderately detrimental	Certain	Moderate - negative	Beyond project life	Province/ Region	Very high - positive	Highly beneficial	Highly probable	Moderate - positive
Food and nutrition	Long term	Local	Moderate - negative	Moderately detrimental	Probable	Minor - negative	Long term	Province/ Region	Moderately high - positive	Moderately beneficial	Probable	Minor - positive
Road traffic accidents and other accidental injuries	Beyond project life	Local	Very high - negative	Highly detrimental	Likely	Moderate - negative	Project Life	Province/ Region	Moderately high - positive	Highly beneficial	Probable	Minor - positive
Air pollution, noise and mal-odours	Project Life	Limited	Very high - negative	Moderately detrimental	Highly probable	Moderate - negative	Project Life	National	Low - positive	Moderately beneficial	Likely	Minor - positive
Chemicals, pesticides and heavy metals	Project Life	Local	Very high - negative	Highly detrimental	Probable	Minor - negative	Project Life	Very limited	Low - negative	Slightly detrimental	Probable	Negligible - negative
Gender-based violence, alcohol and drugs	Long term	Local	High - negative	Moderately detrimental	Highly probable	Minor - negative	Medium term	Province/ Region	Very high - positive	Highly beneficial	Probable	Minor - positive
Social cohesion and Well-being	Project Life	Local	Extremely high - negative	Highly detrimental	Likely	Moderate - negative	Project Life	Province/ Region	High - positive	Highly beneficial	Likely	Moderate - positive

Impact	Pre-mitigation						Post-mitigation					
	Duration	Extent	Intensity	Consequence	Probability	Significance	Duration	Extent	Intensity	Consequence	Probability	Significance
Health systems strengthening	Long term	Municipal Area	Very high - negative	Highly detrimental	Certain	Moderate - negative	Long term	Municipal Area	Extremely high - positive	Highly beneficial	Highly probable	Moderate - positive
Non-communicable Diseases	Long term	Municipal Area	High - negative	Moderately detrimental	Probable	Minor - negative	Long term	Municipal Area	Moderately high - positive	Moderately beneficial	Probable	Minor - positive

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LIST OF ABBREVIATIONS

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
APPA	Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965)
ARV	Antiretroviral Drugs
BHS	Baseline Health Surveys
BoD	Burden of Disease
BUR	Bed Utilisation Rate
CARMMA	Campaign on Accelerated Reduction of Maternal Mortality in Africa
CMMB	Catholic Medical Mission Board, Inc.
CDW	Community Development Worker
cHIA	Community Health Impact Assessment
CHMP	Community Health Management Plan
CVA	Cerebrovascular Accident
DEA	Department of Environmental Affairs
DG	Director General
DM	District Municipality
EHA	Environmental Health Area
EHIA	Environmental Health Impact Assessment
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
ESHIA	Environmental, Social and Health Impact Assessment
HCT	HIV Counselling and Testing
HIA	Health Impact Assessment
HIV	Human Immunodeficiency Virus
HPCSA	Health Professions Council of South Africa
HSS	Health Systems Strengthening
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IFC	International Finance Corporation
IFPRI	International Food Policy Research Institute
IFC	International Finance Corporation
IRS	Indoor Residual Spraying
KAP	Knowledge, Attitude and Practices
KAPB	Knowledge, Attitudes, Practices, and Belief
KII	Key Informant Interviews
KPI	Key Performance Indicator
LED	Local Economic Development

LLM	Lephalale Local Municipality
LM	Local Municipality
M&E	Monitoring and Evaluation
MDGs	Millennium Development Goals
MDR	Multidrug Resistant
MRC	Medical Research Council
MMC	Medical Male Circumcision
NEM: AQA	National Environment Management: Air Quality Act, 2004 (Act No. 39 of 2004)
NCD	Noncommunicable Diseases
NGO	Non-Governmental Organisation
NHA	National Health Act, 2003 (Act No. 61 of 2003)
NHLS	National Health Laboratory Service
PAC	Potentially Affected Community
PCD	Pollution Control Dam
PGE	Platinum Group Elements
PGM	Platinum Group Metal
PM	Particulate Matter
PMTCT	Prevention of Mother-to-Child Transmission
SAHR	South African Health Review
SANS	South African National Standards
SIA	Social Impact Assessment
STI	Sexually Transmitted Illness
TB	Pulmonary Tuberculosis
TSF	Tailings Storage Facility
TSP	Total Suspended Particulates
VCT	Voluntary counselling and testing
VIP	Ventilated Improved Pit-latrine
VOC	Volatile organic compound
WHO	World Health Organization
XDR-TB	Extensively Multidrug Resistant TB
YLLs	Years of Life Lost

1 INTRODUCTION

This document presents the results of the community Health Impact Assessment (cHIA) for the proposed Platreef Underground Mine (Project) near the town of Mokopane in Limpopo Province, South Africa. The objective of the proposed Project is to assess the human health impacts associated with the Project on the population of concern, with particular reference to vulnerable people, through the evaluation of various determinants of health, including those identified in the various specialist studies.

To ensure that environmental health becomes part of the Environmental Impact Assessment (EIA) decision making process, health will need to be integrated into the present process in a structured and systematic manner. This will ensure that human health issues, resulting from a listed activity, are addressed before the start of an activity.

This cHIA report is structured into various sections. Section 8 which determines which health effects, or indicators, ought to be considered. It takes into consideration all the relevant background information (in this case, environmental and health information) including laws, demographics of the affected population, health status, project details, etc., providing a complete characterisation of the current situation around the Project. Section 7 discusses how populations may be affected and to what degree (potential impacts). Section 7.3.9 identifies changes to the proposed Project that either improves community members' health, or eliminates, resulting adverse health outcomes.

1.1 Project Location

The proposed Project is to be situated within the Northern limb of the Bushveld Igneous Complex, which is host to the 'Plat-reef', a mineralised sequence rich in Platinum Group Elements (PGE)-nickel-copper mineralization, approximately eight kilometres north of Mokopane town (previously known as Potgietersrus) located within the Waterberg District of Limpopo Province. The Province is 123 910 km^2 in size and borders Botswana, Zimbabwe and Mozambique to the north and the Mpumalanga, Gauteng and North West Provinces to the south.

The proposed Project is situated in the Mogalakwena Local Municipality (MLM), which borders Aganang LM to the East, Mookgophong LM to the South, Lephalale LM to the West and Blouberg LM to the North. The MLM covers an area of approximately 6 100 km^2 (see Plan 1, Appendix A). There are three proclaimed townships and 178 villages within the MLM. The majority of the townships are located within the Mokopane/Mahwelereng area. Villages directly surrounding the Platreef Project infrastructure include Tshamahansi, Ga-Magongoa, Ga-Kgubudi, Madiba, Masodi, Masehlaneng, Maroteng, Ga-Molekana, Sekgoboko, and Mzumbane. These villages all fall within the jurisdiction of Chief Kekana and the Mokopane Tribal Authority.

The area for the proposed Project is defined as the Proposed Project Area, in which the majority of the population who in future might be affected by the proposed Project is residing. In addition, the demarcation of the study area is informed by drawing on experience from previous studies conducted for Platreef. For the proposed Project this translates into the 17

villages surrounding the proposed project's exploration area. These villages are listed in Table 2 below.

Table 2: Villages constituting study area

Villages	
Sekgakgapeng	Machikiri
Moshate	Mokaba
Masehlaneng	Malepetleke
Maroteng	Masenya
Kgubudi	Mabusela
Sekgoboko (Ledwaba)	Mountain view
Magongoa	Mzumbane (Seven Miles)
Madiba	Mitchel
Tshamahansi	Elsewhere in Mokopane

1.2 Terms of Reference

Digby Wells Environmental (Digby Wells) has been contracted by Platreef Resources (Pty) Ltd. (Platreef) to conduct a community Health Impact Assessment (cHIA) for its proposed underground platinum mine Project. A cHIA was conducted as a specialist study for the compilation of the Environmental and Social Impact Assessment (ESIA). This study evaluated the different types of evidence from the various specialist studies, as well as other readily available information, in order to assess the health impacts associated with the Project on the population of concern. In so doing, the project aimed to adhere to the relevant provisions contained in the Equator Principles (IFC, 2006). These provisions had been derived from the principles themselves and the International Finance Corporation (IFC)'s Performance Standards and Environmental Health and Safety (EHS) Guidelines.

The present scope of work for the Project cHIA will be comprised of the following activities;

- Desktop literature review in order to:
  - Outline the country and community health profile from a desktop perspective including a literature review using a systematic approach; and
  - Review country-specific health regulations.
- A field visit in order to:
  - Undertake primary participatory data collection in the form of a household questionnaire survey, interviewing with men and women in the different Potentially Affected Communities (PACs);
  - Gather additional information that was not available in the public domain during the desktop review. This includes collection of information from health facilities,

from the national health information management system, as well as from unpublished reports and documents;

- Identify key informants and conduct initial interviews using a semi-structured questionnaire;
- Assess the standards of the local health facilities and functionality of the health management information system; and
- Visualise the project and location of communities in relation to planned project activities.

- Impact assessment process which will:
  - Consider the potential future health impacts that the proposed project will have on the health of the respective communities;
  - Determine the existing health needs of the community based on health strategies, infrastructure programs, service priorities, delivery plans and challenges;
  - Based on the existing evidence, rank the likelihood and consequence of different health impacts to outline their significance and prioritisation for mitigation; and
  - Consider alternative options and recommendations for mitigation/management of priority impacts. Recommend measures to avoid/mitigate negative and enhance positive impacts resulting from the project at the relevant project stage; and
  - Determine the existing health needs of the community based on health strategies, infrastructure, programs, service priorities, delivery plans and challenges.

2 PROJECT DESCRIPTION

This chapter provides basic information pertaining to the proposed Project. It commences with a description of the Project's activities and possible infrastructure options.

2.1 Project Activities

This section gives a brief overview of the key aspects of the proposed Project. The proposed Project activities are categorised into the various project stages.

Construction Phase:

- Site Clearing: Removal of topsoil and vegetation.
- Construction of surface infrastructure.
- Transportation of materials & workers on site.
- Temporary storage of hazardous chemicals and fuels.

Operational Phase:

- Removal of Platinum Group Metals (PGM's) (underground mining process).

- Operation of surface infrastructure such as the operation of the mining shaft, crusher, pipelines, the Tailings Storage Facility (TSF) and processing plant (includes water use and storage on site, including pollution control dams).
- Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste, sewage, discards, Pollution Control Dam (PCD).

Decommissioning Phase:

- Demolition & removal of all infrastructures (incl. transportation off site).
- Rehabilitation (spreading of soil, re-vegetation & profiling/contouring) (includes sealing of adit and ventilation shaft entrances).
- Storage, handling and treatment of hazardous products (fuel, explosives, oil) and waste activities (waste and sewage).

Post-closure Phase:

- Post-closure monitoring and rehabilitation.

2.2 Proposed Infrastructure

Platreef is investigating the construction and operation of an underground platinum mine. Platreef obtained exploration rights on the following properties:

- Turfspruit 241 KR;
- Macalacaskop 243 KR; and
- Rietfontein 2 KS.

The proposed Project will be a highly mechanised underground mine primarily focussed on the mining of the PGE group minerals. At steady state production, the mine will be able to produce 3 million tonnes of ore annually, which will be processed at an on-site concentrator plant, with the concentrated product being moved for final refinement into platinum group metals at refineries located either in Polokwane, Rustenburg or the Witwatersrand. Preliminary mine plans show that the following ancillary infrastructure will be constructed on site:

- In plant roads and fences;
- Decline shaft;
- Conveyor;
- Concentrator plant;
- Construction substation and ancillary power lines;
- Impoundment dam;
- Waste water conservancy tank;
- Water treatment works;
- Tailings storage facilities (TSF);

- Pipelines connecting TSF with the plant site;
- Potable water tank;
- Waste rock stockpile;
- Top soil storage area;
- Administrative buildings, change houses, ablution, workshops and storage;
- Diesel and lubrication storage facility;
- Equipment wash-bay and sump with oil skimmer;
- Compressor house;
- Explosive storage; and
- Crusher(s).

3 STATUTORY REQUIREMENTS

3.1 Country

3.1.1 The Constitution

Sustainable development discourse is used in this guideline document. The over-arching legislation is the Constitution of South Africa, in particular section 24, which places people and their needs at the forefront of environmental management. The Constitution provides a right to “an environment that is not harmful to [human] health or well-being” and to have the environment protected, for the benefit of present and future generations, through reasonable legislative measures. These measures include the prevention of pollution and ecological degradation, the promotion of conservation, the securing of ecologically sustainable development and the utilisation of natural resources while promoting justifiable economic and social development.

3.1.2 The National Health Act (Act 61 of 2003)

The National Health Act, 2003 (Act No. 61 of 2003) (NHA) provides a framework for a structured uniform health system in South Africa, taking into account the obligations with regard to health services imposed on the national, provincial and local governments by the Constitution and other laws. Section 20 gives legal effect to the functions of Environmental Health with regard to environmental health management. The Director General (DG) should issue and promote adherence to, norms and standards on health matters, including conditions that constitute a health hazard and facilitate the provision of indoor and outdoor environmental pollution control services. The Act also provides for environmental health investigations in section 88.

Any activity that gives rise to offensive/injurious conditions or is dangerous to health (e.g. accumulation of refuse) may have a negative impact on health and thus warrants being assessed in the Environmental Health Impact Assessment (EHIA).

3.1.3 National Ambient Air Quality Standards

The Department of Environmental Affairs (DEA) issued ambient air quality guidelines for several criteria pollutants, including particulates, sulphur dioxide, oxides of nitrogen, lead, ozone and carbon monoxide. The National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) (NEM:AQA) adopted these guidelines as National ambient air quality standards. On 2 June 2006, the Minister of Environmental Affairs and Tourism announced his intention of setting new ambient air quality standards in terms of Section 9(1)(a) and (b) of the NEM:AQA. The proposed new standards were published for public comment in the Government Gazette of 9 June 2006. Since then, updated draft National standards with allowable frequencies of exceedance and compliance timeframes have been proposed.

The prevailing legislation in the Republic of South Africa with regards to the Air Quality field is the NEM:AQA. The NEM: AQA serves to repeal the Atmospheric Pollution Prevention Act (Act no. 45 of 1965) (APPA) and various other laws dealing with air pollution.

The purpose of NEM: AQA is to set norms and standards that relate to:

- Institutional frameworks, roles and responsibilities;
- Air quality management planning;
- Air quality monitoring and information management;
- Air quality management measures; and
- General compliance and enforcement.

Guidelines provide a basis for protecting public health from adverse effects of air pollution and for eliminating, or reducing to a minimum, those contaminants of air that are known or likely to be hazardous to human health and wellbeing World Health Organization (WHO, 2000). Once the guidelines are adopted as standards, they become legally enforceable. These standards prescribe the allowable ambient concentrations of pollutants which are not to be exceeded during a specified time period in a defined area. If the air quality guidelines/standards are exceeded, the ambient air quality is poor and the potential for health effects is greatest.

Air quality legislation comprises primary standards which protect human health and secondary standards which protect property, vegetation, climate and aesthetic values. The development of new industries that increase air pollution through the emission of gases in the atmosphere should be managed. The municipality is one of the two air quality hotspot within Waterberg followed by Thabazimbi.

The Waterberg area has been declared a National Priority Area in terms of the Air Quality Act (Act no. 39 of 2004) on the 15th of June 2012. This suggests that the ambient air quality in the respective area may exceed national ambient air quality standards in the near future, thus necessitating comprehensive air quality management plans and actions. In addition, it is likely that there may be trans-boundary air pollution between the Waterberg District Municipality and Botswana (DEA, 2012).

Ambient air pollutant concentrations within the Mogalakwena Local Municipality occur not only as a result of local sources but also because of the emissions from various remote sources. Air quality legislation comprises primary standards which protect human health and secondary standards which protect property, vegetation, climate and aesthetic values. The development of new industries that increase air pollution through the emission of gases in the atmosphere should be managed. The municipality is one of the two air quality hotspot within Waterberg followed by Thabazimbi

3.2 International Management Standards

There are a number of international guidelines or best practice guidelines that refer to community health in developing projects. The World Bank Group's standards and norms, in particular those developed by its private sector arm, the International Finance Corporation (IFC), are generally considered as the benchmark. The IFC has published a set of Performance Standards for large projects that will require international funding. Performance Standard 4 (PS4): Community Health, Safety and Security, recognises that project activities result in both positive and negative impacts to communities (IFC, 2012). The objectives of this PS4 are:

- To avoid or minimise risks to and impacts on the health and safety of the local community during the project life cycle from both routine and non-routine circumstances; and
- To ensure that the safeguarding of personnel and property is carried out in a legitimate manner that avoids or minimises risks to the community's safety and security.

The general PS4 community health and safety requirement states that the client will evaluate risks and impacts to the health and safety of the affected community during all stages of a project, and will establish preventative measures to mitigate and manage the identified health impacts. An Action Plan is to be disclosed and on-going engagement with affected communities is to be established (*ibid*.).

IFC Performance Standard 4 "Community Health, Safety and Security"

"The client will evaluate the risks and impacts to the health and safety of the Affected Communities during project life-cycle and will establish preventive and control measures consistent with Good International Industry Practice (GIIP), such as in the World Bank Group Environmental, Health and Safety Guidelines (EHS Guidelines) or other internationally recognised sources. The client will identify risks and impacts and propose mitigation measures that are commensurate with their nature and magnitude. These measures will favour the prevention or avoidance of risks and impacts over minimization."

In addition to being considered the benchmark standards for major projects, the IFC's Performance Standards are applicable to projects seeking financing from either the IFC or other Equator Principles banks.

South Africa is a signatory to certain international conventions that may be applicable to the project and these may be seen to provide additional direction in the absence or limitation of local legislation or policy. Those relevant to health include the following:

- The United Nations Declaration on Rights of the Indigenous Peoples;

- Stockholm Convention on Persistent Organic Pollutants;
- Basel Convention on the control of trans-boundary movements of hazardous wastes and their disposal; and
- United Nations Agencies including:
  - United Nations Environmental Program;
  - International Health Regulations as promulgated by the World Health Organization; and
  - United Nations Development Program. Global and Inclusive Agreement 2002.

3.3 Company Management Standards

Platreef does not have a specific management standard that addresses community health or supports the use of cHIA as a tool. However, as part of the company's commitment to work with communities within which it operates, community Healthcare is a key focus. Platreef is committed to providing a safe, injury free and healthy place to work – the health and safety of our employees and contract workers and adjoining communities is a key priority.

Within their operations, Platreef continuously works to reduce total accidents and minimise health risks. They pursue this by adherence to their standards, promoting safe practices and the promotion of a positive safety culture on the shop floor with safety behaviour ownership.

This Corporate Citizenship Statement of Values and Responsibilities reflects the obligations and partnerships that naturally accompany the various permissions that we receive to operate in countries and communities with divergent degrees of economic development. Such permissions commonly are subject to review and renewal, and so must be continually earned.

Ivanplats and all its subsidiaries, including Platreef, are committed to the principle that people on their project sites and in their offices work in safe and healthy conditions. The Organisation believes that people have a right to clean air and water. Ivanplats is committed to best-practice environmental management and to internationally recognised levels of performance in environmental, health and safety matters.

Potential impacts of field activities are considered in advance of operations. Appropriate prevention and mitigation measures are evaluated and implemented. On mineral development projects, extensive studies are completed to establish environmental and social baseline data and to plan to avoid or minimize potential impacts

4 HEALTH IMPACT ASSESSMENT METHODOLOGY

4.1 Introduction and Definition

A Health Impact Assessment (HIA) is a practical, multi-disciplinary process, combining a range of qualitative and quantitative evidence in a decision-making framework. An HIA seeks to identify and estimate the lasting or significant changes of different actions on the health status of a defined population (Winkler *et al*., 2010). HIA may be defined as "*a combination*

of procedures, methods and tools by which a project may be judged as to its potential effects on the health of a population, and the distribution of those effects within the population". The objective of an HIA is to deliver evidence-based recommendations to maximize potential positive health benefits and prevent or mitigate any detrimental health impacts that a project may have on the potentially affected communities (PAC) (WHO/ECHP, 1999, IAIA, 2006).

The WHO defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity. This is influenced through complex interaction of social, economic, genetic, and environmental factors (WHO, 2010c).

The ultimate deliverable of an HIA is a Community Health Management Plan (CHMP) (Winkler *et al*., 2011). This plan would be based on evidence and stakeholder input, prioritised according to impacts and needs and having clear indicators to monitor and evaluate project impacts and programs. The CHMP will also facilitate the development of social development programs linked to health.

The holistic model of health used in the HIA process acknowledges that the health status of a population is affected by factors known as health determinants (e.g. education, income level, health services, etc.). All of these are closely interlinked and differentials in their distribution lead to health inequalities. These include both biophysical and social determinants of health as well and not just purely health outcomes. The methodology allows HIA practitioners to consider how a project affects these determinants of health, as well as health outcomes.

