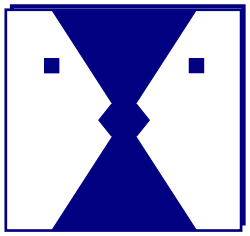
Scafell Cluster PV Facilities Project

Social Impact Assessment



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Executive Summary

The Scafell Cluster Project consists of four separate solar PV facilities and associated grid connection infrastructure with a total generating capacity of up to 525 MW_{ac}. A project site located 19 km west of the town of Sasolburg has been identified for the construction and operation of the solar PV facilities. Although the project is divided into four separate sites, the social impacts resulting from the individual project will be experienced as if there are only one site. This is because social impacts are not footprint specific and take place in the communities closest to the site.

The proposed projects will be in Ward 7 of the Ngwathe Local Municipality (LM) that forms part of the Fezile Dabi District Municipality in the Free State Province. As the towns of Vanderbijlpark, Vereeniging and Sasolburg are in relatively close proximity to the site, the Metsimoholo LM and Emfuleni LM, as well as the wards in these municipalities that are closest to the site were included in the analysis.

Ward 7 consists mostly of agricultural land, but also includes a part of Tumahole township in Parys. The area is mainly of agricultural significance, although tourism and commerce also form part of the economy. There are sand mining activities relatively close to the site.

The population in the Ngwathe LM showed a slight decrease between 2011 and 2016, while the number of households have increased with just over 10%. The Ngwathe LM has the highest dependency ratios in the area, which suggests fewer employment opportunities in this area and high levels of poverty. A greater proportion of households in the Ngwathe LM area were living in poverty in 2016 compared to 2011. It is anticipated that poverty levels in the area have increased even further because of the COVID-19 pandemic.

Most of the population in the area belong to the Black population group, followed by the White population group. Sesotho is the home language of more than two thirds of the population in the Ngwathe LM, followed by Afrikaans. There is a bias towards

females in the area, which is characteristic of rural areas as many males migrated to urban areas in search of employment.

Education levels are relatively low in the Ngwathe LM with more than two thirds having completed education up to some secondary. Only about a third of adults of working age in the Ngwathe LM is employed. A large proportion of households live below the poverty line.

The table below summarise the predicted impacts in different phases of the project.

Impacts	Phases			
	Planning and design	Construction	Operation	Decommission
Local and national economic opportunities				
Employment and skills transfer				
Visual impacts and sense of place				
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment				
Safety and security (crime)				
Impact on residents in closest urban areas				
Impact on agricultural activities (waste, water, grazing, fire)				
Development of clean renewable energy				

The project will have a positive economic impact in the surrounding areas. None of the potential negative social impacts are severe, and all the impacts can be mitigated. The proposed development is unlikely to result in any permanent damaging social impacts. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning.

- The potential negative social impacts associated with the construction phase are typical of construction-related projects and not just focussed on the construction of PV facilities (these relate to influx of non-local workforce and jobseekers, intrusion and disturbance impacts, safety, and security) and could be reduced with the implementation of the mitigation measures proposed.

- New business sales and employment opportunities will be created in the construction and operation phase and the impacts are rated as positive even if only relatively few individuals benefit in this regard.

- The proposed projects could assist the local economy in creating entrepreneurial development, especially if local business could be involved in the provision of general material and services during the construction and operational phases. Capacity building and skills training among employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.

- The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, as well as national challenges in supplying electricity, represents a positive social benefit for society.

- When considering the overall costs and benefits of the projects it is found that the latter is more prominent allowing for the achievement of a net benefit. With respect to risks and negative impacts, these should prove relatively low with mitigation.

Based on the conclusions and findings of this study, the following key recommendations are made:

- Mitigation about safety and security must be implemented as soon as construction commences. The process must involve local security groups and landowners.

- A community liaison officer that is trusted by the community and has the necessary skills and education must be appointed before construction commences.

- Protocols on farm access, compensation, communication, and road maintenance must be agreed upon and be in place before construction commences.

- A grievance mechanism and claims procedure must be in place and shared with all the stakeholders before the construction commences; and

- Economic benefits must be enhanced, and local labour and procurement should be prioritised.

It is recommended that the proposed projects are supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the report. In terms of the potential social impacts arising from the projects, it is found that there is no obvious reason for the competent authority to reject the applications on social grounds

Declaration of Independence

Equispectives Research and Consulting Services declare that:

- All work undertaken relating to the proposed project was done as independent consultants.
- They have the necessary required expertise to conduct social impact assessments, including the required knowledge and understanding of any guidelines or policies that are relevant to the proposed activities.
- They have undertaken all the work and associated studies in an objective manner, even if the findings of these studies were not favourable to the project proponent.
- They have no vested interest, financial or otherwise, in the proposed projects or the outcome thereof, apart from remuneration for the work undertaken under the auspices of the above-mentioned regulations.
- They have no vested interest, including any conflicts of interest, in either the proposed projects or the studies conducted in respect of the proposed projects, other than complying with the relevant required regulations; and
- They have disclosed any material factors that may have the potential to influence the competent authority's decision and/or objectivity in terms of any reports, plans or documents related to the proposed projects as required by the regulations.

Record of Experience

Ilse Aucamp and San-Marié Aucamp compiled this report.

Ilse Aucamp holds a D Phil degree in Social Work obtained from the University of Pretoria in 2015. She also has Masters' degree in Environmental Management (Cum Laude) from the Potchefstroom University for Christian Higher Education, which she obtained in 2004. Prior to that she completed a BA degree in Social Work at the University of Pretoria. She is frequently a guest lecturer in pre- as well as post-graduate programmes at various tertiary institutions. Her expertise includes social impact assessments, social management plans, social and labour plans, social auditing, training as well as public participation. She is a co-author of the *Social Impact Assessment: Guidance for assessing and managing the social impacts of projects* document published by the International Association for Impact Assessment.

San-Marié Aucamp is a registered Research Psychologist with extensive experience in both the practical and theoretical aspects of social research. She has more than 20 years' experience in social research, and she occasionally presents guest lectures on social impact assessment. Her experience includes social impact assessments, social and labour plans, training, group facilitation as well as social research. She is a past council member of the Southern African Marketing Research Association (SAMRA).

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GLOSSARY OF TERMS

Livelihood: The ways in which people combine their capabilities, skills, and knowledge with the resources at their disposal to create activities that enables them to make a living.

Securitisation: A financial arrangement that consists of issuing securities that are backed by a pool of assets, in most cases debt.

Sense of place: Defining oneself in terms of a given piece of land. It is the way humans relate or feel about the environments in which they live.

Social impact: Something that is experienced or felt by humans. It can be positive or negative. Social impacts can be experienced in a physical or perceptual sense.

Social change process: A discreet, observable, and describable process that changes the characteristics of a society, taking place regardless of the societal context (that is, independent of specific groups, religions etc.) These processes may, in certain circumstances and depending on the context, lead to the experience of social impacts.

Social Impact Assessment: The processes of analysing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by these interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.

Social license to operate: The acceptance and belief by society, and specifically local communities, in the value creation of activities.

Social risk: Risk resulting from a social or socio-economic source. Social risk comprises both the objective threat of harm and the subjective perception of risk for harm.

Sustainable livelihood: A livelihood that can carry on in the present and in the future without depleting the resources it depends on and without depriving other people of a livelihood. It can be carried on despite shocks or changes like natural disasters or seasonal cycles.

LIST OF ABBREVIATIONS

DM	District Municipality
ESIA	Environmental and Social Impact Assessment
ESMP	Environment & Social Management Plan
EMP	Environmental Management Plan
ESOMAR	European Society for Opinion and Marketing Research
FPL	Food Poverty Line
IDP	Integrated Development Plan
IFC	International Finance Corporation
IHDI	Inequality-adjusted Human Development Index
LBPL	Lower Bound Poverty Line
LM	Local Municipality
LED	Local Economic Development
MPI	Multidimensional Poverty Index
NGO	Non-Government Organisation
RAP	Resettlement Action Plan
SAMRA	Southern African Marketing Research Association
SIA	Social Impact Assessment
UBPL	Upper Bound Poverty Line
UNEP	United Nations Environmental Programme

1 Introduction

The Scafell Cluster Project consists of four separate solar PV facilities and associated grid connection infrastructure with a total generating capacity of up to 525 MW_{ac}. A project site located 19 km west of the town of Sasolburg has been identified for the construction and operation of the solar PV facilities and the associated grid connection infrastructure.