4.2 Overview of the HIA Process

A standardised approach was considered for the cHIA to ensure that evidence based recommendations supported the impact assessment and community health management plan. To ensure compliance with the IFC performance standards, and especially PS4, the methodology outlined in the Good Practice Note for HIA from the IFC, was adopted (IFC, 2012, International Finance Corporation (IFC), 2008). The main elements of this are discussed briefly below so that the context of the HIA is understood.

The framework that is commonly used for HIA follows a 6-step process (IFC, 2009):

- Screening (preliminary evaluation to determine the necessity of an HIA);
- Scoping (identifying the range of potential project-related health impacts and defining the terms of reference for the HIA, based on published literature, local data and broad stakeholder consultation and how these may be influenced by the proposed project);
- Risk assessment (qualitative and quantitative appraisal of the potential health impacts in relation to defined communities and the project development, including stakeholder participation);
- Appraisal and mitigation (development of a CHMP) based on the findings of the risk assessment);
- Implementation and monitoring (realisation of the CHMP including monitoring activities that allow for adaptation); and

- Evaluation and verification of performance and effectiveness (key step to analyse the cHIA process as a whole).

A standardised approach was considered for the HIA to ensure that evidence based recommendations supported the impact assessment and CHMP. To ensure compliance with the IFC performance standards, and especially PS4, the methodology outlined in the Good Practice Note for HIA from the IFC, was adopted (IFC, 2012). The main elements of this are discussed briefly below so the context of the HIA is understood. Figure 1 below illustrates the HIA procedure.

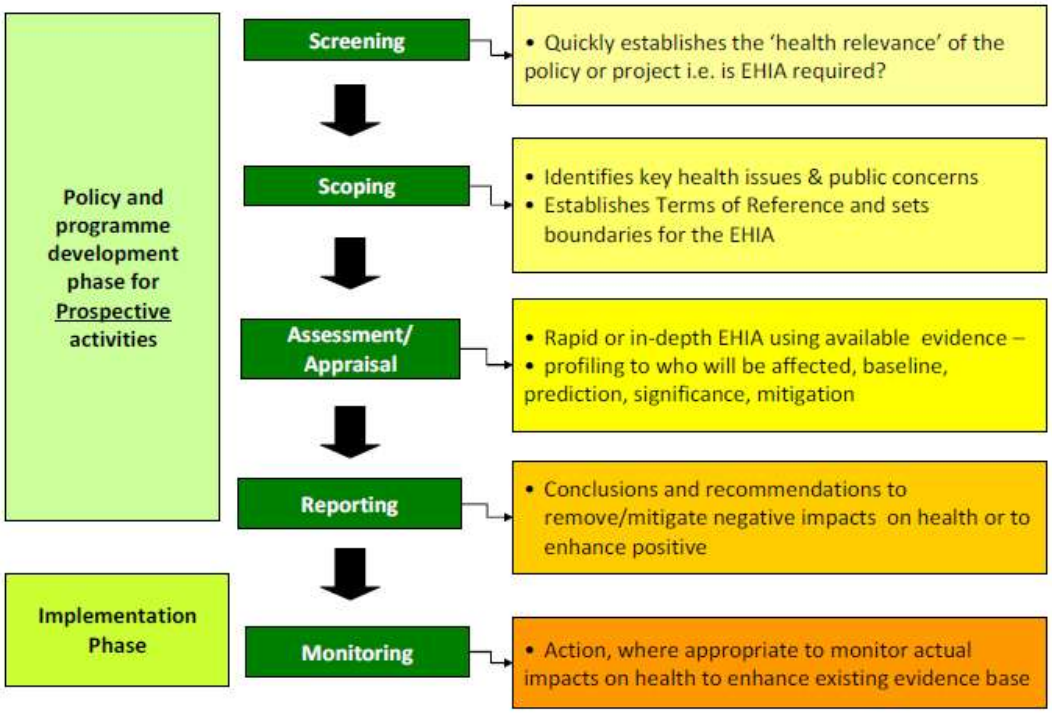


Figure 1: HIA procedure (IFC, 2012)

4.3 Scoping and the cHIA

The cHIA for the proposed Project is being conducted at the exploration stage and as a prospective assessment. It will thus be available to influence design and inform the construction, operation and decommissioning phases of the proposed Project. As HIAs are dynamic iterative processes they do require flexibility in their methodologies and tools - so that they can be fit for purpose for different projects.

Thus, the form of the cHIA for the proposed Project needed to be defined from the outset based on the three levels of HIA that are currently performed as described in Table 3 (IFC, 2009). Based on the scope of work proposed by Platreef Resources; a rapid appraisal approach was considered the most suitable based on the nature of the project. The fact that the cHIA could gain information from social and other specialist environmental surveys supported this.

The activities undertaken in the rapid HIA are highlighted in the coloured area on the table. Performing a rapid appraisal HIA does not mean that the level of effort or analysis of the HIA is minimised, or that the potential for significant health impacts is missing. It only implies that new primary data (especially biomedical indicators) are not collected (IFC, 2009). The activities undertaken in the rapid HIA are highlighted in the coloured area on the table.

Table 3: Levels of HIA (IFC, 2009)

Level of HIA	Characteristics
Desktop HIA	■ Provides a broad overview of possible health impacts; ■ Analysis of existing and accessible data; ■ No new project specific survey data collection.
Scoping/Rapid Appraisal HIA	■ Provides more detailed information of possible health impacts; ■ Analysis of existing data; ■ Stakeholder and key informant analysis; and ■ No new project specific survey data collection.
Comprehensive HIA	■ Provides a comprehensive assessment of potential health impacts; ■ Robust definition of impacts; ■ New project specific survey data collection; and ■ Participatory approaches involving stakeholders and key informants.

A rapid appraisal uses information already available or easily accessible. In-country field visit confirms the literature review and acts as “ground-truthing” verification. New data collection is not considered and this is a defining characteristic. Some type of limited workshop or discussion with key internal and external stakeholders is planned. Specific and relatively narrow boundaries or parameters are specified. A fully quantitative risk assessment exercise is not performed; however, a qualitative assessment is documented. As a second phase, when an evidence-based CHMP must be developed, further specific field work will be required. This could include a quantitative baseline health survey on key indicators of concern as part of the community baseline HIA to strengthen evidence.

The assumption that should authorisation for the Project be granted and the development goes through, there would be an influx of individuals seeking employment and settling in close proximity to the Project site. It is for this reason that the report discusses potential, as well as cumulative impacts with the assumption that there are already existing communities within close proximity of the proposed Project site.

4.4 Stratification into Potentially Affected Communities

To identify and quantify potential health impacts, an accurate population profile needs to be determined. This is important to distinguish between differences in exposure and susceptibility (Mindell, 2001). Therefore, besides a demographic profile of the at-risk population and the identification of the most vulnerable groups, it is essential to understand how the development, construction and operation activities are likely to impact at both a household and community level.

The relevant overall population is divided into PACs. A PAC is a defined community within a clear geographical boundary where project-related health impacts may reasonably be expected to occur. PACs are inherently prospective and simply represent best professional judgments. PACs are likely to change over the course of project implementation; and there may be changes in the project design, and thus its longer term implications are never fully known. This implies that the definition of PACs may need changing as more is known about the project (Winkler, 2010). Mitigation strategies also require specific considerations for the different PACs (*ibid*.).

4.5 Impact Categorisation: Environmental Health Areas (EHAs) Framework

The IFC methodology makes use of twelve Environmental Health Areas (EHAs) to support the systematic analysis of health considerations. These are summarised in Table 4. The set of EHAs provides a linkage between project-related activities and potential positive or negative community-level impacts and incorporates a variety of biomedical and key social determinants of health. In this integrated analysis, cross-cutting environmental and social conditions that contain significant health components are identified instead of an HIA focusing primarily on disease-specific considerations – as is frequently done in many biomedical analyses of potential project-related public health impacts. The EHA framework is based on an analysis performed and published by the World Bank (IFC, 2009).

Table 4: Environmental Health Areas

	Environmental Health Areas (EHAs)
1.	**Communicable diseases linked to housing design** – Transmission of communicable diseases (e.g. acute respiratory infections, pneumonia, tuberculosis, meningitis, plague, leprosy, etc.) that can be linked to overcrowding and housing inflation. It also considers indoor air pollution related to use of biomass fuels.
2.	**Vector-related diseases** – Mosquito, fly, tick and lice-related diseases (e.g. malaria, dengue, yellow fever, lymphatic filariasis, rift valley fever, human African trypanosomiasis, onchocerciasis, etc.)
3.	**Soil-, water- and waste-related diseases** – Diseases that are transmitted directly or indirectly through contaminated water, soil or non-hazardous waste (e.g. diarrheal diseases, schistosomiasis, hepatitis A and E, poliomyelitis, soil-transmitted helminthiases, etc.)

	Environmental Health Areas (EHAs)
4.	**Sexually-transmitted infections, including Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome (HIV/AIDS) –** Sexually-transmitted infections such as syphilis, gonorrhoea, chlamydia, hepatitis B and, most importantly, HIV/AIDS. Linkages of TB will be discussed where relevant under HIV, but often linked to EHA1.
5.	**Food- and nutrition-related issues** – Adverse health effects such as malnutrition, anaemia or micronutrient deficiencies due to e.g. changes in agricultural and subsistence practices, or food inflation; gastroenteritis, food-borne trematodiases, etc. This will also consider feeding behaviours and practices. Access to land plays a major role in developing subsistence farming contexts
6.	**Non-communicable diseases** – Cardiovascular diseases, cancer, diabetes, obesity, etc.
7.	**Accidents/injuries** – Road traffic or work-related accidents and injuries (home and project related); drowning
8.	**Veterinary medicine and zoonotic diseases** – Diseases affecting animals (e.g. bovine tuberculosis, swinepox, avian influenza) or that can be transmitted from animal to human (e.g. rabies, brucellosis, Rift Valley fever, Lassa fever, leptospirosis, etc.)
9.	**Exposure to potentially hazardous materials, noise and malodours** – This considers the environmental health determinants linked to the project and related activities. Noise, water and air pollution (indoor and outdoor) as well as visual impacts will be considered in this biophysical category. It can also include exposure to heavy metals and hazardous chemical substances and other compounds, solvents or spills and releases from road traffic and exposure to mal-odours. There is a significant overlap in the environmental impact assessment in this section. Ionizing radiation also falls into this category.
10.	**Social determinants of health** – Including psychosocial stress (due to e.g. resettlement, overcrowding, political or economic crisis), mental health, depression, gender issues, domestic violence, suicide, ethnic conflicts, security concerns, substance misuse (drug, alcohol, smoking), family planning, health seeking behaviours, etc. There is a significant overlap in the social impact assessment (SIA) in this section.
11.	**Cultural health practices** – Role of traditional medical providers, indigenous medicines, and unique cultural health practices
12.	**Health systems issues** – Physical health infrastructure (e.g. capacity, equipment, staffing levels and competencies, future development plans); program management delivery systems (e.g., malaria-, TB-, HIV/AIDS-initiatives, maternal and child health, etc.)

4.5.1 Impact Assessment

The core activity of an HIA is the prediction, evaluation and mitigation of impacts (IFC, 2009). The significance of identified health impacts can be evaluated by drawing on: (i) the available health data from the literature review; (ii) the information generated through stakeholder consultation; (iii) the knowledge of the project context and developments; (iv) input from other specialist studies that inform the elements of the Environmental, Social and

Health Impact Assessment (ESHIA) and (v) experience of previous HIAs in similar settings (Winkler *et al*., 2010).

To ensure consistency across the different EHAs, a standardised impact assessment guideline was adopted for this study.

The Impact Assessment Process:

- Considers the potential future health impacts that the Project will have on the health of these respective communities.
- Determines the existing health needs of the community based on health strategies, infrastructure, programmes, service priorities, delivery plans and challenges.
- Is based on the existing evidence rank the likelihood and consequence of difference health impacts to outline their significance and prioritisation for mitigation. A confidence ranking will be applied based on the available evidence.
- Develops evidence-based recommendations to avoid/mitigate negative and enhance positive impacts resulting from the project at the relevant project stage.

4.6 Baseline Data Collection

The data collection activities of the cHIA were conducted in a structured manner so as to gather as much information as possible. This included a desktop literature review, participatory data collection (stakeholder input) and direct observation. This structured method allows for the triangulation of data and provides a robust description of data as shown in Figure 2 (Winkler *et al*., 2011).

Figure 2: Triangulation of data (Winkler *et al*., 2011)

4.6.1 Desktop Work

This involved a literature review of health related data in the public domain as well as a review of existing project documentation and related secondary data. The literature review was completed before the field visit so that data gaps could be identified and questioning

routes for Key Informant Interviews (KII) and questionnaires could be developed. Priority was given to topics that contributed the most towards the burden of disease in South Africa and the proposed Project area and also to health-related incidents related to mining.

The desk top work included an extensive literature review to inform the health profiling of the region and where possible the population in the proposed Project Area. The literature reviews focused on the national, provincial and (where available) local level, in a step down fashion, where information was available. The desk top work described the broad health status of the population, based on a systematic review of the 12 EHAs. It must be noted that there is limited information in the public domain regarding the health profile in South Africa, especially at the local level.

The outcomes of the literature review are presented in Section 6 of this report and have been combined with the information that was acquired during the field visit and subsequent project documentation review.

4.6.2 Questionnaire Design

Participatory tools were used in data collection. These tools included a semi structured interview with 5 key informants, and a questionnaire administered to a set of CDWs and community members selected. The assessment helped to identify the major health concerns for the community (HIV/AIDS, TB, arthritis, diabetes etc.), institutional issues (satisfaction or lack thereof with health facilities), socio-economic aspects and environmental concerns. While not all these concerns are directly related to human health, they do provide useful insight into the communities served by the Healthcare facilities.

A questionnaire was designed and formal household-level surveys were conducted. This method was selected for the purpose of this study as semi-structured questionnaires and household surveys are seen as active data-collection strategy and typically provide the most accurate source of disaggregated demographic and health data. These questionnaires also sought to establish Knowledge, Attitudes, Practices, and Belief (KAPB) for specific diseases such as HIV/AIDS. The questionnaire that was designed and distributed among the PACs has been appended to this Report, see Appendix B.

4.6.3 Field Visit

A field visit was conducted in order to collect primary participatory data in the form of interviews with men and women in the different project affected communities. The field work took place from the 3rd to 11th of September 2013. This was conducted by Ms Vumile Dlamini and Mr Duncan Pettit from Digby Wells and supported by a Community Liaison Officer from Platreef. Platreef Resources supported and facilitated some aspects of the field work by facilitating KIIs with district health authorities in Mokopane.

A crucial part of the field visit was to consult stakeholders who have special knowledge of the health status as well as socio/cultural behaviours and norms of the PACs. The aim was to gain a comprehensive picture of the general health situation and to better understand potential health impacts of the proposed Project. It is acknowledged that broad stakeholder engagement is an important element throughout the cHIA process and the district health authorities were consulted to support this.

The field visit also provided an opportunity to visualise and assess the prevailing situation in the communities and their relation to the proposed Project. This was important in order to understand the potential areas of influence of the project and also the general living conditions in the communities living in the proposed Project Area.

4.6.4 Key Informant Interviews

Interviews were conducted with key Healthcare personnel from five various Healthcare facilities. The objective of these interviews was to gain a better understanding of the structure and capacity of the local health system and also to enquire what health statistics were available at the local level and where possible obtain authorised copies of statistics and reports. KIIs were conducted with the health personnel at these facilities, using a semi-structured questionnaire.

Figure 3: Key informant interview conducted by a Digby Wells Consultant

This included specific questions about health, social and environmental determinants but with a different emphasis, depending on the level and role of each key informant being interviewed. Interviews and discussions were open and conducted in English and SePedi.

The key informants consulted during the field visit are shown in Table 5.

Table 5: Key informants that were consulted during field work

Date:	04-Sep-13	04-Sep-13	04-Sep-13	04-Sep-13	05-Sep-13
Facility Name:	Mapela Clinic	Mamaselela Clinic	Tshamahansi Clinic	Mahwelereng Clinic 1	Van den Berg Family Clinic
Name of person	Mrs Francina	Mrs K.A	Mrs R.M	Mr Johannes	Andre Van den

interviewed:	Mailula	Phago	Maphoto	Phiri	Berg
Designation:	Professional Nurse	Operational Manager	Operational Manager	Operational Manager	Doctor
Location (village/town):	Mapela, Fotane	Hans Mapela	Tshamahansi	Mahwelereng	Mokopane Town

During these meetings it was emphasised that Platreef view the relationship with the health authorities as important and that consultation and activities in the area would occur with due consideration of respected protocols and where possible in partnership. Recorded results and responses from these interviews are appended to this Report – see Appendix C.

4.6.5 Sample Selection

A Sample Size Calculator was used to determine how many people needed to be interviewed in order to get results that reflect the target population as precisely as needed for the purpose of this study.

Figure 4 below illustrates the Sample Size Calculator. Choices were entered into the calculator to find the sample size needed or the confidence interval at hand. The total number of households within the seventeen PACs was, as advised by the Digby Wells Social Impact Assessment Specialists, to be 125 196 households. A confidence level of 99% and confidence interval of 4 was chosen. The sample size was the calculated to 1 032. Having stated that there are 17 PACs, the total sample size calculated was then divided by the number 17. One thousand and thirty two questionnaires were then generated and an average of 61 questionnaires was distributed within each community. It should be noted that the size of the communities, which varies as some communities such as Mahwelereng and Tshamahansi are much larger than others. This however did not affect the number of questionnaires distributed into each community.

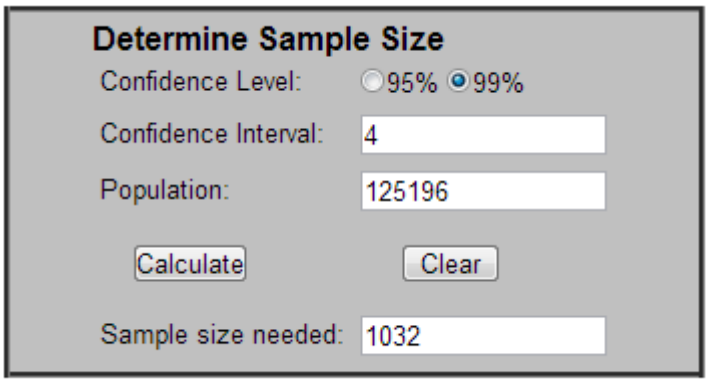


Figure 4: Sample Size Calculator

A confidence interval (CI) is a type of interval estimate of a population parameter and is used to indicate the reliability of an estimate (Cox and Hinkley, 1974). It is an observed interval (i.e. it is calculated from the observations), in principle different from sample to sample, that

frequently includes the parameter of interest if the experiment is repeated (Kendall and Stuart, 1973). How frequently the observed interval contains the parameter is determined by the confidence level or confidence coefficient. More specifically, the meaning of the term "confidence level" is that, if confidence intervals are constructed across many separate data analyses of repeated (and possibly different) experiments, the proportion of such intervals that contain the true value of the parameter will match the confidence level; this is guaranteed by the reasoning underlying the construction of confidence intervals (*ibid.*).

The confidence level tells you how sure you can be. It is expressed as a percentage and represents how often the true percentage of the population who would pick an answer lies within the confidence interval. The 95% confidence level means you can be 95% certain; the 99% confidence level means you can be 99% certain.

4.7 Gaps and Limitations of the cHIA Study

This cHIA has focused on understanding the high level health issues in the proposed Project area. The cHIA also looked for health data gaps that may exist and determined what additional information would be required to inform a more comprehensive health evidence base. A gap analysis is necessary in order to establish whether sufficient data is available to inform a risk/impact analysis and mitigation phase or whether additional baseline data is required.

The gap analysis focuses on the health outcomes and determinants of major concern as described above. This includes critical appraisal of data quality of sources identified during the cHIA process.

Paying close attention to the Baseline Health Surveys (BHS) received from the CDWs and respective community members who assisted with conducting the interviews, there are two major concerns, namely:

- The quality of the data/information collected; and
- The quantity of the data/information collected.

As part of the methodology adopted for this study, 1 032 questionnaires were distributed into seventeen communities. From these 1 032 questionnaires, 737 were received back from assistors. This means 295 questionnaires have not been included into analyses due to missing data.

In addition to this, the quality of received (completed) questionnaires is not of an exceptionally high standard. A lot of the responses are very similar, as if the interviewer may have perhaps been leading respondents into expressing themselves in a particular way.

The following are the recognised limitations of the cHIA study:

- The cHIA study often refers to local level data which has some limitations that need to be understood and respected. There are minimal diagnostic facilities and some of these diagnoses may not have been made correctly. Reporting of the data is also completed manually and while commendable efforts are made by the different levels, it is likely that the recording will lack required accuracy. However, this information is invaluable in understanding the health challenges in the area, although the limitation

must be considered when evaluating information, as the ability to use it as a robust baseline and to use it to monitor relevant health impacts is limited;

- Not all the data that would have been crucial in obtaining a robust baseline of the area was collected. Although a household questionnaire survey was conducted, this did not include biomedical indicators which are often the measure for several diseases. In addition, microbial analysis of community water sources as well as end-user water at the household level was not obtained as it fell outside the scope of this study; and
- Surveys are normally based on respondents' self-declaration which may be prone to recall or response bias. Moreover, when it comes to questions on one's private life, study participants tend to be affected by a social desirability bias, where they choose to give answers that are socially acceptable.