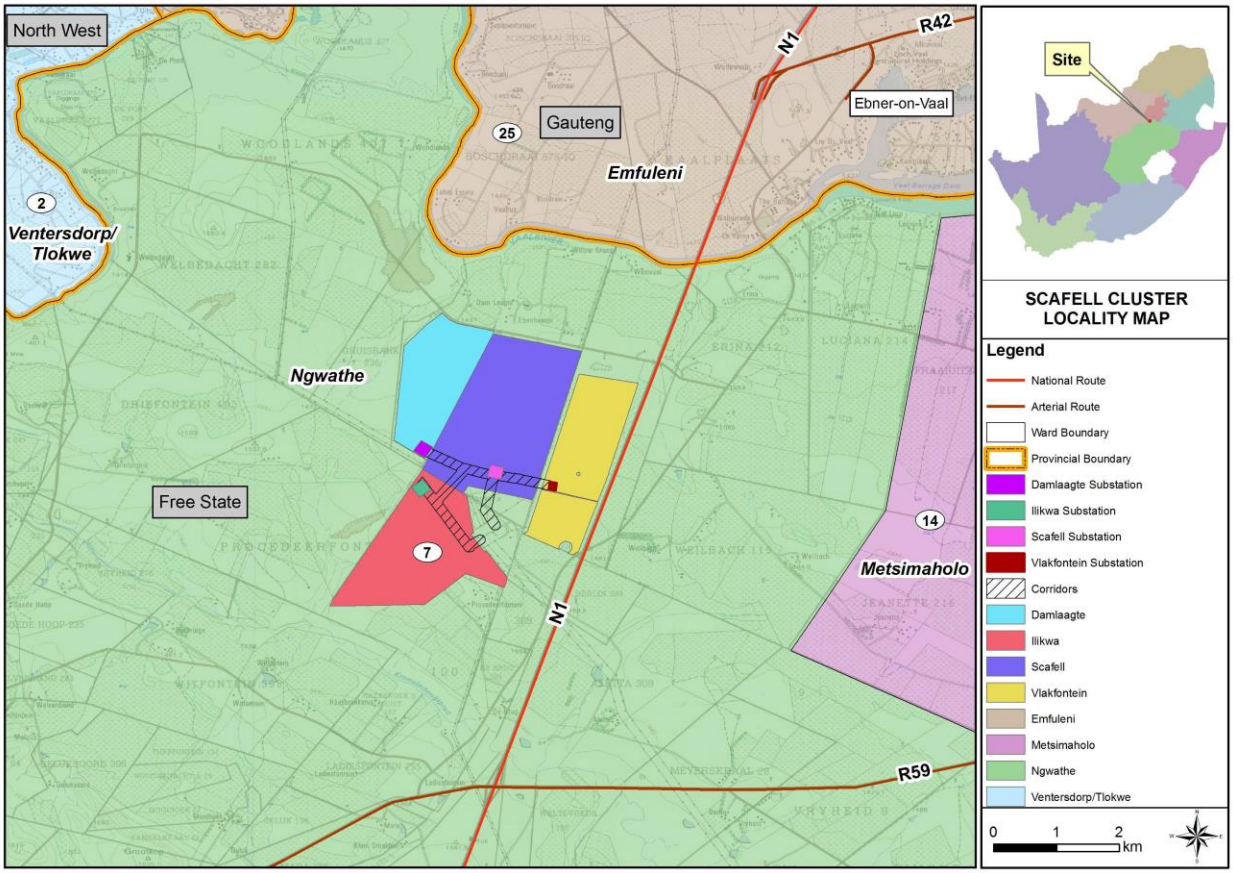
The project site is located within the Central Strategic Transmission Corridor – a node for the development and expansion of large-scale electricity / grid connection infrastructure, such as power lines and substations, amongst others. Existing grid connection infrastructure within the vicinity of the project site include the following:

- Scafell Main Transmission Substation;
- Mercury – Zeus 765 kV Power Line;
- Olympus – Scafell 1 275 kV Power Line,
- Scafell – Snowdon 1 275 kV Power Line; and
- Makalu – Scafell 1 275 kV Power Line.

All of the above-mentioned power lines connect to the Scafell MTS located 2 km south – east of the project site. The grid connection infrastructure associated with the proposed project would either be a direct connection or loop in / loop out connection.

Figure 1 shows the proposed location for the Scafell Cluster Project. A more detailed description of the four PV facilities is provided in Section 3 of the report.

Figure 1: Locality of the site for the proposed Scafell Cluster Project.



One of the ways in which social risk can be managed is by conducting a Social Impact Assessment (SIA). Such an assessment can assist with identifying possible social impacts and risks. Disregarding social impacts can alter the cost-benefit equation of development and in some cases even undermine the overall viability of a project. A proper social impact assessment can have many benefits for a proposed development (UNEP, 2002) such as:

- Reduced impacts on communities of individuals.
- Enhanced benefits to those affected.
- Avoiding delays and obstruction – helps to gain development approval (social license to operate).
- Lowered costs.
- Better community and stakeholder relations; and
- Improved proposals.

SLR Consulting (South Africa) (Pty) Ltd (SLR) has appointed Equispectives Research and Consulting Services to investigate potential social impacts as part of the

Environmental Impact Assessment study for the proposed project. This report represents the findings and recommendations of the social impact assessment.

2 Policy and Planning Environment

Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development.

Policy review provides an insight into government socio-economic objectives, plans, and applicable legislature. This assists in determining the importance and alignment of the project regarding the developmental objectives of various government spheres.

2.1 National Energy Act (Act No 34 of 2008)

The National Energy Act was promulgated in 2008 (Act No 34 of 2008). One of the objectives of the Act was to promote diversity of supply of energy and its sources. In this regard, the preamble makes direct reference to renewable resources, including solar and wind:

> *"To ensure that diverse energy resources are available, in sustainable quantities, and at affordable prices, to the South African economy, in support of economic growth and poverty alleviation, taking into account environmental management requirements (…); to provide for (…) increased generation and consumption of renewable energies…" (*Preamble).

2.2 White Paper on the Energy Policy of the Republic of South Africa

Investment in renewable energy initiatives is supported by the White Paper on Energy Policy for South Africa (December 1998). In this regard the document notes:

> *"Government policy is based on an understanding that renewables are energy sources in their own right, are not limited to small-scale and remote applications, and have significant medium and long-term commercial potential".*

> *"Renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future".*

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind. In addition, renewable applications are in fact the cheapest energy service in many cases; more so when social and environmental costs are considered.

Government policy on renewable energy is concerned with meeting the following challenges:

- Ensuring that economically feasible technologies and applications are implemented.
- Ensuring that an equitable level of national resources is invested in renewable technologies, given their potential, and compared to investments in other energy supply options; and
- Addressing constraints on the development of the renewable industry.

The White Paper acknowledges that South Africa has neglected the development and implementation of renewable energy applications, even though the country's renewable energy resource base is extensive, and many appropriate applications exist. The White Paper further notes that renewable energy applications have specific characteristics that need to be considered. Advantages include:

- Minimal environmental impacts in operation in comparison with traditional supply technologies; and
- Generally lower running costs, and high labour intensities.

Disadvantages include:

- Higher capital costs in some cases.
- Lower energy densities; and
- Lower levels of availability, depending on specific conditions, especially with sun and wind-based systems.

2.3 White Paper on Renewable Energy

The White Paper on Renewable Energy (November, 2003) (further referred to as the White Paper) supplements the White Paper on Energy Policy, which recognizes that the medium and long-term potential of renewable energy is significant. This Paper sets out Government's vision, policy principles, strategic goals, and objectives for promoting and implementing renewable energy in South Africa. The White Paper notes that while South Africa is well endowed with renewable energy resources that have the potential to become sustainable alternatives to fossil fuels, these have thus far remained largely untapped. As signatory to the Kyoto Protocol[1], Government is resolute to realise the country's commitment to reducing greenhouse gas emissions. Therefore, Government has committed itself to the development of a framework in which a national renewable energy framework can be established and operate. South Africa is also a signatory of the Copenhagen Accord, a document that delegates at the 15th session of the Conference of Parties (COP 15) to the United Nations Framework Convention on Climate Change agreed to "take note of" at the final plenary on 18 December 2009. The accord endorses the continuation of the Kyoto Protocol and confirms that climate change is one of the greatest challenges facing the world. In terms of the accord South Africa committed itself to a reduction target of 34% compared to business as usual.

Apart from the reduction of greenhouse gas emissions, the promotion of renewable energy sources is aimed at ensuring energy security through the diversification of supply (in this regard, also refer to the objectives of the National Energy Act). Government's long-term goal is the establishment of a renewable energy industry producing modern energy carriers that will offer in future years a sustainable, fully non-subsidised alternative to fossil fuels.