5 COMMUNITY HEALTH PROFILE

5.1 An Introduction to the Most Common Illnesses

Prior to elaborating on the community health profile of the Country, Region, in addition to the proposed Project area (as well as any key findings of this study), it is imperative to explicitly define some of the most important and common diseases as expressed by the respondents within the PACs. This section aims to give a succinct explanation of these main diseases. These diseases are not listed in any particular order of importance, relevance or prevalence. These definitions provided below are medically accepted and used by South Africa's National Department of Health and the WHO.

5.1.1 Asthma

Asthma is a disease that affects one's lungs. It causes repeated attacks of wheezing, breathlessness, chest tightness and night time or early morning coughing. During an asthma attack the sides of the airways in the lungs swell and the airways shrink. Less air gets in and out of the lungs. The mucus that one's body produces clogs up the airways. The attack may include coughing, chest tightness, wheezing and trouble breathing. Asthma is generally hereditary and can also be triggered by exposure to environmental factors such as dust mites and tobacco smoke.

5.1.2 Cancer

Cancer is not just one disease, but a large group of almost one hundred diseases. Its two main characteristics are uncontrolled growth of the (abnormal) cells in the human body and the ability of these cells to migrate from the original site and spread to distant sites. If the spread is not controlled, cancer can result in death. As stated, there are various kinds of cancer with various causes, such as excessive intake of alcohol, smoking, harmful or hazardous substances in the air, exposure to too much sunlight etc. The symptoms of cancer depend on the kind of cancer that one has, and on which organ the cancer cells are attacking.

5.1.3 Cholera

Cholera is an acute infectious disease characterised by watery diarrhoea that is caused by the bacterium *Vibrio cholera*. Cholera is caused by an infection in the intestine from this bacterium. Cholera is contracted by drinking water or eating food which has been contaminated with the *Vibrio cholera* bacteria. An epidemic is usually caused by the faeces of an infected person that contaminates the water and food. The disease can spread rapidly in areas with inadequate treatment of sewage and drinking water. It is not likely to spread directly from one person to another. Casual contact with an infected person is not dangerous. Cholera symptoms can range from mild to severe and include: severe, watery diarrhoea nausea and vomiting; muscle cramps; dehydration; and shock.

5.1.4 Diabetes

A disease characterised by an inability to process sugars in the diet, due to a decrease in or total absence of insulin production. Most of the food we eat is turned into glucose or sugar for our bodies to use as energy. The pancreas makes a hormone called insulin to help glucose to get into the cells of our bodies. When one has diabetes, their body either does not make enough insulin or cannot use its own insulin. This causes sugar to build up in the blood. Diabetes can cause serious health complications including heart disease, blindness, kidney failure and lower-extremity amputations. There are two types of diabetes, type 1 (characterised by abrupt onset of symptoms (often in early adolescence), insulinopenia, and dependence on exogenous insulin; it is due to lack of insulin production by the pancreatic beta cells) and type 2 (peaking in onset between 50 and 60 years of age, characterised by gradual onset with few symptoms of metabolic disturbance (glycosuria and its consequences) and control by diet, with or without oral hypoglycaemics but without exogenous insulin required).

5.1.5 Heart Disease

The term “heart disease” refers to a structural or functional abnormality of the heart, or of the blood vessels supplying the heart, that impairs its normal functioning. There are several types of heart conditions. Some of these are coronary artery disease, angina, heart failure and arrhythmias. Some conditions as well as some lifestyle factors can put people at higher risk for getting heart disease. The most important of these are high blood pressure, high blood cholesterol, cigarette smoking, diabetes and obesity.

5.1.6 HIV/AIDS

HIV is the Human Immunodeficiency Virus. This virus can lead to Acquired Immune Deficiency Syndrome or AIDS. HIV destroys blood cells called CD4+ T cells. These cells help the body fight diseases. This means that HIV stops one’s body from fighting diseases.

HIV spreads when body fluids like blood or semen from an HIV positive person come into contact with broken skin from another person. The most common ways to get HIV is through: unprotected (without a condom) sex with someone with HIV; sharing needles, syringes and other equipment used to inject drugs; as well as from an infected mother. HIV cannot be

contracted: casual contact like hugging, shaking hands or sharing dishes; closed mouth or “social” kissing; saliva, tears or sweat; insects like mosquitoes; and air or water.

5.1.7 Hypertension

Hypertension (HTN) or high blood pressure, sometimes called arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated. Blood pressure is the force of blood pushing up against the blood vessel walls. The higher the pressure the harder the heart has to pump. Hypertension is a major risk factor for stroke, myocardial infarction (heart attacks), heart failure, aneurysms of the arteries (e.g. aortic aneurysm), peripheral arterial disease and is a cause of chronic kidney disease. Even moderate elevation of arterial blood pressure is associated with a shortened life expectancy. Dietary and lifestyle changes can improve blood pressure control and decrease the risk of associated health complications, although drug treatment is often necessary in people for whom lifestyle changes are not enough or not effective.

The exact cause of hypertension is usually unknown. There are, however, some factors associated with the condition. These are: smoking; obesity or being overweight; diabetes; lack of physical activity; high levels of salt intake; insufficient calcium, potassium and magnesium intake; vitamin D deficiency; high levels of alcohol consumption; stress; aging; medicines such as birth control pills; genetics and family history; chronic kidney disease; and adrenal and thyroid problems.

5.1.8 Influenza

Influenza or ‘flu’ is a viral illness that occurs mainly in the winter months in South Africa. Influenza viruses can infect the nose, throat, sinuses, upper airways and lungs. In healthy children, young adults and middle-aged people the disease is mostly mild. Flu can however be life-threatening in older people, babies, toddles and people of any age who have underlying conditions. Flu spreads easily from person to person through droplets when an infected person coughs or sneezes. It can spread when you touch other people or surfaces where droplets have landed.

5.1.9 Malaria

Malaria is a mosquito-borne infectious disease of humans and other animals caused by parasitic protozoans (a type of unicellular microorganism) of the genus Plasmodium. Commonly, the disease is transmitted via a bite from an infected female Anopheles mosquito, which introduces the organisms from its saliva into the person's circulatory system. In the blood, the protists travel to the liver to mature and reproduce. Symptoms of malaria include fever and flu-like illness such as shaking chills, headache, muscle aches and tiredness. Nausea, vomiting and diarrhoea may occur. If not promptly treated, the infection can become severe and may cause kidney failure, seizures, mental confusion, which in severe cases can progress to coma or death.

In South Africa malaria is found in Limpopo, Mpumalanga and the north-eastern part of KwaZulu-Natal. The peak period is between September and May.

5.1.10 Stroke

A stroke, sometimes referred to as a CerebroVascular Accident (CVA), is the rapid loss of brain function due to disturbance in the blood supply to the brain. This can be due to ischemia (lack of blood flow) caused by blockage (thrombosis, arterial embolism), or a haemorrhage (Sims, 2009). As a result, the affected area of the brain cannot function, which might result in an inability to move one or more limbs on one side of the body, inability to understand or formulate speech, or an inability to see one side of the visual field (Donnan, 2008).

5.1.11 Tuberculosis

Tuberculosis, MTB, or TB (short for tubercle bacillus) is a common, and in many cases lethal, infectious disease caused by various strains of mycobacteria, usually *Mycobacterium tuberculosis* (Kumar, 2007). Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It is spread through the air when people who have an active TB infection cough, sneeze, or otherwise transmit respiratory fluids through the air. People nearby or in close proximity may breathe in these bacteria and become infected. The classic symptoms of active TB infection are a chronic cough with blood-tinged sputum, fever, night sweats, and weight loss (the latter giving rise to the formerly prevalent term "consumption").

5.2 General Health Profile: Country Specific

South Africa's has a large public sector and a smaller but fast growing private sector. The country's Healthcare system comprises a network of health facilities providing primary health care, supported by several higher levels of care. Health care in South Africa varies from the most basic primary health care, offered free by the state, to highly specialised, hi-tech health services available in the both the public and private sector.

The public health sector is stretched and under-resourced in several places. While the state contributes about 40% of all expenditure on health, the public health sector is under pressure to deliver services to about 80% of the population. The private sector, on the other hand, is run largely on commercial lines and caters to middle- and high-income earners who tend to be members of medical schemes (South Africa Info, 2013). It also attracts most of the country's health professionals.

This two-tiered system is not only inequitable and inaccessible to a large portion of South Africans, but institutions in the public sector have suffered poor management, underfunding and deteriorating infrastructure. While access has improved, the quality of health care has fallen. The situation is compounded by public health challenges, including the burden of diseases such as HIV and tuberculosis (TB), and a shortage of key medical personnel.

However, the South African government is responding with a far-reaching reform plan to revitalise and restructure the South African health care system, including:

- Fast-tracking the implementation of a National Health Insurance scheme, which will eventually cover all South Africans;

- Strengthening the fight against HIV and TB, non-communicable diseases, as well as injury and violence;
- Improving human-resource management at state hospitals and strengthening co-ordination between the public and private health sector;
- Deploying "health teams" to communities and schools;
- Regulating costs to make health care affordable to all; and
- Increasing life expectancy from 56.5 years in 2009 to 58.5 years in 2014.

5.2.1 Healthcare Facilities

There are 4 200 public health facilities in South Africa. People per clinic is 13 718, exceeding WHO guidelines of 10 000 per clinic. However, figures from March 2009 show that people averaged 2.5 visits a year to public health facilities and the usable bed occupancy rates were between 65% and 77% at hospitals (South Africa Info, 2013).

Since 1994, more than 1 600 clinics have been built or upgraded. Free health care for children under six and for pregnant or breastfeeding mothers was introduced in the mid-1990s (*ibid*.).

The National Health Laboratory Service (NHLS) is the largest pathology service in South Africa. It has 265 laboratories, serving 80% of South Africans. The laboratories provide diagnostic services as well as health-related research (*ibid*.).

5.2.2 Doctor Shortages

In March 2012, 165 371 qualified health practitioners in both public and private sectors were registered with the Health Professions Council of South Africa (HPCSA), the health practitioner watchdog body. This includes 38 236 doctors and 5 560 dentists (*ibid*.).

The doctor-to-population ratio is estimated to be 0.77 per 1 000. Due to the vast majority of General Practitioners – 73% – work in the private sector, there is approximately one practising doctor for every 4 219 people (*ibid*.). In response, the Department of Health has introduced clinical health associates, midlevel health-care providers, to work in underserved rural areas.

Approximately 1 200 medical students graduate annually. In some communities, medical students provide health services at clinics under supervision (*ibid*.). Newly graduating doctors and pharmacists complete a year of compulsory community service in understaffed hospitals and clinics.

5.2.3 HIV/AIDS

HIV/AIDS and other poverty-related diseases such as TB and cholera place a tremendous strain on South Africa's health care system. According to Statistics South Africa, in 2011:

- The overall HIV prevalence rate was 10.6%. About one-fifth of South African women in their reproductive ages were HIV positive;

- There were 5.38 million people living with HIV. This was up from 4.21 million in 2001;
- 16.6% of the adult population (aged 15–49) years was HIV positive;
- There were about 2.01 million orphans due to HIV;
- New HIV infections for 2011 among adults was estimated at 316 900; and
- An estimated 1.06 million adults and 105 123 children were receiving antiretroviral treatment in 2010. This was up from 101 416 and close to 12 000 children in 2005.

In May 2012, the government reported to having cut the mother-to-child transmission rate from 3.5% in 2010 to less than 2%. It also stated that the rate of new infections had dropped from 1.4% to 0.8% in the 18 to 24 age groups (South Africa Info, 2013).

5.2.4 Tuberculosis

Fuelled by the concomitant hyper-endemic TB and HIV epidemic, South Africa now has the highest incidence of TB in the world (981 per 100 000) and the third largest burden of TB, after China and India (DHB, 2011/12). TB management remains a challenge in South Africa; especially it's co-morbidity with HIV/AIDS. South Africa has one of the highest incidence rates of TB in the world. In 2010, the incidence rate for all types of TB was 805 per 100,000.

HIV and TB are dangerous bed fellows: the co-infection rates exceed 70%, with TB being the most common opportunistic infection in HIV-positive patients.

Due to of late detection, poor treatment management and drug-resistant forms of TB (known as DR-TB or multidrug-resistant TB; and XDR TB or extensively drug-resistant TB) have increased significantly, with about 5 500 cases diagnosed during 2009 (*ibid.*).

Integrating the double scourge of HIV/AIDS and TB for the first time, the government has launched the National Strategic Plan for HIV/AIDS and TB for 2012 – 2016. It is shored up by a provincial implementation programme.

The plan seeks to address the social structural drivers of HIV/AIDS, STD and TB care, prevention and support; to prevent new infections; to sustain health and wellness; and to protect human rights and access to justice of sufferers.

The HIV Counselling and Testing (HCT) campaign was launched in April 2010 – by mid-2012, almost 20 million people had been tested and knew their status. Millions were also screened for TB.

Increasing the number of anti-retroviral sites as well as nurses certified to initiate Antiretroviral (ARV) treatment has seen 1.7 million people placed on ARV treatment, from 1.1 million in 2009. South Africa has the largest ARV therapy programme in the world, and an improved procurement process has seen a 50% decrease in the prices of ARV drugs (*ibid.*).

5.2.5 Maternal Health

South Africa is a signatory to several international commitments such as the UN's Millennium Development Goals (MDGs), which seeks to address the health needs of women and children. However, in South Africa the health of mothers and children remains poor.

According to statistics from WHO, South Africa has a maternal mortality ratio of 310 deaths per 100 000 lives births. The infant (under-1) mortality rate in 2010 was 41 deaths per 1 000 live births, while the under-5 mortality rate was 57 per 1 000 live births (*ibid.*).

Under the national Prevention of Mother-to-Child Transmission (PMTCT) programme, every pregnant woman is offered HIV testing and counselling. If a woman tests positive for HIV, she is put on to a regime of anti-retroviral therapy to avoid transmitting the virus to her baby, and is offered a continuum of treatment, care and support for herself and her infant.

But it is really access and utilisation of Antenatal Care (ANC) services that most influence pregnancy outcome, child survival and maternal health. The renewed focus on primary health and the improving and expanding the health system infrastructure should go some way to addressing the high mortality rates – and get South Africa closer to the MDG target of reducing infant mortality to 20 by 2015.

The Department of Health has a strategic plan in place which identifies “priority interventions” that will have the greatest influence on reducing mortality rates, as well as enhancing gender equity and reproductive health. The campaign on Accelerated Reduction of Maternal Mortality in Africa (CARMMA), an African Union initiative, was launched in May 2012 and aims to reduce maternal and infant mortality rates (South Africa Info, 2013).

5.2.6 Child Health

Immunisation is a significant barrier against disease and death, and the rates of children receiving their primary vaccines have steadily been increasing under immunisation programmes. These aim to protect children against vaccine-preventable diseases, such as measles, TB, cholera and pertussis.

Measures to improve child health also include the expansion and strengthening of school health services and the establishment of district clinical specialist teams. Other prevention services, such as regular deworming and growth monitoring, help protect children's health.

The Health of our Children report in 2010, which surveyed 8 966 children, found that HIV prevalence among infants (age 0 to 2 years) was 2.1%, lower than the 3.3% average in the age 0 to 4 years, suggesting a positive impact of the national Prevention of Mother-to-Child Transmission programme, begun in 2006 (South Africa Info, 2013).

5.2.7 Traditional Medicine

An estimated 80% of South Africans consult with traditional healers alongside general medical practitioners (*ibid.*). The Medical Research Council (MRC) founded a traditional medicines research unit in 1997 to introduce modern research methodologies around the

use of traditional medicines. It also aims to develop a series of patents for promising new entities derived from medicinal plants.

5.2.8 Malaria

Malaria is not endemic in South Africa, and does not pose a major health risk. According to the WHO's World Malaria Report 2010, only 4% of the population is at high risk of malaria and 6% at low risk, while 90% live in malaria-free areas. Almost all cases are caused by *Plasmodium falciparum* (WHO, 2010). Transmission occurs seasonally, with peak rates of infection occurring in September and declining by June.

5.2.9 Health Legislation in South Africa

The National Health Act, 2003 (Act No. 61 of 2003), provides a framework for a single health system for South Africa. The Act provides for a number of basic health care rights, including the right to emergency treatment and the right to participate in decisions regarding one's health.

The implementation of the Act was initiated in 2006, and some provinces are engaged in aligning their provincial legislation with the national Act.

Other legislation relating to health care includes laws which aim to:

- Ensure all health establishments comply with minimum standards through an independent entity (National Health Amendment Bill, 2010);
- Make drugs more affordable and provide for transparency in the pricing of medicines (Medicines and Related Substances Amendment Act (Act no. 59 of 2002));
- Regulate the medical schemes industry to prevent it from discriminating against "high risk" individuals like the aged and sick (Medical Schemes Act, 1998);
- Legalise abortion and allow for safe access to it in both public and private health facilities (The Choice on Termination of Pregnancy Act, (Act No. 92 of 1996);
- Limit smoking in public places, create public awareness of the health risks of tobacco by requiring certain information on packaging, and prohibit the sale of tobacco products to anyone younger than 18 (Tobacco Products Control Amendment Act (Act no. 23 of 2007));
- Provide for the introduction of mandatory community service for nurses (Nursing Act, 2005)
- Introduce a process to develop and redesign mental health services so as to grant basic rights to people with mental illnesses (Mental Health Care Act, 2002); and
- Allow non-pharmacists to own pharmacies, with the aim of improving access to medicines (Pharmacy Amendment Act, 2000). This came into effect during May 2003.

Other important developments in health care policy and legislation include:

- The Health Professions Amendment Bill of 2006;

- The Traditional Health Practitioners Act (Act no. 35 of 2004); and
- Regulations relating to the Labelling and Advertising of Foodstuffs came into effect in May 2012, and aim to empower citizens to make healthy food choices.

5.3 General Health Profile: Project Region Specific

5.3.1 Burden of Disease

The Waterberg District's 2009 Burden of Disease (BoD) profile is considered from an analysis of the causes of death. This is above the South African mean of 30.2% and a long way from the internationally recognisable standard of 10%. Of the unusable classifications, 21.6% of deaths were assigned to 'ill-defined' causes and 11.6% to 'garbage codes'. An analysis of the Years of Life Lost (YLLs) after redistribution of the deaths by four broad cause groups reflects that the highest proportion of YLLs was due to communicable diseases (together with maternal, perinatal and nutritional conditions) (35.4%), followed by non-communicable diseases (27.7%). HIV and TB (24.5%) ranked third whilst the lowest proportion (12.4%) of YLLs was due to injuries (*ibid.*).

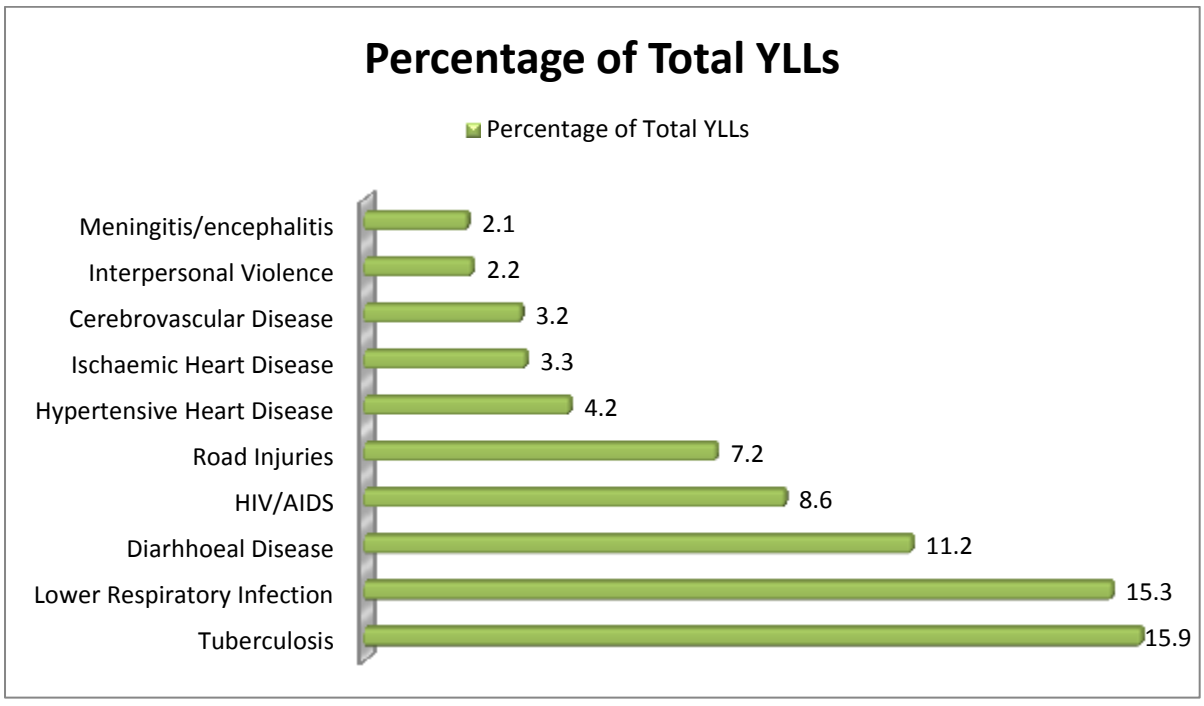


Figure 5: Leading causes of Years of Life Lost (YLLs): LP – DC36: Waterberg District Municipality

5.3.2 Primary Healthcare Facilities in Mogalakwena LM

The Mogalakwena municipality is serviced by 3 Hospital, 26 Clinics and 12 Mobile Clinics. Walking distance to hospitals and clinics: - More than 80% of the population is within 120 minutes from health facilities (Day *et al*., 2012).

Figure 6: A Healthcare facility situated in one of the PACs

5.3.3 Usable Bed Utilisation Rate

The usable Bed Utilisation Rate (BUR) is a process indicator (identifies activities related to the functioning of the health system) that is also a measure of efficiency. The BUR reflects how many of the usable beds in a hospital were occupied over a given time period, usually a year. A low BUR value for a given hospital may indicate that there is little or no need for the hospital in the particular community or area. Another explanation could be that the community chooses not to use the hospital for any number of reasons.

In contrast, a high BUR could indicate that patients are spending too long in the hospital and not being discharged appropriately or it could mean that there are insufficient beds to cater for the needs of the population.

The national BUR was 67.2% in 2011/12. The majority of Limpopo districts exceeded the national rate and the national target (*ibid.*).Waterberg district has 1.3 district hospital beds per 1 000 population, higher than both the provincial and national averages of 0.8 and 0.7 respectively. The bed utilisation rate was 61.4%, the lowest in the province, with an average length of stay of 4.5 days (*ibid.*).

5.3.4 HIV/AIDS

HIV and AIDS is major contributor to the disease burden in South Africa and has had a severe effect on the social and economic fabric of South Africa. To detect HIV infection early, the public health sector provides HIV counselling and testing to pregnant women to prevent mother-to-child transmission. During 2011/12, 98.8% of pregnant women were tested for HIV (Day *et al*., 2012). The Limpopo province reflected coverage of 101.6%, which is over the 100% Department of Health's annual target.

The antenatal client HIV 1st test rate dropped from 100.9% in 2010/11 to 99.4% in 2011/12 in the Waterberg District. The antenatal client HIV 1st test positive rate decreased slightly from 24% in 2010/11 to 21.7%. The antenatal client HIV prevalence (routine data) was 26.7% and in line with the 2010 HIV Antenatal seroprevalence[1] Survey rate of 26.1% (*ibid.*). The rate of antenatal clients initiated on HAART was 64%, well below the national average of 80.4%. The distribution rate for male condoms increased from 10.8 condoms per male (15 years and older) in 2010/11 to 27. This rate was above the provincial average of 19.7 condoms (Day *et al*., 2012).

Limpopo had the third lowest HIV prevalence in the country at 8.8% (Shisana *et al*., 2009). The antenatal HIV prevalence for Waterberg District was 24% (Day *et al*., 2012). The last HIV prevalence survey in the Mogalakwena Local Municipality was conducted in 2000 and estimated the prevalence to be 10.2% (Mogalakwena Local Municipality, 2012).

[1] The frequency of individuals in a population that have a particular element (as antibodies to HIV) in their blood serum.

5.3.5 Tuberculosis

In 2010, there were 184.6 smear positive TB cases per 100,000 people in Limpopo, which remained the lowest incidence in South Africa. The TB cure rate in Limpopo was 70.3% in 2009, which was close to the national average of 71.1%. Waterberg District had the highest TB incidence in Limpopo, but also has the worst outcomes, with a smear conversion rate of only 55.6%, a low cure rate of 62.4% coupled with a high defaulter rate of 13.2%. There were 681 cases per 100,000 of TB in Waterberg District in 2011. In the same year, new HIV positive patients who had a confirmed TB rate was 14.4% (Day *et al*., 2012).

5.3.6 Malaria

Malaria is endemic in three South African provinces, and is more prevalent in specific districts than others. Limpopo is one of these provinces. Malaria is a seasonal disease and quarterly monitoring of the incidence rate may not reflect disease trends accurately. Table 6 depicts the number of malaria deaths in Limpopo. Limpopo is endemic to malaria, and transmission is distinctly seasonal, with most cases reported during the summer rainy season between September and May. Most cases are reported in December, due to the movement of people between malaria areas outside the province and areas under control within the province.

There were 253 reported cases of malaria in the province between October and December 2012. This was a decrease from 504 during the same period in 2011 and 1,744 in 2010. The mean case fatality rate from malaria in South African has been reported to be about 1.1% per season. The incidence of malaria in Waterberg District between 1998 and 2005 was about 30.9 per 100,000 person years. The mean number of cases reported per season is about 190 while the mean number of reported deaths per season is 1.1 (Gerritsen *et al*., 2008). The Department of Health and Social Development regularly sprays households, with 300,000 houses sprayed[2] (Indoor Residual Spraying (IRS)) between October and December 2012 (Politicsweb, 2012).

Table 6: Number of deaths due to Malaria in Limpopo, 1997 - 2009

Year	Number of Deaths
1997	170
1998	160
1999	380
2000	324
2001	377
2002	359
2003	359
2004	313

[2] Indoor Residual Spraying is the application of a long-lasting residual insecticide to potential malaria vector resting surfaces such as internal walls, eaves, and ceilings of all houses or structures (including animal shelters) where such malaria vectors might come into contact with the insecticide (WHO, 2013).

Year	Number of Deaths
2005	296
2006	183
2007	59
2008	80
2009	570
Source: Mortality and causes of death in South, 1997-2009; Findings from the death notification, Statistics South Africa	

5.3.7 Child Health

Immunisation is an essential intervention to protect children against vaccine-preventable diseases. During 2011/12 the national full immunisation coverage rate for children under the age of one was 95.2%, which exceeded the annual target of 95%. The Limpopo province, again, exceeded the national target (*ibid.*).

Immunisation is one of the most effective health care interventions to prevent serious illnesses and death in young children. Immunisation has a significant impact on morbidity and mortality rates and plays a critical role in efforts to achieve Millennium Development Goal 4 to reduce child mortality rates by two-thirds by 2015, compared to the 1990 baseline. The Limpopo province ranked in the top 10 (in 2010/11) and showed large increases in immunisation rates over the past 5 years.

- The immunisation coverage under 1 year in the Waterberg District increased from 80.6% in 2010/11 to 86.9% in 2011/12.
- Over the same period the pneumococcal vaccine 3rd dose coverage increased from 80% to 103.2%, the rotavirus 2nd dose coverage increased from 82.8% to 109.6% and the measles 1st dose under 1 year coverage increased from 90.4% to 103.5%.
- The indicators that have numerators greater than the denominators resulting in coverage rates of more than 100% may indicate data quality issues.
- The measles 1st to 2nd dose drop-out rate increased dramatically from 4.0% to 21.2% (*ibid.*).

5.3.8 Non-communicable Diseases

Non-communicable diseases (NCD) play an important role in the overall burden of disease in the Limpopo Province. Strokes, chronic lung disease, heart disease, hypertension and diabetes are all mentioned in the top 20 disease burdens in the province (Bradshaw *et al*., 2004). There is very little information in the public domain related to NCD at the district level.

- The diabetes mellitus and hypertension detection rate in Waterberg District in 2010 was estimated to be between 0.1 and 0.2% (Day *et al*., 2012).
- The hypertension detection in the Waterberg District was 0.1%.

- The mental health case load was 0.8%, the lowest in the province and below the national average of 1.4% (*ibid.*).

6 BASELINE HEALTH STATUS

6.1 Environmental Health Areas (EHAs)

The following section describes the baseline health status in the proposed Project area with reference to the EHAs. This is based on the national and regional baseline health data that was identified during the desktop review and during the site visit from 3rd to the 11th of September 2013. Data at the local level is based on the aforementioned distributed Questionnaires and KII that were carried out during the field visit.

6.1.1 EHA #1: Communicable Diseases Linked to Overcrowding and Poor Environmental/Social Conditions

6.1.1.1 General Housing and Respiratory Diseases

Based on the key informant interview it was clear that most households live in a brick structure or traditional structures on individual properties (with more than one house on the respective property) or one house on a separate stand/property. According to data derived from 2011 census there is not an extreme need for housing throughout the province as 88.7% of people in Limpopo reside in formal housing (Stats SA, 2011). Table 7 depicts the type of housing in the Project region. The household survey conducted in the PACs showed a similar scenario as it was confirmed during the field visit that much of the population within the PACs has some kind of formal residence. Houses were traditional brick or mud structures either with a thatch or corrugated iron roof.

Table 7: Type of housing

Study area	Type of housing			
	Formal	Informal	Traditional	Other
Limpopo	89%	5%	4%	2%
Waterberg	86%	12%	1%	1%
Mogalakwena	94%	5%	1%	0%

Based on the KII as well as the household survey, overcrowding is a problem with some respondents claiming to have ten individuals living in a three bedroomed house. Houses are basic and sufficient. With the exception of Mzumbane, squatter areas do not appear to be a problem.

According to KIIs as well as data collected from the household survey, TB is the most common respiratory disease in the PACs. A whopping 496 out of the 737 questionnaires received reported TB to being one of the most common illnesses in their communities. This is approximately 68% of the total surveyed population. One hundred and thirty (130)

Respondents stated that asthma was one of the three most important illnesses in their communities. These results are illustrated in Figure 7. Less than 20% of respondents reported to influenza being one of the most common illnesses affecting their communities.

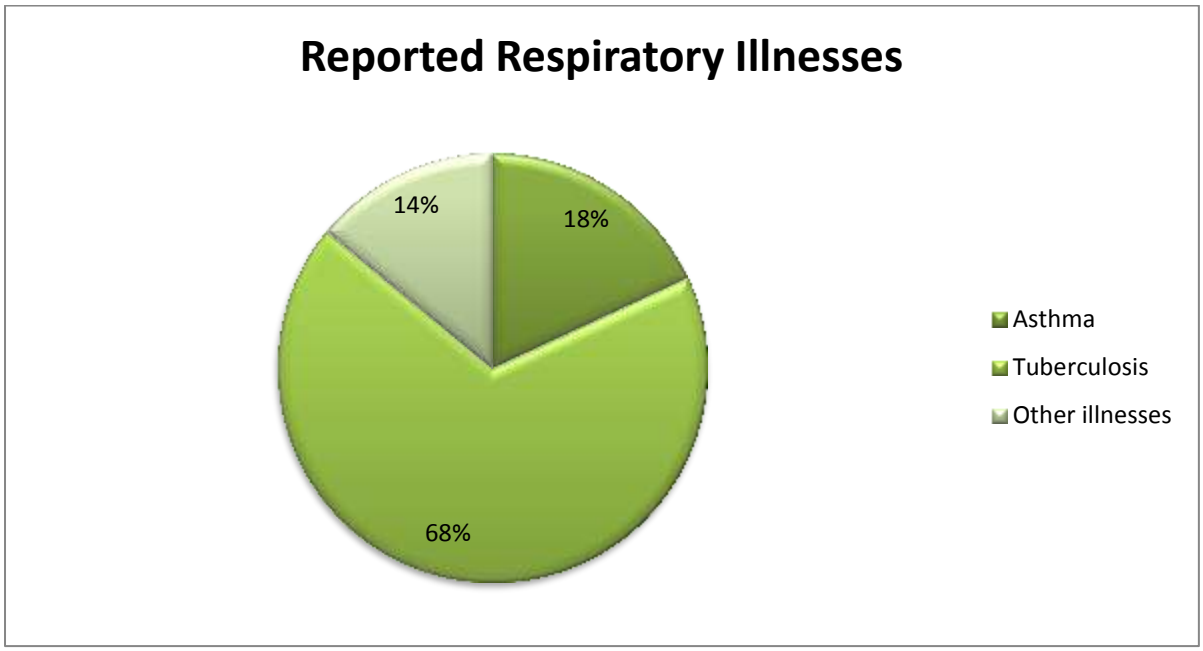


Figure 7: Number of times TB and asthma were mentioned during the household survey

6.1.2 EHA #2: Vector-related Diseases

6.1.2.1 Malaria

Although malaria is not common in South Africa, twelve respondents in Sandsloot and one in Kgubudi listed malaria as one of the top three most common illnesses/diseases in their communities. Fourteen (14) out of 737 individuals is an extremely minute percentage of the population. Malaria can therefore be ruled out as a disease of concern.

6.1.3 EHA #3: Soil-, Water- And Waste-Related Diseases

The Mogalakwena River flows to the west of the proposed Project Area and ultimately flows into the Limpopo River. The Mogalakwena River is characterised by the presence of vleis and wetlands along its drainage course on both the Turfspruit and Macalacaskop farms. The Sterk River is a major tributary of the Mogalakwena River and joins the Mogalakwena River from the west some 30 km below the proposed Project Area. The Doorndraai Dam is located on the Sterk River. The Doorndraai Dam is the main water supply dam for Mokopane.

There are four main water courses that drain across or adjacent to the proposed Project Area. The Rooisloot, Dorps and the Ngwaditse Rivers flow in a westerly direction across the proposed Project Area into the Mogalakwena River. The Dithokeng stream crosses the corner of the mine property in the north before joining the Mogalakwena River. A dam has been constructed on this stream upstream of the town to the north east of Turfspruit. The

dam is used for domestic water supply. Individuals in some of the PACs have reported to drinking from and swimming in open water bodies such as these.

Water is recognised as a scarce resource in the district and municipal area and management systems are generally poor. In Mogalakwena ground water resources are available for use and can supplement the local water supply schemes. The municipality achieved a relatively low blue drop grading at 78%, a municipalities Blue drop status refers to the safety of water, which is made available for human consumption. Concerns were raised about the availability of water in the project area to support the mine and related operations, as well as the needs for agriculture and domestic use.

The availability of sanitation facilities not only improves the dignity of people, but also promotes their health. Areas without proper sanitation systems give rise to water borne diseases like cholera, diarrhoea, and typhoid. Household surveys indicated that the majority of households do not have access to adequate sanitation services. The bulk of these occur in the rural areas where residents construct their own pit latrines often of poor standard. In the household survey the majority of the respondents used pit latrines and Ventilated Improved Pit-latrine (VIP) toilets in their own yards. All households inside and closer to Mokopane town such as the Extensions, and Mahwelereng reported to having adequate sanitation facilities (flush toilets) inside their houses and yards.

Cholera was the most common water and sanitation related illness reported in the proposed Project area with 38 individuals, approximately 7% of the surveyed population, listing the disease as one of their communities biggest health challenge. The Department of Health and Social Development in partnership with the Department of Water Affairs conducted a door-to-door campaign and distributed disinfectants to prevent the outbreak of cholera in the Mokopane and surrounding area in March 2011. A news report on the '*New Age*' newspaper asserted that there were no reported cases of cholera in the area, and that the Department and the Mogalakwena Municipality had taken proactive steps to prevent an outbreak by conducting door- to-door campaigns to cover the Sekgakgapeng, Moshate, Masodi and Ga-Madiba areas (New Age Newspaper, 2011). Households in the PACs generally obtain their drinking water from taps and boreholes provided by the municipality, as well as "Jojo tanks[3]" (see Figure 8 below).

[3] The Jojo vertical tank is the familiar upright tank and is used for the storage of water, fertilizers, chemicals and most other liquids. They range from 750L to 20000L. All Jojo water tanks are lined with a black food safety accredited lining material that inhibits the growth of algae.

Figure 8: Sources of drinking water: *Jojo* tanks

6.1.4 EHA #4: Sexually-Transmitted Infections, Including HIV/AIDS

All five key health personnel interviewed listed HIV/AIDS as one of the top five most common illnesses that they treat. All health facilities have the ability to diagnose HIV. However, only four Healthcare facilities stock ARVs.

Condoms are readily available within the communities. They are available for free at health facilities and they are also available in the shops, '*spazas*', schools and shebeens. There is little stigma associated with buying condoms, although some women stated that they sometimes feel shy to take free condoms from public places.

There are regular HIV awareness campaigns within the community. The Catholic Medical Mission Board, Inc. (CMMB) has launched a comprehensive medical male circumcision (MMC) HIV prevention program in the community. Figure 9 illustrates a picture of one of the CMMB posters at a Healthcare facility in one of the PACs. The district health authorities reported that there is good knowledge of HIV transmission and prevention measures.

Figure 9: CMMB MMC poster at one of the Healthcare facilities

Most members of the communities also have a good attitude towards people with HIV, whilst a handful has discriminatory attitudes towards HIV positive people.

Information collected during focus group discussions shows that a large proportion of respondents know the two main ways to prevent HIV, namely condom use and having one uninfected sexual partner. One of the respondents in Ntete village noted that although the knowledge of prevention methods is higher among men this knowledge is seldom translated into practice by men.

6.1.4.1 HIV/AIDS: Knowledge, Attitude and Behaviour

More than 95% of the surveyed population reported to having heard about HIV/AIDS. With numerous respondents across the PACs stating that HIV/AIDS is a serious problem in their communities it is clear to see that HIV/AIDS has affected all levels of these communities – from the youth to the elderly. Many people stated that the disease is one of grave concern as it is "killing the youth." It is unsurprising that the household surveys revealed that over 80% of the respondents have heard of the disease. While the remaining 20% asserted that HIV/AIDS is not a serious problem in their communities as nurses and NGOs educate the populace about this disease, and therefore expect that everyone should have knowledge on this diseases, results prove that the general levels of awareness and consistent knowledge on the disease and preventive behaviours is relatively poor. Thus, the mere acknowledgement of the disease in the absence of understanding the disease risk, the modes of transmission and associated preventive behaviours, will not support any form of behaviour change or risk taking practices.

There are high levels of stigma in the communities with associated discrimination as, although individuals were willing to purchase food from someone who they knew was HIV positive, more than half of the respondents would keep their HIV positive family member's

status a secret. Apart from this being attributable to a general respect for their family member's privacy, part of this is due to the poor levels of knowledge and beliefs. Traditional, cultural and religious beliefs make it difficult to inform behavioural change information. It is felt that the more rural communities simply don't have access to adequate information about HIV and AIDS, and the high levels of illiteracy also makes behavioural change communication somewhat challenging.

Information collected during the household survey shows that a large proportion of respondents know the two main ways to prevent HIV, namely condom use, abstaining and having one uninfected sexual partner (monogamy –being faithful).

6.1.4.2 Commercial Sex

With regard to the negative impacts of the project development it was reported by key health personnel that there are no commercial sex workers in the broader study area. This was completely different to the situation as described by the respondents that reported that commercial sex was a broader community challenge. If commercial sex is not reported in the study communities then the challenge will be to maintain this situation when the practice is considered to be a challenge in the broader community. Should the mine lead to the emergence of more prostitution in the area there would be negative social and health connotations. There was also a concern raised that an influx of single male migrants from outside the area would place a burden on scarce resources and also cause an increase in the incidence of HIV and STI. Results from the household surveys suggest that disadvantaged young girls and child-headed households would be extremely vulnerable to single men with disposal income.

6.1.5 EHA #5: Food- And Nutrition-Related Issues

Food security includes a variety of aspects such as stability of the availability of food, as well as stability of access to and utilisation of food (SAHR, 2008). Nutritional status is determined by the degree of nourishment. Under-nourishment, an indicator of food security, means consumption is continuously below. Approximately 52% of South African households experienced hunger in 2009 (WHO, 2010). Therefore food security is an important consideration in understanding potential health impact of development projects. This EHA is affected by influx of people resulting in increased demand for food.

Based on the key informant interviews and household survey results, food shortage is a serious problem in the area. Surprisingly and somewhat contradictory, malnutrition was not rendered as a serious disease. A few respondents stated that malnutrition was a problem. This was for both children and also the elderly as vulnerable groups. Much of this was linked to poverty in the communities. Food shortage has been noted as one of the main health needs in the area. Malnutrition is linked to poverty and food security issues, as the population cannot afford basic foodstuffs. Poor feeding practices related to poor education and illiteracy are bound to worsen the existing situation.

6.1.6 EHA #6: Non-Communicable Diseases

The chief chronic conditions observed in the surveyed communities include chronic diseases such as hypertension, diabetes, stroke, and cancer. Four hundred and twenty (420),

approximately 57% of the surveyed population highlighted that hypertension/"high blood pressure" and diabetes are serious problems in their communities. This is also asserted by information obtained during the KIIs, where three out of the five interviewed key health personnel listed hypertension in their top five major illnesses facing their community. One hundred and seventy three (183) respondents, approximately 25% of the surveyed population reported to cancer being one of the most common illnesses in their communities. They did not, however, state the type of cancers being referred to. Arthritis was also in the top five most common illnesses mentioned overall in the communities.