[1] The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC), aimed at fighting global warming. The UNFCCC is an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". The Protocol was initially adopted on 11 December 1997 in Kyoto, Japan and entered into force on 16 February 2005. As of November 2009, 187 states have signed and ratified the protocol (https://unfccc.int/kyoto_protocol.)

2.4 Integrated Energy Plan (2016)

The development of a National Integrated Energy Plan (IEP) was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives were identified, namely:

- Objective 1: Ensure security of supply.
- Objective 2: Minimise the cost of energy.
- Objective 3: Promote the creation of jobs and localisation.
- Objective 4: Minimise negative environmental impacts from the energy sector.
- Objective 5: Promote the conservation of water.
- Objective 6: Diversify supply sources and primary sources of energy.
- Objective 7: Promote energy efficiency in the economy; and
- Objective 8: Increase access to modern energy.

The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e., agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and consider the impact of key

policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others.

Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are analysed. The IEP is focused on determining the long-term energy pathway for South Africa, considering a variety of factors which are embedded in the eight objectives. As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios:

- The **Base Case Scenario** assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term.

- The **Environmental Awareness Scenario** is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy.

- The **Resource Constrained Scenario** in which global energy commodity prices (i.e., coal, crude oil, and natural gas) are high due to limited supply.

- The **Green Shoots Scenario** describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met.

The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of renewable energy, the document refers to wind and solar energy. The document does, however, appear to support solar over wind noting that solar PV and CSP with storage present excellent opportunities to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Solar technologies also present the greatest potential for job creation and localisation. Incentive programmes and special

focused programmes to promote further development in the technology, as well as solar roll-out programmes, should be pursued.

In terms of existing electricity generation capacity, the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result, large investments are required in the electricity sector to maintain an adequate supply in support of economic growth. By 2020, various import options became available, and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs.

In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy. An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered.

In term of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution. The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and

Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.

The IEP notes that a diversified energy mix with a reduced reliance on a single or a few primary energy sources should be pursued. In terms of renewable energy, wind and solar are identified as the key options.

Wind

- Wind energy should continue to play a role in the generation of electricity. Allocations to ensure the development of wind energy projects aligned with the IRP2010 should continue to be pursued.

Solar

- Solar should play a much more significant role in the electricity generation mix than it has done historically and constitutes the greatest share of primary energy (in terms of total installed capacity) by 2050. The contribution of solar in the energy mix comprises both CSP and solar PV.

- Investments should be made to upgrade the grid to accommodate increasing solar and other renewable energy contributions.

With reference to the Renewable Energy Independent Power Producer (REIPP) Procurement Programme, the IEP notes:

- The REIPP Procurement Programme should be extended, and new capacity should be allocated through additional bidding windows in order ensure the ongoing deployment of renewable energy technologies.

- Experience and insights gained from the current procurement process should be used to streamline and simplify the process.

- The implementation of REIPP projects in subsequent cycles of the programme should be aligned with the spatial priorities of provincial

and local government structures in the regions that are selected for implementation, in line with the Spatial Development Frameworks. This will ensure that there is long-term, sustainable infrastructure investment in the areas where REIPP projects are located. Such infrastructure includes bulk infrastructure and associated social infrastructure (e.g., education and health systems). This alignment will further assist in supporting the sustainable development objectives of provincial and local government by benefiting local communities.

The IEP indicates that Renewable Energy Development Zones (REDZs) have been identified and describe geographical areas:

- In which clusters (several projects) of wind and solar PV development will have the lowest negative impact on the environment while yielding the highest possible social and economic benefit to the country.
- That are widely agreed to have strategic importance for wind and solar PV development.
- Where the environmental and other authorisation processes have been aligned and streamlined based on scoping level pre-assessments and clear development requirements; and
- Where proactive and socialised investment can be made to provide time-efficient infrastructure access.

2.5 Integrated Resource Plan (2019)

The NDP envisages that, by 2030, South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, is socially equitable through expanded access to energy at affordable tariffs and that is environmentally sustainable through reduced pollution.