6.1.7 EHA#7: Accidents/Injuries

Accidents and injuries were commonly reported in the two of the KIIs. Road traffic accidents (RTA) are the not very common in the communities. Gender-based violence and crime related injuries such as assault are more common. There is a strong link to alcohol in domestic violence and motor vehicle accidents.

6.1.8 EHA #9: Exposure to Potentially Hazardous Materials, Noise and Malodours

During the field visit, it was apparent to Digby Wells' Consultants that numerous households still use wood for cooking and heating that may cause a risk from indoor air pollution and associated respiratory health concerns. As waste removal from households is a challenge many households burn waste that can emit harmful by products especially with plastics. In the more rural communities (further from Mokopane town) there are illegal and uncontrolled dump sites and those which are available can contaminate water supplies and present unhygienic conditions.

Dust generation in the project area is principally a result of traffic of vehicles on unpaved roads in the area, but the effect should be minimal in the sparsely populated area. In a similar way noise is not regarded as a major affect in the area.

6.1.8.1 Air Quality and Human Health

As part of the ESIA, Digby Wells conducted an Air Quality Impact Assessment Study. A domain of 20x20 km was defined, with a reference mid-point within the future mining and plant area. This domain, defined as the zone of potential impact due to air pollution emanating from the proposed Platreef mine stretches 10 kilometres from the reference point to the North, South, East and Western boundaries. This zone of impact encompasses Magongoa in the northeast, Tshamahansi to the east, Kgubudi to the west and southwest, Mzumbane to the south, and Masodi, Madiba, Masehlaneng Mahwelereng, Moshate and Sekgakgapeng further south.

Other sources of air pollution have also been considered. Mokopane town has a number of small industries within its location, as well as hospital with stack. Anglo Platinum operates a well-established platinum mine. The current infrastructure of Mogalakwena platinum mine consists of four open pits, namely the Sandsloot, Zwartfontein, Mogalakwena Central and Mogalakwena North pits. The mining method is open-pit truck and shovel, and the current pit depths vary from 110 metres (Mogalakwena North) to 245 metres (Sandsloot).

It is not foreseen that the various construction activities would result in higher off-site impacts than the operational phase mining activities. The transitory nature of the construction activities, and the low likelihood that some of these activities would concur with the first operational mining months would reduce the significance of the potential impacts. The main pollutant of concern identified as a result of the construction and operational phases of the mining development will be the particulate matter, whether in the form of total suspended particulates (TSP), PM_{10} or $PM_{2.5}$.

In terms of health effects, particulate air pollution is associated with complaints of the respiratory system (WHO, 2000). Particle size is important for health because it controls where in the respiratory system a given particle deposits. Fine particles are thought to be more damaging to human health than coarse particles as larger particles are less respirable in that they do not penetrate deep into the lungs compared to smaller particles (Manahan, 1991). Larger particles are deposited into the extrathoracic part of the respiratory tract while smaller particles are deposited into the smaller airways leading to the respiratory bronchioles (WHO, 2000). The range of adverse health effects of PM is broad, involving respiratory and cardiovascular systems in children and adults. The health effects of identified air pollutants have been discussed in depth in the Air Quality Impact Assessment Report.

6.1.9 EHA #10: Social Determinants of Health

Substance misuse such as alcohol, tobacco or other drugs is not only an important health determinant but also closely linked to mental health (Prince *et al*., 2007) –the use of the drug 'nyaope[4]' which was reported (during the KIIs) to lead to mental illness. Misuse is associated with crime, prostitution and domestic violence. Several respondents admitted that most members of their communities drink a lot of alcohol, especially during the weekends and at the end of the month when individuals have received their wages and salaries. The key health personnel validated this by asserting that alcohol and drug abuse was a major contributor of disease.

6.1.10 EHA #11: Cultural Health Practices

Culture and traditional values play a very important role in the local communities. The SePedi and Shangaan communities place a large emphasis on traditional values and practices and this relates to health care and health seeking behaviour. Surprisingly, traditional medicine did not play a major or an integral role in health seeking behaviour and also where choices are made as to preference for health care. The vast majority sought help from Healthcare facilities as their first option. Numerous respondents stated that traditional medicine is often accessed after seeking care for a more western medical source –"I will go to the traditional healer if the doctors in the clinics cannot help me". From the KII it was apparent that some cultural traditions and religious beliefs of the local population in themselves pose a challenge in providing effective health services.

[4] Nyaope is a street drug that has allegedly come into widespread use in South Africa. It is famous for allegedly containing antiretroviral drugs for HIV.

There is some collaboration between Healthcare facilities and traditional healers, for instance, four out of five interviewed key health personnel admitted to their respective facilities holding monthly meetings with traditional healers in the relevant communities. The aim here is to establish a collaborative relationship whereby the traditional healers will refer “difficult patients” (patients they cannot treat or heal) to the healthcare facilities. Professional Nurse, Francina Mailula confirmed that these monthly meetings seem to be helping as some of the traditional healer's hygiene practices have improved, and Mrs K.A Phago, Operational Manager from Mamaselela Clinic stated that some “active” traditional healers are now bringing patients to the clinics. It was also reported that some traditional healers do not always provide a consistent and safe service to patients, such as dosage of medication, or concoctions of herbs etc. There is no regulation of the practice and levels of training and understanding vary widely. Some practices are dangerous and clearly not compatible with standard medical practice.

6.1.11 EHA #12: Health Systems Issues

The health care infrastructure in the district and municipal area is relatively well served, but with a somewhat notable disproportion toward the urban compared with the more rural areas. While the infrastructure was reported as sound it was mentioned at the KII and also the household surveys that the major challenge for health service delivery in the area was the deteriorating state of health service delivery at the hospital and clinic levels.

Although more than half of the respondents were happy with the quality of services they receive from their local clinics and hospitals, a notable proportion of the surveyed population was unhappy with these services. They attributed their dissatisfaction to a lack of skilled staff to support the daily functioning of the facilities; the operating times of the facilities (clinics not being 24 hour facilities and sick people having nowhere to go during cases of emergency at night); a general disregard and lack of respect for patients (by the nurses); shortages of medication; failure of health practitioners to follow the Batho Pele Principles[5] with pride; long queues and overcrowding.

Key health personnel mentioned a shortage of staff, especially in the form of doctors. This creates service delivery challenges and often results in long waits for patients, and places increased stress on the current medical staff. Staff shortages were also reported at the clinic level and this associated with equipment, consumables and basic services like electricity (with regular power outages noted at Mahwelereng Clinic 1 and Mapela Clinic), and limited documentation storage/filing methods (see Figure 10), mean that these services do not function optimally.

[5] Batho Pele principles were developed to serve as acceptable policy and legislative framework regarding service delivery in the public service. These principles are aligned with the Constitutional ideals of: promoting and maintaining high standards of professional ethics; providing service impartially, fairly, equitably and without bias; utilising resources efficiently and effectively; responding to people's needs; the citizens are encouraged to participate in policy-making; and rendering an accountable, transparent, and development-oriented public administration

Figure 10: Filing system in local Healthcare facilities

7 IMPACT ASSESSMENT

7.1 Key Issues and Related Health Impacts

This section provides an analysis of the potential impacts associated with the project and has included the analysis of potential negative impacts and their mitigation measures, but also includes potential positive impacts and measures to enhance these. This is based on the evidence presented in the baseline health description, the planned project activities and information obtained from the other available specialist studies.

The key health impacts and needs have been described in the EHA framework to ensure consistency. Project specific determinants and comments will be described so as to inform the impact assessment. While it is recognised that some of these existing health needs will be inherited by the project, and are maybe the responsibility of the government, they may influence the impacts and need to be considered for mitigation/management. It is also true that some of these management measures could overlap into social investment, especially for enhancement of certain impacts. For this reason the mitigation and enhancement will be divided into two different categories:

- **Project impact mitigation:** interventions required to mitigate the impacts of the project on the communities; and
- **Corporate social Investment:** interventions suggested and recommended for the improvement of the existing poor health status of the communities.

7.2 Impact Rating Methodology

The impact assessment methodology was developed by Digby Wells for assessing a range of environmental and socio-economic impacts according to severity, spatial scale, duration and probability. The impact rating process is designed to provide a numerical rating of the various environmental and socio-economic impacts identified for various project activities.

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability of an impact occurring

where

***Consequence = Type of impact* x (*Intensity + Spatial Scale + Duration*)**

In the formula for calculating Consequence,

***Type of impact* = +1** (for positive impacts) ***or* -1** (for negative impacts).

The rating options for each variable in the formula, as well as the criteria for selecting a particular option, are given in Table 8 below.

Table 8: Impact rating options

Rating	Definition	
	Negative impacts (Type of impact = -1)	**Positive impacts** (Type of impact = +1)
Intensity		
7	Irreparable damage to highly valued items of great cultural significance or complete breakdown of social and health order	Noticeable, on-going social and health benefits which have improved the livelihoods and living standards of the local community in general
6	Irreparable damage to highly valued items of cultural significance or breakdown of social and health order	Great improvement to livelihoods and living standards of a large percentage of population
5	Very serious widespread social and health impacts. Irreparable damage to highly valued items	On-going and widespread positive benefits to local communities which improves livelihoods
4	On-going serious social and health issues. Significant damage to structures or items of cultural significance	Average to intense social and health benefits to some people
3	On-going social and health issues. Damage to items of cultural significance	Average, on-going positive benefits, not widespread but felt by some
2	Minor medium-term social and health impacts on local population. Mostly repairable. Cultural functions and processes not affected	Low positive impacts experience by very few of population
1	Minimal social and health impacts, low-level repairable damage to commonplace structures	Some low-level social and health benefits felt by very few of the population
Spatial scale/Extent[6]		
7	International: The effect will occur across international borders	Very limited: Limited to specific isolated parts of the site
6	National: Will affect the entire country	Limited: Limited to the site and its immediate surroundings
5	Province/Region: Will affect the entire province or region	Local: Extending across the site and to nearby settlements
4	Municipal Area: Will affect the whole municipal area	Municipal Area: Will affect the whole municipal area

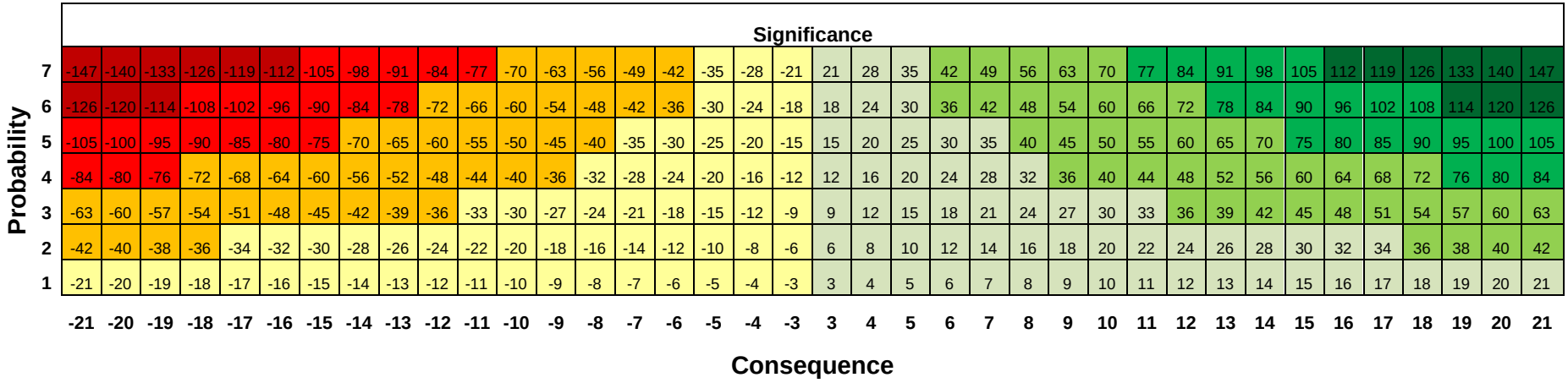
[6] The spatial scale is inverted for positive impacts because various scales have opposite meanings when considering their intensity. For e.g., the more widespread a negative impact the more intense (detrimental) it will be; conversely, the more widespread a positive impact the less intense (beneficial) it is for local communities.

Rating	Definition	
	Negative impacts (Type of impact = -1)	**Positive impacts** (Type of impact = +1)
3	Local: Extending across the site and to nearby settlements	Province/Region: Will affect the entire province or region
2	Limited: Limited to the site and its immediate surroundings	National: Will affect the entire country
1	Very limited: Limited to specific isolated parts of the site	International: The effect will occur across international borders
Duration		
7	Permanent: The impact will remain long after the life of the project	
6	Beyond project life: The impact will remain for some time after the life of the project	
5	Project Life: The impact will cease after the operational life span of the project	
4	Long term: 6-15 years	
3	Medium term: 1-5 years	
2	Short term: Less than 1 year	
1	Immediate: Less than 1 month	
Probability		
7	Certain/Definite: There are sound scientific reasons to expect that the impact will definitely occur	
6	Almost certain/Highly probable: It is most likely that the impact will occur	
5	Likely: The impact may occur	
4	Probable: Has occurred here or elsewhere and could therefore occur	
3	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	
2	Rare/improbable: Conceivable, but only in extreme circumstances and/or has not happened during lifetime of the project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures	
1	Highly unlikely/None: Expected never to happen.	

After an impact had been rated on each variable in this table, its significance was calculated using the formula given above. Each impact was then categorised into one of eight categories in terms of its significance, as indicated in Table 9 below. The relationship between consequence, probability and significance ratings is also graphically depicted in Figure 11.

Table 9: Significance ratings

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	**Major (positive)**
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment	**Moderate (positive)**
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment	**Minor (positive)**
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment	**Negligible (positive)**
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment	**Negligible (negative)**
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment	**Minor (negative)**
-73 to -108	A serious negative impact which may prevent the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects	**Moderate (negative)**
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects	**Major (negative)**



Probability	Significance																																										
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Figure 11: Relationship between consequence, probability and significance ratings

7.3 Impact Analysis, Mitigation and Enhancement

This cHIA has focused on understanding what potential health impacts the project may have on the nearby communities. To support this it was important to define the existing baseline health status in the proposed Project Area so that the potential for and direction of health impacts could be analysed.

Based on the findings in Section 6, potential high level health impacts are described below. These will consider options for stakeholder communication and development of short term management plans.

It is important to understand that assessing health impacts is often based on a broad range of factors. These can be influenced from a national or regional policy/program decision/intervention and thus may be extremely dynamic. The impact analysis considers the present state of health based on the community profile, and impacts related to the existing plans and designs of the project (Winkler *et al*., 2010).

7.3.1 EHA #1 – Communicable Diseases linked to Housing Design

7.3.1.1 Transmission of Communicable Diseases due to Overcrowding

Overcrowding leads to an increase in the prevalence of respiratory health outcomes, including TB. This is set to increase during construction and operational phase of the Project.

Impact Evaluation and management measures:

EHA #1	**Increased disease related to overcrowding and close contact**					
Construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Beyond Project life (6)*	*Municipal Area (4)*	*High-negative (-6)*	***Highly detrimental (7)***	***Highly probable (6)***	***Moderate-Negative (-84)***
Management Measures						
Project impact mitigation ■ Support community based information campaigns related to TB symptoms and the need to seek care. The campaign should address the risk of co-infection between HIV and TB. This can be managed through community-based peer health educators; ■ Labour policies should encourage hiring of local staff to avoid job seeking migrants. The project should not hire at the front gate but consider a recruitment office at an off-site location; ■ Influx management and advice with regards to town planning to prevent overcrowding;						

■ Develop partnerships to support the community based TB control programs in conjunction with the authorities and any agencies/NGO. This needs to include case detection, management and surveillance activities under the national TB program policy and strategy; and ■ Support the health management information system and collect longitudinal data on key TB indicators. This will require health systems strengthening to get this essential data.						
Corporate Social Investment Support improvements in the capacity of local TB case management. This should include training of health care staff, appropriate diagnostics for case detection and a referral system for effective treatment. This can be through support of a local NGO and/or the national program. This will assist in addressing case surveillance and in ensuring that the TB situation does not deteriorate in the area.						
After Management	*Long term (4)*	*Municipal (4)*	*Moderate-positive (+3)*	***Moderately beneficial (+11)***	***Probable (4)***	***Minor-positive (+44)***

7.3.2 EHA #3 – Sexually Transmitted Infections, including HIV/AIDS

7.3.2.1 Transmission of STIs and HIV/AIDS

HIV/AIDS and STI are significant existing public health challenges nationally and within the immediate proposed Project Area. Although, the HIV prevalence in the proposed Project Area is low, it is still of public health concern. STIs, if present and untreated, have been found to increase the risk of transmission of HIV, if one partner is infected. HIV's link with TB and its importance has been discussed above.

Influx or/and movement of labour into the area will pose an increased risk for STIs. There will be more disposable income either as a direct or indirect consequence of the project. Commercial sex workers are more likely to establish in Mokopane town, but may also be attracted to the immediate proposed Project Area, where local community may be vulnerable to opportunistic sexual liaisons. The likely effect of the project employing a number of relatively well-paid employees may also increase the risk for transactional sex, especially if they are away from their normal family unit. Economic upliftment and settlement in the proposed Project Area may also lead to the adoption of "urban" values and lifestyle changes, which may also play a role in casual sexual engagement.

Women and young girls are extremely vulnerable and have limited negotiating power for safe practices and family planning. Gender based sexual violence is common and while there NGO's are active in the area there is very little support for victims.

HIV/AIDS should be considered a major risk for the Project and the community and interventions should be implemented on a broad base in the workforce and the community. It may also be influenced by considering the "4 M's**"** detailed below (International Food Policy Research Institute (IFPRI), 2005):

7.3.2.1.1 Mobility

The transport corridors which will be improved with the development of the project will increase traffic to the area. Transport drivers are well known to engage in casual sexual practices as they are often away from family units. This can not only result in high risk sexual activity along the whole transport route but also in Mokopane as an end destination. The migration of people into the proposed Project Area in search of work may cause similar consequences.

The contract workforce also needs to be considered. This workforce may come from areas where the HIV prevalence rates are significantly higher and also carry different viral strains. They may have also worked in remote settings away from their normal partners for extended periods and thus causal sexual relations become the norm.

7.3.2.1.2 Money

There will be adequate amounts of disposable income in the area which will increase during the duration of the project. People who benefit directly and indirectly from the project may have more money available to partake in forms of transactional sex. These include both local hires as well especially semi-skilled contract workers and even senior expatriates.

7.3.2.1.3 Men

Men play a predominant role in the local society and will form the bulk of the workforce due to the physical demands from mining. Transport worker and the construction work-force are also generally men.

7.3.2.1.4 Mixing

This is strongly linked into mobility. In-migration of outsiders, returning migrants, the construction workforce and the transport workers are all different population groups that may mix with the present indigenous population. This may result in mixing of people with high prevalence with those with low prevalence of disease, and also introduce different virus strains.

There was no confirmed accurate data on HIV prevalence and very little in the way of data to understand practices and behaviour linked to HIV. The cumulative impacts of HIV, STIs and TB need to be considered.

Impact Evaluation and management measures:

EHA# 3	Sexually transmitted infections including HIV/AIDS					
Construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Permanent (7)*	*Province / Region (5)*	*Extremely high-negative (-7)*	***Extremely detrimental (-19)***	***Certain (7)***	***Major-negative (-133)***
Management Measures						

Project impact mitigation:

- Develop a HIV/AIDS policy that incorporates both the workplace and community considerations;
- Develop an integrated HIV management program that considers both the workplace and the community but with different levels of intervention. The workplace should include a comprehensive program while the community program should have a focus on awareness and prevention activities. TB and STI must be integrated into this;
- Conduct a Knowledge, Attitude and Practices (KAP) study to understand levels of awareness and knowledge in both the workplace and community. This needs to have an emphasis on practices so that appropriate behaviour change programs are developed;
- Conduct a seroprevalence study in the area in partnership with the local health authorities;
- Support the local health authorities in extending care and treatment programs in the area. Support the local health authorities with the establishment of Voluntary counselling and testing (VCT) centres in the area;
- Support information campaigns and community based peer educator programs in both the workforce and community. These need to use locally acceptable tools and based on the finding of the KAP study. These must serve as indicators to monitor the impact of the behaviour change and must have a gender focus. Community based peer health educators will play a key role;
- Develop an Influx Management Plan that also considers HIV;
- Support equal employment opportunities for women and support livelihood programs to reduce risk for opportunistic sexual encounters;
- Support NGO groups active in area on gender-based sexual violence; and
- Prevent fraternization of external contractors with the community through codes of conduct and reduce the number of external people sleeping in the community at night.

Corporate Social Investment: ■ Support the development and extension of prevention of mother to child transmission programs; ■ Support community based condom distribution centres; and ■ Support health services in area with improved infection control and medical waste management.						
After Management	*Long term (4)*	*Province/ Region (5)*	*Very high-positive (+6)*	***Moderately beneficial (+15)***	***Highly probable (6)***	***Moderate-positive (+90)***

7.3.3 EHA #4 – Soil-, Water- and Waste-related Diseases

7.3.3.1 Spread of Soil-, Water- and Waste-Related Diseases

The communities in the proposed Project Area have good access to clean or improved water supplies. There is a heavy reliance on non-protected wells as a primary source of drinking water. Water quality has not yet been assessed.