The Integrated Resource Plan (IRP) 2010–2030, promulgated in March 2011, updated in October 2019, represents an electricity infrastructure development plan for South

Africa based on least-cost supply and demand balance considering security of supply and the environment (minimize negative emissions and water usage). Since the promulgated IRP 2010–2030 in 2011, a total 6 422MW under the Renewable Energy Independent Power Producers Procurement Programme (REIPPPP) has been procured, with 3 272MW operational and made available to the grid. At the time of promulgation, it was envisaged that the IRP would be a "living plan" to be revised by the then Department of Energy (DoE) frequently. Since the promulgation of the IRP in March 2011 several assumptions have changed, including electricity demand projection, Eskom's existing plant performance, as well as new technology costs. The 2019 IRP notes that the Gross Domestic Product (GDP) for the period 2010– 2016 was significantly lower than the GDP projections assumed in the promulgated IRP 2010–2030. The expected electricity demand as forecasted in the promulgated IRP 2010–2030 did therefore not materialise and the forecast was updated accordingly to reflect this. In so doing the 2019 IRP assesses the electricity demand for the period 2017-2050. Three demand scenarios were assessed, namely an upper, median, and lower forecast based on varying GDP growth rates. The median scenario also considered the assumed change in the structure of the economy where energy-intensive industries make way for less intensive industries. The lower scenario considered lower economic growth linked to possible downgrading decisions by rating agencies. The 2019 IRP also considered the externality costs associated with Green House Gas (GHG) emissions, specifically the negative externalities-related air pollution caused by pollutants such as nitrogen oxide (NOx), sulphur oxide (SOx), particulate matter (PM) and mercury (Hg). These externality costs reflect the cost to society because of the activities of a third party resulting in social, health, environmental, degradation or other costs.

The scenarios were analysed in three timeframes, namely 2017–2030, 2031–2040 and 2041–2050. The period 2021–2030 is termed a "medium-to-high" period of certainty, with new capacity requirements driven by the decommissioning of old Eskom power plants and marginal demand growth. While demand and technology costs are likely to change, the decommissioning of old plants will result in the requirements for additional capacity.

The period 2031–2040 is termed an "indicative period", as the uncertainty regarding the assumptions begins to increase. The output for this period is relevant to the investment decisions of the 2021–2030 period because it provides information needed to understand various future energy mix paths and how they may be impacted by the decisions made today. The period 2041–2050 is even more uncertain than the period before 2040.

Based on the results of the scenario analyses, the following findings are relevant to the RE sector:

- Committed REIPPPP (including the 27 signed projects) and Eskom capacity rollout ending with the last unit of Kusile in 2022 will provide more than sufficient capacity to cover the projected demand and decommissioning of plants up to around 2025.
- The installed capacity and energy mix for scenarios tested for the period up to 2030 does not differ materially. This is driven mainly by the decommissioning of about 12GW of Eskom coal plants.
- Imposing annual build limits on RE will not affect the total cumulative installed capacity and the energy mix for the period up to 2030.
- Imposing carbon budget as a strategy for GHG emission reduction or maintaining the PPD approach used in 2010 will not alter the energy mix by 2030.
- The projected unit cost of electricity by 2030 is similar for all scenarios, except for market-linked gas prices where market-linked increases in gas prices were assumed rather than inflation-based increases.
- The scenario without RE annual build limits provides the least-cost option by 2030.

For the period post 2030, the findings indicate:

- The decommissioning of coal plants (total 28GW by 2040 and 35GW by 2050), together with emission constraints imposed, imply coal will contribute less than 30% of the energy supplied by 2040 and less than 20% by 2050.

- Imposing annual build limits on RE will restrict the cumulative renewable installed capacity and the energy mix for this period.

- Adopting no annual build limits on renewables or imposing a more stringent GHG emission reduction strategy implies that no new coal power plants will be built in the future unless affordable cleaner forms of coal to power are available.

- Of key relevance, the assessment found that the scenario without RE annual build limits provides the cheapest option by 2050.

The IRP 2019 Report concludes that based on the findings of the scenario's analysis, the scenario of RE without annual build limits provides the least-cost path up to 2050. The document also notes that a detailed analysis of the appropriate level of penetration of RE in the South African national grid is required to better understand the technical risks and mitigations required to ensure security of supply is maintained during the transition to a low-carbon future.

2.6 National Development Plan

On 11 November 2011 the National Planning Commission released the National Development Plan: Vision for 2030 (NPC, 2012) for South Africa and it was adopted as government policy in August 2012. The National Development Plan (NDP) was undertaken to envision what South Africa should look like in 2030 and what action steps should be taken to achieve this (RSA, 2013). The aim of the NDP is to eliminate poverty and reduce inequality by 2030.