Influx may also play a role in availability of water due to increased demand, which may ultimately negatively affect water quality. Water-borne diseases such as diarrhoea are common and are linked to contaminated water and poor sanitary conditions. Water-washed diseases such as eye and skin infections are common. These are linked to poor hygiene.

7.3.3.1.1 In-migration and Unplanned Settlements

Pressure on existing limited services in terms of water supply and sanitation could dramatically increase the risk of water related diseases.

There is little data on basic water and sanitation practices or burden of disease linked to specific water and sanitation indicators. There is the potential for the project to be accused of polluting the water bodies in the surrounding communities from plant or domestic water and thus it is important to establish firm baselines for mitigation. Water and sanitation are significant existing needs in the community and if Platreef Resources supports any initiatives they should be linked to specific indicators to measure impact.

Due to influx into the area and the indirect pressure it will cause on available sanitation services, the project is likely to have an impact on the sanitation situation in the area. However, improving the sanitation situation is likely to have major beneficial impacts in the communities and improve their overall quality of life.

Impact Evaluation and management measures:

EHA# 4	Soil, water and waste related diseases					
Pre-construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Long term (4)*	*Local (3)*	*Moderately high-negative (-5)*	***Moderately detrimental (-11)***	***Certain (7)***	***Moderate-Negative (-77)***
Management Measures						
Project impact mitigation ■ The quality of groundwater and surface water must be monitored to ensure that the project does not have any detrimental effects on community water sources; ■ Influx management; ■ Restrict access to project created water bodies; ■ Conduct baseline water and sanitation studies on practices based on accepted health indicators; ■ Perform end user analysis of water quality. This serves as an indicator for monitoring water quality where it is consumed and determines the level of general sanitation and hygiene even if water is collected from clean sources; ■ Ensure proper disposal of human waste that is generated from the project; and ■ Ensure proper waste management from project generated waste according to waste management principles.						
Corporate Social Investment ■ Support the local authorities and other partners in supporting and improving water and sanitation services; ■ Establish water and sanitation committees in the communities to manage their own water and sanitation services. This will improve sustainability of any outreach support; ■ Promote and support local authorities in improved collection and disposal of waste in communities; ■ Support information campaigns in the community on water use, hygiene and general sanitation; ■ Depending on the results of the baseline support the government's school deworming programme in partnership with local authorities. Schools should be supported with VIP latrines.						
After	*Beyond*	*Province/*	*Very high-*	***Highly***	***Highly***	***Moderate-***

Management	*project life (6)*	*Region (5)*	*positive (+6)*	***beneficial (+17)***	***probable (6)***	***positive (+102)***

7.3.4 EHA #5 – Food- and Nutrition-related Issues

7.3.4.1 Malnutrition

Influx of people into the area will put a strain on existing land and yields may reduce. Inflation could reduce food security in a situation of already high food prices that communities cannot afford.

Changes in practices also need to be considered over the medium term. The community may start buying more food in the form of refined products as a result of economic upliftment. A reduction in physical exertion may also result as a result of changing livelihoods. Ironically, the final result could be an increased incidence in obesity.

Impact Evaluation and management measures:

EHA #5	**Food and Nutrition related issues**					
Operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Long term (4)*	*Local (3)*	*Moderate-negative (-4)*	***Moderately detrimental (-11)***	***Probable (4)***	***Minor-negative (-44)***
Management Measures						
Project impact mitigation: ■ Perform a baseline nutritional assessment through anthropometric measures in children under 5 and also micronutrient deficiencies (anaemia as an indicator). Perform surveillance on nutritional status through this data set as means to track well-being; ■ Reduce project related communicable diseases that may impact nutrition; ■ Minimise agricultural land loss through resettlement programmes; ■ Inflation management as part of social program; and ■ Favour local procurement of food items in combination with incentives to increase local production.						
Corporate Social Investment: ■ Support mitigation measures for communicable diseases such as malaria, diarrhoea and respiratory infection to reduce the co-morbidity created by malnutrition; ■ Support sustainable livelihood programs through increased use of agriculture. The financial						

benefit of farming over other practices will be essential to support; ■ Promote access to education and schooling for women; ■ Health systems strengthening for recognition and management of nutritional disorders; ■ IEC programs that promote proper feeding practices at relevant age groups including improved complementary feeding; ■ Support maternal and child health programs. This can include supporting the promotion of ANC, breastfeeding practices, food preparation/hygiene, and family planning; and ■ Support any nutritional activities in partnership with the government or NGO in the proposed Project Area.						
After Management	*Long term (4)*	*Local (3)*	*Very high-positive (6)*	***Moderately beneficial (+12)***	***Highly probable (6)***	***Minor-positive (+72)***

7.3.5 EHA #6 – Non-Communicable Diseases

7.3.5.1 Non-communicable Diseases

These diseases are poorly described in the country and district. This is due to the high burden of communicable diseases in the country that have focussed the human and economic resources to this sector.

NCD may play a major role in the economics of the country as it is well recognised that poor adult health negatively effects economic well-being at an individual and household level, but also at a macro level. Labour productivity will fall, and the social and medical costs of managing chronic diseases as well as an ageing population, will increase.

The project will in all likelihood enhance the socio-economic conditions in the area either from direct or cumulative benefits. As the project starts to uplift health programs in the area through direct or indirect means, it will hopefully increase the life expectancy in the area and also the productive time of breadwinners. The short term effects may be an increased spending ability and adoption of more western sedentary lifestyle and diet. With prosperity and organised settlement may come a degree of urbanism with associated changes in values and behaviour, which predisposes the community to an increase in lifestyle related diseases such as obesity, hypertension, diabetes, dental caries and some forms of cancers. This may place an additional burden on the local health care facilities that may not have an ability to diagnose and appropriately manage these conditions.

The project will employ a number of permanent and temporary workers. Diet and lifestyle will need to be monitored in this sector as they will have access to increased incomes and potentially free meals on the project site. This is a workplace health as well as a community health concern.

In terms of the significance of the project on the communities the following can be considered:

- Reduction in traditional lifestyle and values;
- Social and environmental factors that increase stress and unhealthy behaviours; and
- Increase pressure on existing health care facilities that only practice limited preventive health care.

These conditions are chronic in nature and difficult to predict at the local level. The cumulative impacts of the economic upliftment of the country will need to be considered and such the impacts cannot solely be ascribed to the project. Mitigation and management at the local level is however important.

Impact Evaluation and management measures:

EHA #11	**Non-communicable diseases**					
Operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Long term (4)*	*Municipal area (4)*	*High-negative (5)*	***Moderately detrimental (-13)***	***Probable (4)***	***Minor-negative (-52)***
Management Measures						
Project impact mitigation: ■ Collect indicator data on NCD in area. Focus on hypertension and diabetes as most common conditions; and ■ Support health education programs as part of a community based peer health educator program. These should focus on lifestyle risk factors such as diet, exercise, smoking and alcohol consumption.						
Corporate Social Investment: ■ Support the district health authorities implement a local integrated non-communicable disease intervention program based on the WHO Stepwise program. This seeks to reduce risk factors in the community, enhancing the preventive practices of the health care personnel and ensuring provision of correct diagnostics and treatment. This may need to be a strategy that develops over time due to local policy priorities; ■ Support the local health care personnel with training on disease management programs and the recognition of NCD symptoms and associated management. This should include integrated management to include proper management strategies for hypertension and high cholesterol; and ■ Support with diagnostic medical hardware.						
After Management	*Long term (4)*	*Municipal area (4)*	*Moderately high-*	***Moderately beneficial***	***Probable (4)***	***Minor-positive***

			positive (5)	***(+13)***		***(+52)***

7.3.6 EHA #7 – Accidents/Injuries

7.3.6.1 Road traffic Accidents and other Accidental Injuries

Some community members may be relatively naïve to risks from road traffic accidents and the larger volumes of traffic may increase their exposure risk. This is especially relevant for small children.

The health facilities along the haul road have very limited capacity to respond and manage any form of complex trauma or multiple casualty situations. In addition, there are limited emergency services so delays to care can be significant and inappropriate movement has the potential to exacerbate injuries.

Impact Evaluation and management measures:

EHA #6	**Accidents and Injuries**					
Construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Beyond project life (6)*	*Local (3)*	*Very high-negative (-6)*	***Highly detrimental (-16)***	***Likely (5)***	***Moderate-negative (-75)***
Management Measures						
Project impact mitigation: ■ Develop community security and safety management plans for the project related to the different activities. This should include emergency response plans for both community related accidents and also for the workplace. This must include a fire, rescue and chemical spill response capability, as well as medical emergency response strategies; ■ Conduct a traffic impact assessment to assess the impact of increased traffic within the proposed Project Area; ■ Develop a clear policy for the management of emergencies or accidents in the community as a direct result of the projects activities; ■ Support with local safety and security as addressed in these specialist studies.						
Corporate Social Investment: ■ Support the refurbishment of the local health facilities to support any injuries or trauma. This should be limited to first aid and stabilisation prior to transport. This can also include emergency care training of the local health care practitioners; and ■ In partnership with the local authorities and police coordinate information campaigns about						

	responsible driving including speed management and vehicle safety. Educational efforts on road safety should also be supported through the school system.					
After Management	*Project life (5)*	*Local (3)*	*Moderately high-negative (+5)*	***Highly beneficial (+13)***	***Probable (4)***	***Minor-positive (+52)***

7.3.7 EHA #9: Exposure to Potentially Hazardous Materials, Noise and Malodours

7.3.7.1 Air pollution, Noise and Mal-odours

Exposures and environmental health determinants as a result of the project will be covered in a number of specialist reports. These include air quality, water, noise and soil studies. There was no large industrial activity in the area.

Noise is also a factor to consider and the health impacts of noise are well described at both a physical and psychosocial level. The noise related to transport and use of equipment will also need to be assessed. Noise at the plant site will need to be managed with worker health and safety requirements and also based on IFC guidelines to reduce ambient noise that may affect surrounding communities. These will be addressed in the relevant specialist report and the cHIA will need to be updated when the study is completed.

Air quality and odours have been addressed in detail in the Air quality report. Dust generation was highlighted as a potential impact especially in operations linked to crushing and drying of the ore.

Impact Evaluation and management measures:

EHA #7	**Environmental health determinants: Air, water, noise pollution and malodours**					
Construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Project life (5)*	*Local (3)*	*Extremely high-negative (-7)*	***Moderately detrimental (-15)***	***Highly probable (6)***	***Moderate-negative (-90)***
Management Measures						
Project impact mitigation: ■ Evaluate and manage air, water and noise issues as part of the environmental impact assessment and environmental management plan requirements. Human health considerations should be considered based on results of the surveillance activity;						

■ Collect data on a longitudinal basis from the local health centres on incidence of increased respiratory disease- especially upper respiratory tract infections that could be ascribed to dust. While these may not be specifically ascribed to the project the prevailing trends are useful to monitor so that any concerns could be addressed. This may require health systems strengthening to support recording ; ■ Develop transport management plans to minimise dust exposure.						
After Management	*Project life (5)*	*Limited (2)*	*Low-positive (+3)*	***Moderately beneficial (+10)***	***Likely (5)***	***Minor-positive (+50)***

7.3.7.2 Impact 7.2: Chemicals, Pesticides and Heavy Metals

No obvious dangerous chemicals or agents are likely to be used in the construction phase of the Project. Cement will be used but should not pose any community health threats. Hydrocarbon fuels pose a risk to water bodies and need to be controlled.

Pesticides are likely to be used in general camp management and possibly for vector control programs. These will need to be managed under the guidance of *IFC Performance Standard 3 for pesticide use and management* to ensure that they do not have a negative impact on human health and the environment. The project will need to adopt a pest management approach so that minimal pesticides are utilised at the project. The Food and Agricultural Organisation (FAO) has developed an International Code of Conduct on the Distribution and Use of Pesticides that focuses on risk reduction, protection of human health and the environmental, and support for sustainable agricultural development by using pesticides in an effective manner and applying integrated pest management strategies (WHO and FAO, 2010).

The potential for acid rock drainage from waste rock with more heavy metals being available for leaching will need to be considered. Heavy metal exposure may also be one of the major potential impacts of the project. These will be addressed in the relevant specialist report and the cHIA will need to be updated when this study is completed. There is no adequate biological baseline data on heavy metal exposures in the area and key informants in the health services reported that they would not be able to accurately diagnose any heavy metal exposures.

The operations phase will involve flocculants, of which some may be flammable and hazardous in high concentrations. These include acids like hydrochloric acids and hydrofluoric acid. Moreover, it is also important to consider that vanadium is hazardous in some of its forms. International best practice will be needed in managing these hazardous substances.

Impact Evaluation and management measures:

EHA #7	Environmental health determinants: Chemicals, pesticides and heavy metals					
Operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Project life (5)*	*Local (3)*	*Very high-negative (-6)*	***Highly detrimental (-14)***	***Probable (4)***	***Minor-negative (-56)***
Management Measures						
Project impact mitigation: ■ Hazardous chemical substance management as part of the environmental impact assessment and environmental management plan requirements; ■ Determine baseline values of arsenic and mercury in PACs. These should be sampled in communities across similar exposure groups to determine background community exposures. Hair samples are preferred but otherwise urine should be adequate; ■ Water monitoring as recommended in the environmental management plan must include surveillance for heavy metals; ■ Background naturally occurring radiation levels should be measured; and ■ Ensure the project complies to IFC performance standard 3: Pollution prevention and abatement. These standards should apply to the planned integrated vector control programs. The least hazardous product should be chosen for control and selected based on the World Health Organization Recommended Classification of Pesticides by Hazard Class. The guidelines of the FAO should be followed for procurement, storage, application and disposal of insecticides for malaria control.						
After Management	*Project life (5)*	*Very Limited (1)*	*Low-negative (-1)*	***Slightly detrimental (-7)***	***Probable (4)***	***Negligible-negative (-28)***

7.3.8 EHA #10 – Social Determinants of Health

7.3.8.1 Gender-based Violence, Alcohol and Drugs

Gender-based violence occurs commonly and is often related to substance abuse. Women and young girls are often the most vulnerable.

While drug and alcohol abuse are currently not a major problem, these have the potential to increase during the lifespan of the project.

Influx and development of make-shift structure and settlements may be important to consider, although these may not alter the baseline significantly.

Impact Evaluation and management measures:

EHA #8	**Social determinants of health: Gender-based violence, alcohol and drugs**					
Construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Long term (4)*	*Local (3)*	*High-negative (-4)*	***Highly detrimental (-11)***	***Likely (5)***	***Minor-negative (-55)***
Management Measures						
Project impact mitigation: ■ Social management plans and recommendations as part of the social impact assessment; and ■ Gender empowerment must be considered through these programs.						
Corporate Social Investment: ■ Support information programs in the community on domestic violence, role of men and support of women, alcoholism and drug abuse; and ■ Support local authorities with improved policing and criminal justice system for gender-based violence.						
After Management	*Medium term (3)*	*Local (3)*	*Very high-positive (+6)*	***Highly beneficial (+12)***	***Probable (4)***	***Minor-positive (+36)***

7.3.8.2 Impact 8.2: Social Cohesion and Well-being

Influx into the proposed Project Area will play a major role in lifestyle and perceptions of wellbeing.

Employment is a major need in the proposed Project Area. The SIA will highlight the potential benefits that the project may bring for employment opportunities. There are distinct direct and indirect health benefits related to this, which will be addressed in detail under the job creation and stimulation of economic growth impact analysis in the SIA.

Education is also a major existing need in the community. The level of education in the proposed Project Area is described as low. It was cited as a priority developmental need in the community. Women's literacy is extremely important to enhance health needs in the family unit as they are the gatekeepers to health.

It remains unlikely that individuals from the local population will be employed and trained in time for construction or operation of the graphite mine, due to the level of skills required not being available locally. Platreef Resources may be left with no other alternative but to make use of skilled migrant workers, as training required may be too complex. Once the mine becomes operational, several permanent jobs will be created, constituting of skilled, semi-skilled and unskilled labourers. Many of the highly-skilled workers may come from outside of the Proposed Project Area which may lead to community tension.

Resettlement is likely to be limited to moving households within the same community. The households will be moved to areas within their own host communities thus reducing social challenges in their own or new host communities. The effects of economic resettlement are addressed in separate specialist reports.

It is not the intention of the cHIA to address social issues in detail as this will be covered in more detail in the social impact assessment. However, it is important to recognise the well-being and perceptions on quality of life have both a social and health basis.

Impact Evaluation and management measures:

EHA #8	**Social determinants of health: Social cohesion and well-being**					
Pre-construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Project life (5)*	*Local (3)*	*Extremely high-negative (-7)*	***Highly detrimental (-15)***	***Likely (5)***	***Moderate-negative (-75)***
Management Measures						
Project impact mitigation ■ Many elements will be addressed in the social management plan including influx management and resettlement management. It is essential that where possible health is integrated into social programs; ■ Gender empowerment and equity. This should include programs as well as employment opportunities; and ■ Extensive communication and management of expectations will need to be conducted with stakeholders. Community expectations will need to be managed carefully.						
Corporate Social Investment ■ Supporting education programs with a gender equity focus; ■ Support cultural activities and sports especially in schools; ■ Support vulnerable groups; and						

■ Support graduate training programs for the youth in the community.						
After Management	*Project life (5)*	*Local (3)*	*High-positive (+5)*	***Highly beneficial (+17)***	***Likely (5)***	***Moderate-positive (+85)***

7.3.9 EHA #12 – Health Systems Issues

7.3.9.1 Health System Strengthening

There are several Healthcare facilities within the project area with one of these being the district hospital in Mokopane. However, there remains a challenge with the capacity of these facilities. There are also a few NGOs such as the Red Cross which support health infrastructure and health system strengthening programs.

Health information management is generally good in the health facilities that surround the project.

Impact Evaluation and management measures:

EHA #10	**Health systems issues**					
Pre-construction and into operations and closure						
	Duration	**Extent**	**Intensity**	**Consequence**	**Probability**	**Significance**
Before Management	*Long term (4)*	*Municipal area (4)*	*Very high-negative (-6)*	***Highly detrimental (-14)***	***Certain (7)***	***Moderate-negative (-98)***
Management Measures						
Project impact mitigation: ■ Influx management and supporting already limited health facilities to cope with the increased population if related to project; ■ Support community volunteer programs through expansion of the community based peer health educator group; and ■ Support the health information management system at the local health facilities as a means to support the monitoring of specific health impacts. This will provide a longitudinal tool to track specific health conditions and through the partnership provide access to information. The project should set up a basic monitoring tool with support of the local health facilities.						
Corporate Social Investment: ■ Develop a plan to support health infrastructure in the Proposed Project Area. This strategic investment should consider the existing health needs of the community and be designed in such a way to evolve with the likely future health needs. Even minimal support with the local						

health infrastructure will result in significant positive impacts.

- The needs and the location of the facilities need to be discusses and agreed with the communities so that the projects are community owned and supported. This must be done cautiously so that expectations are managed and disparities are not created;
- Develop a memorandum of understanding (MoU) with the government for the mutual support of the health facilities in the proposed Project Area. The project must not become the de-facto government as this will create an unsustainable situation. It is recommended that the project support upgrading of facilities and eventually with the development of new ones (e.g. a mobile clinic) to a level that supports the needs of the community and supports the planned mitigation and enhancement activities. The community leaders must be part of this MoU;
- The following model is recommended in case a new health facility is developed:
  - The communities provide land and labour to construct facilities. This must be based on government standards;
  - The project will provide materials and construction supervisory support;
  - The project should equip the facility through an NGO agreement; and
  - The government must provide staff and supply of essential drugs and consumables.
- The local health authorities meets with all health oriented NGOs working in the proposed Project Area regularly. This serves as an ideal opportunity for the Project to seek to engage NGO partners, and to do so in collaboration with the local health authorities;
- Support outreach services to local communities through support or partnership with programs- e.g. vaccination and logistics support; and
- Support the health information management system through the following mechanisms:
  - Improve information technology through education of staff and providing computers;
  - Ensure adequate diagnostic equipment;
  - Support training on the national system to ensure accurate reporting; and
  - Develop a basic site based monitoring program to track key health trends.

After Management	*Long term (5)*	*Municipal area (4)*	*Extremely high-positive (+7)*	***Highly beneficial (+15)***	***Highly probable (6)***	***Moderate-positive (+90)***

8 COMMUNITY HEALTH MONITORING PLAN

The surveillance of health impacts is a crucial element for the project. The CHMP and its associated interventions should be monitored and evaluated (M&E) to ensure that the associated mitigation measures and interventions are meeting the desired objectives. This surveillance should include the monitoring of impact mitigation designed to avoid or reduce negative impacts but also of health interventions designed to enhance the health and well-being of the community. These can potentially be linked to the M&E of specific health programmes.

Any monitoring system must have sufficiently sensitive and specific key performance indicators (KPIs) so that changes in key objective endpoints can be documented in an appropriate and timely fashion.

Monitoring and evaluation are essential management tools which help to ensure that health activities are implemented as planned and to assess whether desired results are being achieved.

Monitoring generally refers to a process of measuring, recording, collecting and analysing data on actual implementation of the programme and communicating it to the programme managers so that any deviation from the planned operations are detected, diagnosis for causes of deviation is carried out and suitable corrective actions are taken (Selvaraj, unknown). Monitoring aims to:

- Provide concurrent feedback on the progress of activities;
- Identify the problems in their implementation; and
- Take corrective action.

Evaluation aims to o assess whether the desired results of a programme have been achieved if not how it should be redesigned.

Monitoring and evaluation (M&E) plans should be based on appropriate, applicable, and relevant KPIs and therefore it is important to have a robust baseline with areas that can be measured based on impact management and interventions.

Numerous KPIs have been established for monitoring health performance indicators and for the purposes of the cHIA these are divided into three categories (Mosse and Ellen, 2009):

- **Structural-** buildings, equipment, drugs, medical supplies, and vehicles; personnel; money; and organizational arrangements;
- **Process-** asses the effectiveness of the actions, and identify who is involved and whether the various programs are working; and
- **Outcome-** measures the long-term effects of a program. The five Ds (death, disease, disability, discomfort, and dissatisfaction) are typically considered outcome measures. The morbidity and mortality outcome indicators are calculated as rates.

Table 10 outlines the planned community health monitoring program for the proposed Project.

Table 10: Community Health Monitoring Plan

Community Health Monitoring Program			
Health Impact	**Structural indicators**	**Process indicators**	**Outcome indicators**
Transmission of communicable disease due to overcrowding	▪ Household size and no. of rooms/people; ▪ House inflation; and ▪ Effective project waste disposal services.	▪ Influx management; ▪ Local recruitment; ▪ Health education campaigns; ▪ TB policy and program; and ▪ Support of national TB management programs.	▪ Key TB indicators from health services; ▪ ARI indicators; and ▪ Any epidemics outbreak in community (e.g. meningitis).
Transmission of STIs and HIV/AIDS	▪ Health facility capacity on key HIV care and treatment principles; ▪ Effective management of STI and sexual partner follow up; ▪ Community based peer health educator activities; and ▪ Medical waste management.	▪ HIV policy implemented; ▪ HIV management program implemented with metrics; ▪ Health education programs; ▪ Commercial sex work activity; ▪ Reproductive health services for commercial sex workers; and ▪ Distribution of condoms.	▪ Health facility and district statistics; ▪ KAP survey and behaviour change measures; and ▪ HIV seroprevalence studies.
Access to safe drinking water	▪ Proportion of households with access to improved water sources; and ▪ Equality of improved water supply.	▪ Health education programs; ▪ Influx management; and ▪ Water quality results.	▪ Diarrhoea, skin and eye disease rates from health facility; and ▪ End-user water quality results.
Sanitation and waste management	▪ Proportion of households with access to improved sanitation services; ▪ Equality of sanitation services; and ▪ Effectiveness of project sanitation services.	▪ Health education programs; ▪ Influx management; ▪ Support school-based deworming programs; and ▪ Agreements with local authorities.	▪ Schistosomiasis and soil transmitted prevalence rates; and ▪ Health facility statistics for schistosomiasis, intestinal parasites and diarrhoea, skin and eye disease.
Malnutrition and food	▪ Health facility capacity and reporting; and ▪ NGO agreements on nutritional programs.	▪ Access to land; ▪ Effectiveness of nutritional support programs;	▪ Malnutrition statistics from health facility; ▪ Anthropometric measurements; and

Community Health Monitoring Program			
Health Impact	**Structural indicators**	**Process indicators**	**Outcome indicators**
security		▪ Health education programs; and ▪ Food inflation.	▪ Anaemia prevalence.
Accidents and injuries	▪ Health service support with improved trauma capability; ▪ Emergency response ability; and ▪ Emergency equipment and trained staff at site.	▪ Health and safety plans; ▪ Emergency response plans and updates; ▪ Drug and alcohol programs; ▪ Transport management plan; ▪ Health education programs; ▪ First aid training; and ▪ Community grievances related to project activities.	▪ Police and health facility statistics; and ▪ Workplace health and safety statistics.
Environmental health determinants	▪ Environmental and occupational hygiene monitoring- human resource, equipment; and ▪ Change houses to prevent cross contamination from soiled clothing.	▪ Dust suppression activity; ▪ Air quality monitoring; ▪ Transport management plan; ▪ Community grievances; and ▪ Compliance to IFC performance standard 3.	▪ Heavy metal testing at baseline; ▪ Health facility statistics on respiratory infections; and ▪ Water quality testing.
Social Determinants of health	▪ Equipment to screen for substance abuse.	▪ Health education programs; ▪ Workplace substance abuse policy and program; ▪ NGO support programs; ▪ External stakeholder communication; and ▪ Grievance register linked to health.	▪ Reported cases of domestic violence; and ▪ Reports on alcoholism and substance abuse.
Health	▪ Health service capacity at workplace. Minimum standards adhered to in terms of	▪ Influx management; ▪ Support of local health	▪ Utilization and capacity of health facilities.

Community Health Monitoring Program			
Health Impact	**Structural indicators**	**Process indicators**	**Outcome indicators**
systems	stock, staff and equipment; and ▪ Community based peer health educator activities.	facilities and monthly reports; ▪ NGO agreements; and ▪ Define dependent health care benefits and sign off from labour organisation.	
Non communicable diseases	▪ Improved diagnostic services in health facilities; and ▪ Health management information system supports surveillance of NCD.	▪ Health education programs; ▪ NCD disease ; and ▪ Training of health care personnel.	▪ Diabetes and hypertension statistics from health facility; ▪ Baseline health profile and risk mapping of different sectors of workforce; ▪ Cancer registry; and ▪ Spontaneous abortion registry.

9 CONCLUSION

In conclusion, Platreef Resources and their proposed Project need to consider two major factors related to community health. The first is the existing health needs of the community. These existing health needs are present regardless of the project and represent the current health status of the community. Secondly the proposed Project will need to consider the future health impacts that it (the proposed Project) may exert on the community.

This HIA has outlined the significant changes on the health status of the local community that may be caused by the proposed Project. An attempt has been made to give a comprehensive outlook of the baseline health status of the proposed Project area (where possible) and also to understand and prioritise future Project health impacts, based on the available evidence.

The following are regarded as the key next steps to support the HIA:

- Development of a study protocol and budget for a BHS based on comments on the scoping study;
- Baseline health data collection in the field for selected indicators, including clinical indicators;
- Analysis of additional data collected and reporting;
- Integration of data into a final comprehensive health impact assessment report; and
- Development of the CHMP in collaboration with key stakeholders.

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Appendix A: Plans

Plan 1: Regional Setting

Plan 2: Local Setting

Plan 3: Healthcare Facilities

Plan 1

Platreef Resources (Pty) Ltd

Regional Setting

Legend

- ESIA Study Area
- Secondary Town
- Settlement
- Main Road
- National Road
- Railway Line
- River
- Dam
- Local Municipal Boundary

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: scc.PLA1677.201310.052
Datum: Hartebeesthoek 1994	Revision Number: 2
Central Meridian: 29°E	Date: 08/10/2013

N

0 2.5 5 10 15 20

Kilometres

1:400 000

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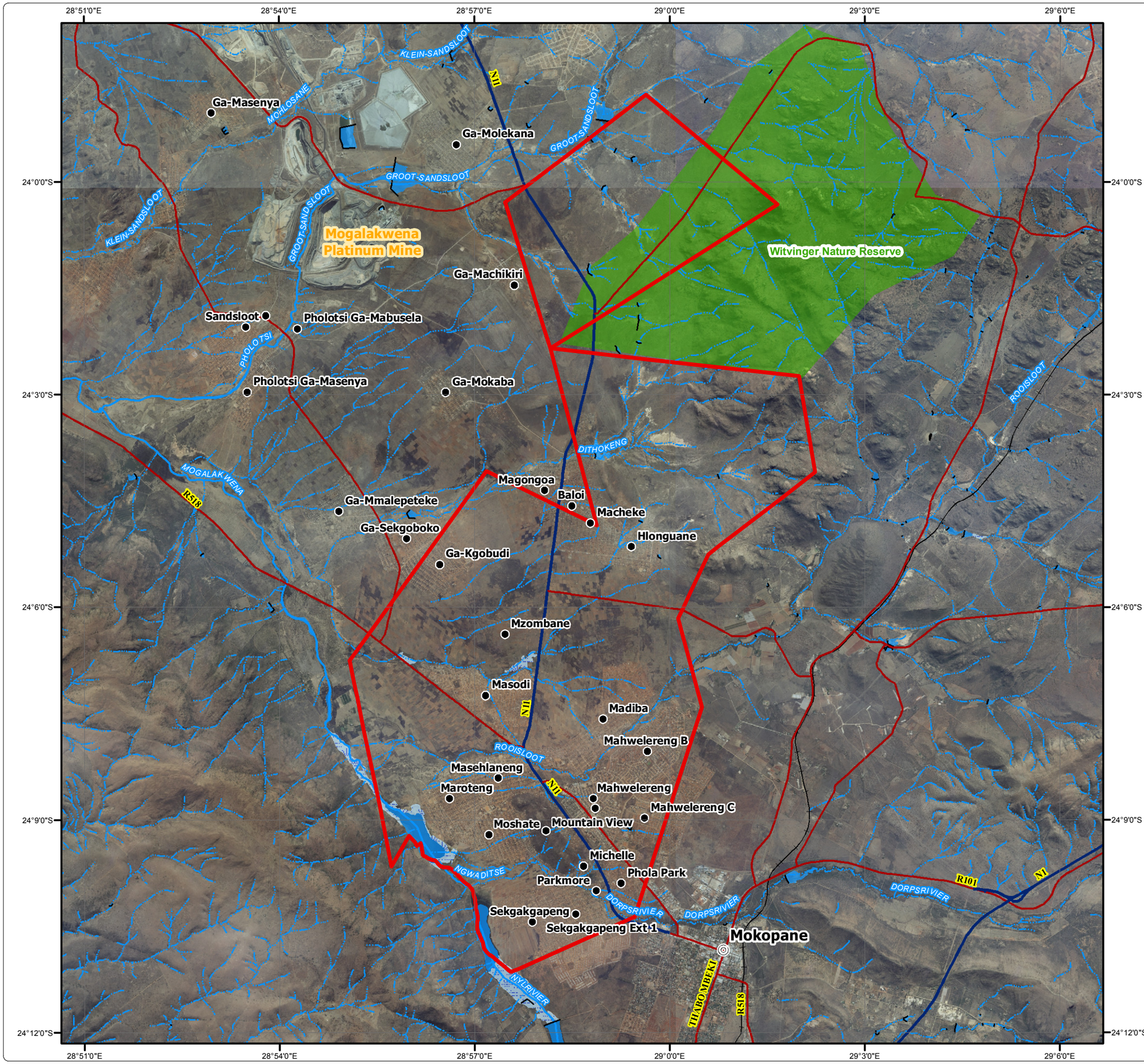
Plan 2

Platreef Resources (Pty) Ltd

Local Setting



Legend

- ESIA Study Area
- Arterial / National Route
- Main Road
- Railway Line
- Dam Wall
- Non-Perennial Stream
- Perennial Stream
- Dam / Lake
- Wetland
- Witvinger Nature Reserve

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: scc.PLA1677.201310.053
Datum: Hartebeesthoek 1994	Revision Number: 2
Central Meridian: 29°E	Date: 08/10/2013

N

0 0.5 1 2 3 4 5

Kilometres

1:100 000

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Plan 3

Platreef Resources (Pty) Ltd

Health Facilities

Health Facilities
Bokwalakwala Clinic
Mahwelereng Clinic No 1
Mahwelereng Clinic No 2 (Madiba)
Mahwelereng Clinic Zone 2
Mokopane Hospital
Mokopane Mobile Health Service
SAIMR Mokopane Laboratory
Sekgakgapeng Clinic

Health Facilities
Beauty Mobile Health Service
Bosveld R.S.C. Emergency Services
Gillemberg Mobile Health Service
Marken Mobile Health service
Mogalakwena Municipality Clinic
Northern Prov Western Reg Office
Palala Mobile Health Service
Potgietersrus District Surg PT
Potgietersrus EHS + PHC office
Potgietersrus LA Health Services
Potgietersrus Mobile Health Service
Potgietersrus Oral Health Clinic
Potgietersrus PHC Clinic
Roedtan Mobile Health Service
SAIMR Potgietersrus (Voortrekker)
Sterkrivier Mobile Health Service
Tolwe Mobile Health Service
V.D. Berg Family Clinic
Voortrekker Hospital
Western Emergency Services

Legend

- Health Facility
- ESIA Study Area

Buffer of Project Area

- 10 km
- 20 km
- 30 km
- Secondary Town
- Other Town
- Settlement
- Main Road
- National Road
- Railway Line
- River
- Dam
- Local Municipal Boundary

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: Hartebeesthoek 1994
Central Meridian: 29°E

Ref #: scc.PLA1677.201309.002
Revision Number: 2
Date: 13/09/2013

N

0 2.5 5 10 15

Kilometres

1:300 000

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Appendix B: Community Health Impact Assessment Questionnaire

DIGBY WELLS ENVIRONMENTAL
COMMUNITY HEALTH IMPACT ASSESSMENT
COMMUNITY QUESTIONNAIRE

Location	Date	Interviewer	Age of participant

Please may we ask a few questions related to health in your community? We will ask a number of questions related to health challenges you face in your community, the local health care services, the decision making in accessing the services and the general satisfaction of the available facilities. Please note that there are no right or wrong answers. Everyone's opinion is valued and important to us. Please let everyone speak and if you do not agree with a person then express this openly but without criticism as they are entitled to their opinion.

Please note that we do not represent Platreef Resources and thus cannot make commitments on their behalf. So questions related to requests or commitments that Platreef have made should not be discussed. If you have any questions for us please feel free to ask.

Education:

Employment:

Health seeking behaviour	
Where did you go first the last time when your child had a fever/cough?	
If they usually do not go to the health facility, ask for the main reason for not doing so (Accessibility; Acceptability; Affordability)	
Where is the nearest health facility? (Also ask if there is any mobile clinic facility in the area and how frequently it comes to the community. Also inquire whether medical staff do home visits, e.g. during emergencies. Inquire about the presence of an ambulance) **How long does it take to walk there?** **How long does it take you to get there on motorbike?**	
Do you have to pay for medical services? (If yes) **How much do you pay?** (Find out if there is any community based health insurance scheme)	
Are you satisfied with the health care services you receive? **If not why?**	

How many traditional healers do you have in your village? **What sort of reasons will take you to the traditional healer?**	
Are there other health actors (e.g. NGOs) active in the communities? **If so what do they do?** (Note down active NGOs and what services they provide)	

1 **MATERNAL AND CHILD HEALTH**	
Do women in your community get antenatal care services? Where? **Are you satisfied with the services you receive?**	
Do all the new born children get vaccinations up to the age of one year? **Are there people in your community who do not take their children for vaccination?** (If yes) **Why?**	
Have your children under 5 been weighed and measured? **If so where? If not why?**	
Where do women normally deliver?	

If at home, who assists?	
Do women practice family planning in your village? (Discuss what methods they commonly use)	
Epidemiology of disease	
What are the 3 most important diseases in your community?	
Do many people have skin disease?	

2 **LET'S TALK ABOUT HIV/AIDS**	
Have you heard about the disease called HIV/AIDS? **What is it?** **Do you think it is a serious problem in your community?** (Why do they think it is/isn't such a serious problem?)	
When you hear the word protection/prevention- what does it mean to you? (Discuss methods of prevention)	

Do people use condoms? **Are they easily accessible?** **Why do people use/ not use them?**	
Is there much commercial sex? *These questions below are to guide the conversation* **What different kinds of commercial sex are there? Who are the sex workers and where do they work? Who are the clients and where do they work?**	
Are there categories of men who are known to have many sexual partners? *These questions below are to guide the conversation* **Which categories are these? Who do they have sex with and why? Are some categories of men riskier than others and why?**	
Are young people having sex? *These questions below are to guide the conversation* **If so, at what age? Who are their partners? Why are they having sex so**	

early?	
Is it possible for a healthy-looking person to have HIV/AIDS? **Would you buy food from somebody who you knew had HIV/AIDS?** **If someone in your family had HIV/AIDS would you keep it a secret?**	

3 **SOIL AND WATER RELATED DISEASE**	
What is the main source for <u>drinking</u> water in the community? (Record type of water source)	
Does every household have its own latrine? (Record types of sanitation facilities in the community)	
Do people swim in, or drink from open water bodies in the area?	
Do you consider your environment clean or dirty? **Why?**	

Housing	
Are there any challenges related to housing or accommodation in your	

community? **Is overcrowding a problem?**	

Food and Nutrition	
Do you have enough food in your community? (If there is a food shortage, find out why) **Is malnutrition a problem in the community (especially in children)?** Why (Bad feeding practices, food shortage)	
What food stuffs are most commonly consumed in the area?	
Do you generally buy food or grow it/ obtain from domestic livestock?	
Do you use salt in your diet? **Where do you buy the salt from? (Do a visual check that it is iodated)**	
Social Determinants of Health	
Do people in the community drink alcohol and smoke? (Discuss the extent of these vices)	
Do they use drugs?	

Is domestic violence common in your community?	
In general is there a feeling of wellbeing or state of hopelessness in your community?	

Project and Community Cohesion	
What are your general perceptions about the project?	
How do you think the project will influence your health and wellbeing?	
How do you think the project can help improve the community's health? **What can you as a community do to improve your own health?**	

THANK YOU

Appendix C: Healthcare Facility Questionnaires

DIGBY WELLS
ENVIRONMENTAL

1

Date: ~~3rd~~ 4th Sept			
Facility name: Mapela Clinic			
Name of person interviewed: Francina Mailula	Designation: Prof. nurse		
Location (village/ town): Mapela - Fotane			
Type of facility:	Clinic ✓	Hospital	Other
Funding:	Government ✓	Private	Other
How many people have access to this health care facility- the target population? Which villages/ communities?	± 12 000 (servicing 10 villages)		
Is there constant water supply?	Yes ✓	No	
What is the quality of the water?	salty, but have R_2O machine to cleans		
Is there constant electricity supply?	Yes ✓	No	off once month
Operating hours of clinic/ hospital:	24 hours		
Please indicate the main illnesses, as well as those most commonly affected (women, children, elderly, men, poor):	Illness	Most commonly affected	Rank (1=most common)
90% ✓	TB	both m & F	1
	HIV	u	2

DIGBY WELLS
ENVIRONMENTAL

drugs etc.	Hypertension	women	3
	Diabetes	women	4
	mental illness	men	5

How many doctors work at this facility full-time?	no full time		
Do you have visiting doctors?	Yes 1		
If yes, from where?	Mokopane - State		
If yes, how often?	Tuesdays only		
How many nurses work at this facility full-time?	eight prof.; 4 enrolled; 2 assistants.; 2 cleaners 1 groundmen		
Do you have visiting nurses?	yes		
If yes, from where?	Mokopane (state) - Mokopane Hospital - out reach - dentist always here		
If yes, how often?	once a month - Shared.		
Does this facility have a mobile clinic?	Yes ✓	No	maternity issue. Dr from mokopane, pharmacy too. - George Masebe
Do doctors/ nurses from this facility conduct home visits if a patient is very ill/ bed ridden/ on their death bed?	Yes ✓ homebased care!	No	
If this facility is a clinic, where is the closest hospital?	George Masebe closer, but not easily accessible so all go to Mokopane		- transport issues - assistance from mobile demarcation of ambulance
If this facility is a clinic, how are patients transported to hospital?	ambulance		
Does this facility have an ambulance?	Yes ✓	No	State ambulance.
When a follow-up is required, do patients see the same nurse/ doctor they saw initially?	Yes Same dr; diff nurse.	No	

DIGBY WELLS
ENVIRONMENTAL

Do patients return for follow-up visits?	Yes ✓	No	
If not, what do you think the main reasons are? go to other clinics			
From where does the facility receive its medicine? Depot in Seshego - orders are controlled in Makopane			
How often does the facility receive its medicine? twice a month			
Does the facility ever run out of medicine?	Yes	No ✓	not any more
If yes, does the patient receive anything in its place?	Yes	No ✓	referred to hospital
If yes, what?			
What is the most common medication prescribed? painkillers - paracetemol.; antibiotics			
Does this facility store medicine for other facilities?	Yes ✓	No ✓	
If yes, what types? N/A - Mabuyela clinic (new clinic); so not established yet, get meds from here.			
Does this facility stock ARVs?	Yes ✓	No	
Does this facility stock birth control medicine or pills?	Yes ✓	No	
Do you distribute condoms from the health care facility? Are there any other condom distribution points in the community? Peer educators assist to distrib. in communities - two of them			
Do patients pay to see a doctor?	Yes	No ✓	
Do patients pay to see a nurse?	Yes	No ✓	
Do patients pay for medicine?	Yes	No ✓	
Does the facility offer routine childhood vaccination services? Yes			

find ARVs in toilets!!

DIGBY WELLS
ENVIRONMENTAL

What record of documentation do you keep?	Patient files - for ARVs only.		
How are patient documents stored?	Hard copy only	Electronic only	Both ✓
Does this facility currently have any health awareness campaigns or programs?	Yes, support home based cares for STIs - condom use. teenage pregnancy - targetted high schools.		
Are there other health actors (e.g. NGOs) active in the communities? What services or activities do they perform?	ORAM - training of personal CHMB - male circumsi.		
Considering the number of patients that come to the facility, would you say domestic violence is an issue of concern in this community?	↳ taboo. not saying. probing & counselling. Women are secretive		training
Judging by the numbers of patients who come to this facility, on a scale of one out of ten patients, how many would you say show symptoms of substance (drugs or alcohol) abuse?	month end - switching - alcohol passing & crimes.		
Are accidents common in the area? What form do these take on (road traffic, assault?)	Yes, assault - month end. Not much traffic		
Do traditional medical practitioners play a role in health care in the community?	especially with breast milk. - no mbita. flush out nutrients Monthly meeting with traditional healers		
Does this facility collaborate with traditional medical practitioners in any way?	getting there but not there yet		
How do you think the project will influence the community's health?			
How do you think the project can help improve the community's health?	give youth skills & not idle & abuse substances - youth can be kept busy, recreational facilities - drugs. ↳ to try get them to refer patients at an earlier stage. ↳ improving, hygiene getting better		

DIGBY WELLS
ENVIRONMENTAL

Date: Mamaselela Clinic			
Facility name: 4th ~~3rd~~ Sept. 2013			
Name of person interviewed: Mrs K.A Phago		Designation: operational manager.	
Location (village/ town): Hans Mapela			
Type of facility:	Clinic ✓	Hospital	Other
Funding:	Government ✓	Private	Other
How many people have access to this health care facility- the target population? Which villages/ communities?		6 villages 11 333 people.	
Is there constant water supply?	Yes ✓	No	
What is the quality of the water? good			
Is there constant electricity supply?	Yes ✓	No	
Operating hours of clinic/ hospital: 24 hours - not full night duty. On call system			
Please indicate the main illnesses, as well as those most commonly affected (women, children, elderly, men, poor):	Illness	Most commonly affected	Rank (1=most common)
	HIV/Aids	Women - men don't come for testing	1
	~~Chronics hypertension~~ mental health. care	males	2.

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ENVIRONMENTAL

Hypertensive	m & f	3
Diabetes	m f f	4
Asthma	both m & f	5

How many doctors work at this facility full-time?	- no full time		
Do you have visiting doctors?	Yes, every Tuesday - State.		
If yes, from where?	State		
If yes, how often?	Weekly (once)		
How many nurses work at this facility full-time?	4 prof. nurses +1, 2 enrolled nurses, 1 enrolled nursing assistant		
Do you have visiting nurses?	No		
If yes, from where?	—		
If yes, how often?	—		
Does this facility have a mobile clinic?	Yes	No ✓	- two villages from (1) Mare Francina (Lapeka)
Do doctors/ nurses from this facility conduct home visits if a patient is very ill/ bed ridden/ on their death bed?	Community home based care Yes ✓	No	
If this facility is a clinic, where is the closest hospital?	Molopane hospital.		
If this facility is a clinic, how are patients transported to hospital?	Ambulance.		
Does this facility have an ambulance?	Yes	No ✓	Molopane amb.
When a follow-up is required, do patients see the same nurse/ doctor they saw initially?	Same dr, dilf nurses. Yes	No	

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ENVIRONMENTAL

Do patients return for follow-up visits?	Yes	No	Sometimes
If not, what do you think the main reasons are? referral to other hospital so they go there, feel better			
From where does the facility receive its medicine? Depot in Seshego			
How often does the facility receive its medicine? every 2 weeks - 2ce a month			
Does the facility ever run out of medicine?	Yes ✓	No	reffered to hospital
If yes, does the patient receive anything in its place?	Yes ✓	No	dr. brings extra meds
If yes, what? e.g. hypertensive meds. caresni no mox, now replace with enalapril Medicate glopicrall			
What is the most common medication prescribed? antibiotics, analgetics, vaccines, ARVs, antipsychotics, diabetics - met			
Does this facility store medicine for other facilities?	Yes	No ✓	
If yes, what types?			
Does this facility stock ARVs?	Yes ✓	No	
Does this facility stock birth control medicine or pills?	Yes ✓	No	
Do you distribute condoms from the health care facility? Are there any other condom distribution points in the community? Yes. Community HB cares to Shops, schools, taverns etc.			
Do patients pay to see a doctor?	Yes	No ✓	
Do patients pay to see a nurse?	Yes	No ✓	
Do patients pay for medicine?	Yes	No ✓	
Does the facility offer routine childhood vaccination services? Yes			

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ENVIRONMENTAL

What record of documentation do you keep?	Chronics only patient files – rest use registers (respective registers)		
How are patient documents stored?	Hard copy only	Electronic only	Both ✓
Does this facility currently have any health awareness campaigns or programs?	flu vaccinie; polio & measles; – together with vitamin A		
Are there other health actors (e.g. NGOs) active in the communities? What services or activities do they perform?	Mapela community HBC, Bathuseng, Red Cross } com. home base		
Considering the number of patients that come to the facility, would you say domestic violence is an issue of concern in this community?	- Refer to hospital; some decide to go to police station instead.		
Judging by the numbers of patients who come to this facility, on a scale of one out of ten patients, how many would you say show symptoms of substance (drugs or alcohol) abuse?	2 - out of ten - alcohol. - month end.		
Are accidents common in the area? What form do these take on (road traffic, assault?)	not common.		
Do traditional medical practitioners play a role in health care in the community?	included in clinic committee meetings. Yes, one is active - sh even refers patients		
Does this facility collaborate with traditional medical practitioners in any way?	✓		
How do you think the project will influence the community's health?			
How do you think the project can help improve the community's health?	- mines don't employ local ↑ in HIV infection rate to increase - problem with tracing patients - defaulttering will be high - CSR projects in the community. ↳ split between the traditional healers (funeral diviners due to politics)		

↳ building of clinics - other villages have to travel far

↳ clinics with no staff

↳ assist staff establishment of ~~the staff~~

Request copy full Report.

DIGBY WELLS
ENVIRONMENTAL

5

Date: 4 Sept. 2013			
Facility name: Tshamahansi Clinic			
Name of person interviewed: R. M. Maphoto	Designation: Operations manager		
Location (village/ town): Tshamahansi			
Type of facility:	Clinic ✓	Hospital	Other
Funding:	Government ✓	Private	Other built by the American Embassy.
How many people have access to this health care facility- the target population? Which villages/ communities?	6 villages - after hours service more as other Clinics, 6 = 12		
Is there constant water supply?	Yes ✓	No	borehole water
What is the quality of the water? - distiller machine ∴ good			
Is there constant electricity supply?	Yes ✓	No	- rainy / lightening / windy = outages
Operating hours of clinic/ hospital: 24 hours			
Please indicate the main illnesses, as well as those most commonly affected (women, children, elderly, men, poor):	Illness	Most commonly affected	Rank (1=most common)
3/10 TB HIV +ve	TB	both m & f	1
	HIV/Aids, sti	"	2

* 17288

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ENVIRONMENTAL

→ Teenage pregnancy
→ Substance abuse

Cough / URTI	both	3
Diahorrea	children / m+F	4
Mental illnesses	both	5

How many doctors work at this facility full-time? none			
Do you have visiting doctors? Yes			
If yes, from where? Mokopane Hosp. - Station			
If yes, how often? once a week - Thursdays			
How many nurses work at this facility full-time? 9 prof. nurses, 3 enrolled, 3 enrolled assistants			
Do you have visiting nurses? no			
If yes, from where? —			
If yes, how often? —			
Does this facility have a mobile clinic?	Yes ✓	No	Mapela (other 1 from Francina)
Do doctors/ nurses from this facility conduct home visits if a patient is very ill/ bed ridden/ on their death bed?	HBC Re engineering project Yes ✓	No	
If this facility is a clinic, where is the closest hospital? Mokopane			
If this facility is a clinic, how are patients transported to hospital? ambulance			
Does this facility have an ambulance?	Yes	No ✓	- Stationed @ Mokopane (town)
When a follow-up is required, do patients see the same nurse/ doctor they saw initially?	Same dr. Yes diff nurse.	No ✓	

↳ community (2) nurses; 4 community health workers - conduct DAILY VISITS - Registration of families then write a referal to clinic. i.e. Duncan @ number 4 is sick

nurses refer to the dr.

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ENVIRONMENTAL

Do patients return for follow-up visits?	Yes	No	Not all.
If not, what do you think the main reasons are?	feel better, lazy, work - transport is not a problem		
From where does the facility receive its medicine?	Depot @ Seshego.		
How often does the facility receive its medicine?	twice a month		
Does the facility ever run out of medicine?	Yes ✓	No	Chronics referred to malapan Chronics drugs prepacked
If yes, does the patient receive anything in its place?	Yes	No ✓	
If yes, what?	N/A		
What is the most common medication prescribed?	pain killer - paracetamol ibrufen ; anti-bacterial - bactrim & cipro.		
Does this facility store medicine for other facilities?	Yes	No ✓	
If yes, what types?	N/A		
Does this facility stock ARVs?	Yes ✓	No	
Does this facility stock birth control medicine or pills?	Yes ✓	No	
Do you distribute condoms from the health care facility? Are there any other condom distribution points in the community?	Yes - SANTA group distributing to taverns, Shebeens & Shops ↳ HBCs also distribute		
Do patients pay to see a doctor?	Yes	No ✓	
Do patients pay to see a nurse?	Yes	No ✓	
Do patients pay for medicine?	Yes	No ✓	
Does the facility offer routine childhood vaccination services?	Yes		

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ENVIRONMENTAL

What record of documentation do you keep?	Patient files for HIV/ Chronics/ Maternity / TB - child health register as well.		
How are patient documents stored?	Hard copy only ✓	Electronic only new - only HIV	Both ✓
Does this facility currently have any health awareness campaigns or programs?	Re-engineering Project - even go to schools - dewarming		
Are there other health actors (e.g. NGOs) active in the communities? What services or activities do they perform?	Red Cross - HBC; Rutaoke - HBC, SANTA - condo		
Considering the number of patients that come to the facility, would you say domestic violence is an issue of concern in this community?	Yes - substance abuse		
Judging by the numbers of patients who come to this facility, on a scale of one out of ten patients, how many would you say show symptoms of substance (drugs or alcohol) abuse?	4/10 - Fridays - Sunday. A lot of substance abuse - worse at schools		
Are accidents common in the area? What form do these take on (road traffic, assault?)	Yes, close to main road. - daily - not even pay day.		
Do traditional medical practitioners play a role in health care in the community?	Some.		
Does this facility collaborate with traditional medical practitioners in any way?	Some even refer - Clinic Health committee - one traditional healer is a member & usually monthly.		
How do you think the project will influence the community's health?	- spread of communicable diseases - ? HIV infection rate; migration. - already overpopulated - increased burden on clinic services - stress/burden on clinic - small clinic		
How do you think the project can help improve the community's health?			

* mobile police station - domestic violence
* Social workers also stationed here.
* CDP - also com. dev. pract.
* livelihood from selling nyaupe.

→ employment opportunities ∴ financial, physical & health status will improve because of money.
→ health services improve - learning about illnesses from other places. e.g. Mozambique - from imigrants
→ cultural diversity
→ community development through (CSR)

* extension / improvement of infra. structure - maternity ward

DIGBY WELLS
ENVIRONMENTAL

4

Date: 4 Sep 2013			
Facility name: Mahwelereng Clinic 1			
Name of person interviewed: Phiri Johannes		Designation: Operational Manager	
Location (village/ town):			
Type of facility: Clin	Clinic x	Hospital	Other
Funding:	Government x	Private	Other
How many people have access to this health care facility- the target population? Which villages/ communities?	10 villages	pop 23 359	
Is there constant water supply?	Yes X	No	
What is the quality of the water?	Borehole; good quality		
Is there constant electricity supply?	Yes x	No	
Operating hours of clinic/ hospital:	Failure during rainy season; no generater		
Please indicate the main illnesses, as well as those most commonly affected (women, children, elderly, men, poor):	Illness	Most commonly affected	Rank (1=most common)
* more females than male - male don't come to clinic	HIV	Females	1
	TB	Both few children	2

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*Non-Executive

DIGBY WELLS
ENVIRONMENTAL

Hypertension	Both	3
Diabetes	Both	4
STI	Both	5

How many doctors work at this facility full-time?			
Do you have visiting doctors? Every Tuesday visit			
If yes, from where? Voortrekker hospital			
If yes, how often? Every week			
How many nurses work at this facility full-time? 18 full-time			
Do you have visiting nurses? no			
If yes, from where? n/A			
If yes, how often? n/A			
Does this facility have a mobile clinic?	Yes	No X	Zone 2 Clinic
Do doctors/ nurses from this facility conduct home visits if a patient is very ill/ bed ridden/ on their death bed?	Yes X	No	
If this facility is a clinic, where is the closest hospital? Mokopane Hospital - first Voortrekker 2nd; use both.			
If this facility is a clinic, how are patients transported to hospital? Call Ambulace			
Does this facility have an ambulance?	Yes	No X	- called from town.
When a follow-up is required, do patients see the same nurse/ doctor they saw initially?	Yes X	No	

↓ Visiting doctor the same * nurse next page

DIGBY WELLS
ENVIRONMENTAL

Do patients return for follow-up visits?	Yes X	No X	99% return
If not, what do you think the main reasons are?	* (Different shifts; find new staff member.)		*previous page doctor
From where does the facility receive its medicine?	Limpopo medicine depot.		
How often does the facility receive its medicine?	2 per month		
Does the facility ever run out of medicine?	Yes	No X	-If run out request from voortrek recieve same day.
If yes, does the patient receive anything in its place?	Yes	No X	
If yes, what?			
What is the most common medication prescribed?	1st ARV. 2nd Painkiller - paracetemol.		
Does this facility store medicine for other facilities?	Yes	No X	
If yes, what types?			
Does this facility stock ARVs?	Yes X	No	
Does this facility stock birth control medicine or pills?	Yes X	No	
Do you distribute condoms from the health care facility? Are there any other condom distribution points in the community?	Yes; Community based dist. to taverns schools.		
Do patients pay to see a doctor?	Yes X	No X	
Do patients pay to see a nurse?	Yes	No X	
Do patients pay for medicine?	Yes	No X	
Does the facility offer routine childhood vaccination services?	Yes		

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What record of documentation do you keep?	Record of all patients		
How are patient documents stored?	Hard copy only X	Electronic only	Both
Does this facility currently have any health awareness campaigns or programs?	Door to door general health care & workplace visit - health awareness.		
Are there other health actors (e.g. NGOs) active in the communities? What services or activities do they perform?	Red Cross. Santa - TB & HIV. ~~Hosp Mamre~~ Mw psap		
Considering the number of patients that come to the facility, would you say domestic violence is an issue of concern in this community?	If likely - go to hospital first as unit there. Don't deal direct		
Judging by the numbers of patients who come to this facility, on a scale of one out of ten patients, how many would you say show symptoms of substance (drugs or alcohol) abuse?	2 in ten - evidents of subs abuse; not reason for visiting clinic		
Are accidents common in the area? What form do these take on (road traffic, assault?)	Not common as visit hospital rather than clinic		
Do traditional medical practitioners play a role in health care in the community?	One in Mahw clinic community. If can't treat traditionally - train		
Does this facility collaborate with traditional medical practitioners in any way?	to bring to clinic. One represents others in community.		
How do you think the project will influence the community's health?			
How do you think the project can help improve the community's health?			

Project will increase TB & HIV due to increased population.
Waste disposal must be proper methods & water must n't pollute. - communities boreholes run dry - health implications.

Clinics build by Anglo - but in villages; nothing in Mahwotdeeg.
More clinics are needed. - 10km to walk to clinic. > more clinics to help population.
- Many people to one clinic

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have own pathology lab

5

Date: 5 September 2013			
Facility name: Vd Berg family Clinic			
Name of person interviewed: Andre van den Berg	Designation: Doctor		
Location (village/ town): Mokopane Town			
Type of facility:	Clinic	Hospital	Other ✓
Funding:	Government	Private ✓	Other
How many people have access to this health care facility- the target population? Which villages/ communities?	too many		
Is there constant water supply?	Yes ✓	No	
What is the quality of the water?	good – drinkable		
Is there constant electricity supply?	Yes ✓	No	& generator & dialysis
Operating hours of clinic/ hospital:	8-5 but 24hrs on call system		
Please indicate the main illnesses, as well as those most commonly affected (women, children, elderly, men, poor):	Illness	Most commonly affected	Rank (1=most common)
	Cardiovascular	both	1
	Diabetes	women	2

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3. HIV & TB ✓ not drug resistant	Prostate gland problems	males	3
	dist. gynea	women	4
			5

How many doctors work at this facility full-time?	1		
Do you have visiting doctors?	2 doctors (state)		
If yes, from where?			
If yes, how often?	anaesthetic – drs. on ad hoc basis – dentists etc.		
How many nurses work at this facility full-time?	3 ~~prof~~ 4 part time nurses; 3 prof sisters on standby after hours.		
Do you have visiting nurses?	none		
If yes, from where?	–		
If yes, how often?	–		
Does this facility have a mobile clinic?	Yes	No ✓	Yes, in town only.
Do doctors/ nurses from this facility conduct home visits if a patient is very ill/ bed ridden/ on their death bed?	Yes ✓	No	
If this facility is a clinic, where is the closest hospital?	Voortrekker		
If this facility is a clinic, how are patients transported to hospital?	call ambulance		
Does this facility have an ambulance?	Yes	No ✓	State ambulance
When a follow-up is required, do patients see the same nurse/ doctor they saw initially?	Yes	No	

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- ARVs collect Transpharm

Do patients return for follow-up visits?	Yes ✓	No	very ill ones
If not, what do you think the main reasons are?	transport issues, get better		
From where does the facility receive its medicine?	dispense from here / all chronics get from chemists (own chemists)		
How often does the facility receive its medicine?	Daily		- not costly - peer review from med. aid - very cost effective prescriptions +- 250 per patient
Does the facility ever run out of medicine?	Yes	No ✓	
If yes, does the patient receive anything in its place?	Yes	No ✓	
If yes, what?			
What is the most common medication prescribed?	hypertension, 50mg twice a day Captoeril		
Does this facility store medicine for other facilities?	Yes	No ✓	
If yes, what types?	only mother to child transmission		
Does this facility stock ARVs?	Yes	No ✓	Medical aids bring her as collection point
Does this facility stock birth control medicine or pills?	Yes	No ✓	
Do you distribute condoms from the health care facility? Are there any other condom distribution points in the community?	no Yes		
Do patients pay to see a doctor?	Yes ✓	No	R300 - gen includes sauna, does dopplers.
Do patients pay to see a nurse?	Yes	No ✓	
Do patients pay for medicine?	Yes	No ✓ —	scripts. flu meds etc, pregnant women + children
Does the facility offer routine childhood vaccination services?	Yes - 0-5 years (pay for it)		

14 & 15 yr olds come from abortions

500 girls since between 1995 - 2011

Red Cross counselling

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What record of documentation do you keep?	patient files		
How are patient documents stored?	Hard copy only ✓	Electronic only	Both
Does this facility currently have any health awareness campaigns or programs?	Dr counsels patients; posters up on walls; nurses talk to them during visits		
Are there other health actors (e.g. NGOs) active in the communities? What services or activities do they perform?	Cansa - voluntary work ↳ pap smear screening		
Considering the number of patients that come to the facility, would you say domestic violence is an issue of concern in this community?	NO		
Judging by the numbers of patients who come to this facility, on a scale of one out of ten patients, how many would you say show symptoms of substance (drugs or alcohol) abuse?	youngsters & drugs (early 20s) not much alcohol. Heroin problem ✱.		
Are accidents common in the area? What form do these take on (road traffic, assault?)	No - straight to hospitals - platinum mines ↳ platinum health patients ↳ mine accidents		
Do traditional medical practitioners play a role in health care in the community?	2 of them yes - not collaborations		
Does this facility collaborate with traditional medical practitioners in any way?	↳ babies go there after here		
How do you think the project will influence the community's health?	impr economy ∴ impr health !! No problem ↳ no air quality issues so everything is fine		
How do you think the project can help improve the community's health?			

✱ do not want to be bullied by mines
↳ fair treatment - not flat rate - no matter what you do, this is how much you will get paid
↳ battle to get money from platinum health - med. aid.

↳ Voortrekker has enough doctors
↳ no extra burden. Medical system is good
pull factors in Mokopane are needed

↳ There is no private hospital in Mokopane.
↳ support the doctors - open the fields completely - medical aid accredited list / patient to decide where they want to be treated
↳ workers must shop here, not in PLK
↳ use local produce, business support.