The NDP identifies nine key challenges and associated remedial plans. Managing the transition towards a low carbon national economy is identified as one of the nine key

national challenges. Expansion and acceleration of commercial renewable energy is identified as a key intervention strategy.

2.7 Sustainable Development Goals

All 189 Members States of the United Nations, including South Africa, adopted the United Nations Millennium Declaration in September 2000 (UN, 2000). The commitments made by the Millennium Declaration are known as the Millennium Development Goals (MDGs), and 2015 was targeted as the year to achieve these goals. The United Nations Open Working Group of the General Assembly identified seventeen sustainable development goals, built on the foundation of the MDGs as the next global development target (UN, 2014). The sustainable development goals include aspects such as ending poverty, addressing food security, promoting health, wellbeing and education, gender equality, water and sanitation, economic growth and employment creation, sustainable infrastructure, reducing inequality, creating sustainable cities and human settlements, and addressing challenges in the physical environment such as climate change and environmental resources (UN, 2014). These aspects are included in the NPD, and it can therefore be assumed that South Africa's development path is aligned with the international development agenda regarding renewable energy.

2.8 National Infrastructure Plan

The South African Government adopted a National Infrastructure Plan in 2012. The aim of the plan is to transform the economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. The plan also supports the integration of African economies. The Government plan to invest significantly in infrastructure development in South Africa. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing, and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, **electricity plants**, hospitals, schools, and dams will contribute to improved economic growth. Eighteen Strategic Integrated Projects (SIPs) have been identified to be included as part of the implementation of the plan.

2.9 Provincial Growth and Development Strategies

The objective of the Free State Economic Growth and Development Strategy (FSPGDS, 2007) is to set the province on a defining shared growth and development trajectory. Its responsibility entails creating, promoting, and supporting the environment, institutions, and mechanisms crucial for shared growth and development. Renewable energy is a key focus area in the Free State (www.fdc.co.za) as the province is seen to have significant potential for the harvesting of solar energy.

2.10 Integrated Development Plans

For this project, Integrated Development Plan (IDP) documents of two municipalities need to be considered, namely the Fezile Dabi District Municipality and the Ngwathe Local Municipality.

The Fezile Dabi District Municipality (Fezile Dabi District Municipality IDP 2021/22) has identified four strategic goals that link to the National Development Plan (NDP) and the Free State Growth and Development Strategy (FSGDS), namely:

- To stimulate local economic growth and ensure social cohesion.
- Good governance and public participation.
- Delivery of basic services and creating conditions for decent living; and
- Build capable institution and administration.

Furthermore, eight of the eighteen Strategic Integrated Projects (SIPs) that are contained in the National Infrastructure Plan (NIP) impact on the Fezile Dabi District, namely:

- The Durban – Free State – Gauteng Logistics and Industrial Corridor.
- Integrated municipal infrastructure project.
- Green energy in support of the South African economy.
- Electricity generation to support socio-economic development.

- Electricity Transmission and Distribution for all.
- Agri-logistics and rural infrastructure.
- Expanding access to communication technology; and
- Water and sanitation infrastructure.

The Ngwathe Local Municipality (Ngwathe Local Municipality IDP Review 2020-2021) has identified the following objectives to align with National and Provincial Objectives and Programmes:

- Water and sanitation – to increase clean water supply in Ngwathe, to improve revenue collection, and to eliminate water leaks.
- Roads, bridges, and storm water channels – to provide residents of Ngwathe LM with roads and decent mobility access.
- Sports and recreation
    - Providing opportunities for Ngwathe LM's residents to actively participate in sports and recreation.
    - To harness socio-economic contributions that can create a better life for the municipality's residents.
- Electricity and Energy
    - To install high mast lights in required areas.
    - To improve service delivery to residents.
    - To enhance safety in the area.
- Good governance and public participation – to improve the overall governance and effectiveness of the Technical Services Department

- Municipal transformation and institutional development – upskilling of departmental workers.
- Development Business Plans and mechanisms to seek funding that will enhance infrastructure development; and to improve departmental reporting systems and structures.
- Local economic development – increase the scale of EPWP works by the Infrastructure Department.
- Financial management – ensure all grants are spent effectively.

On a ward level, Ward 7 has identified the following needs:

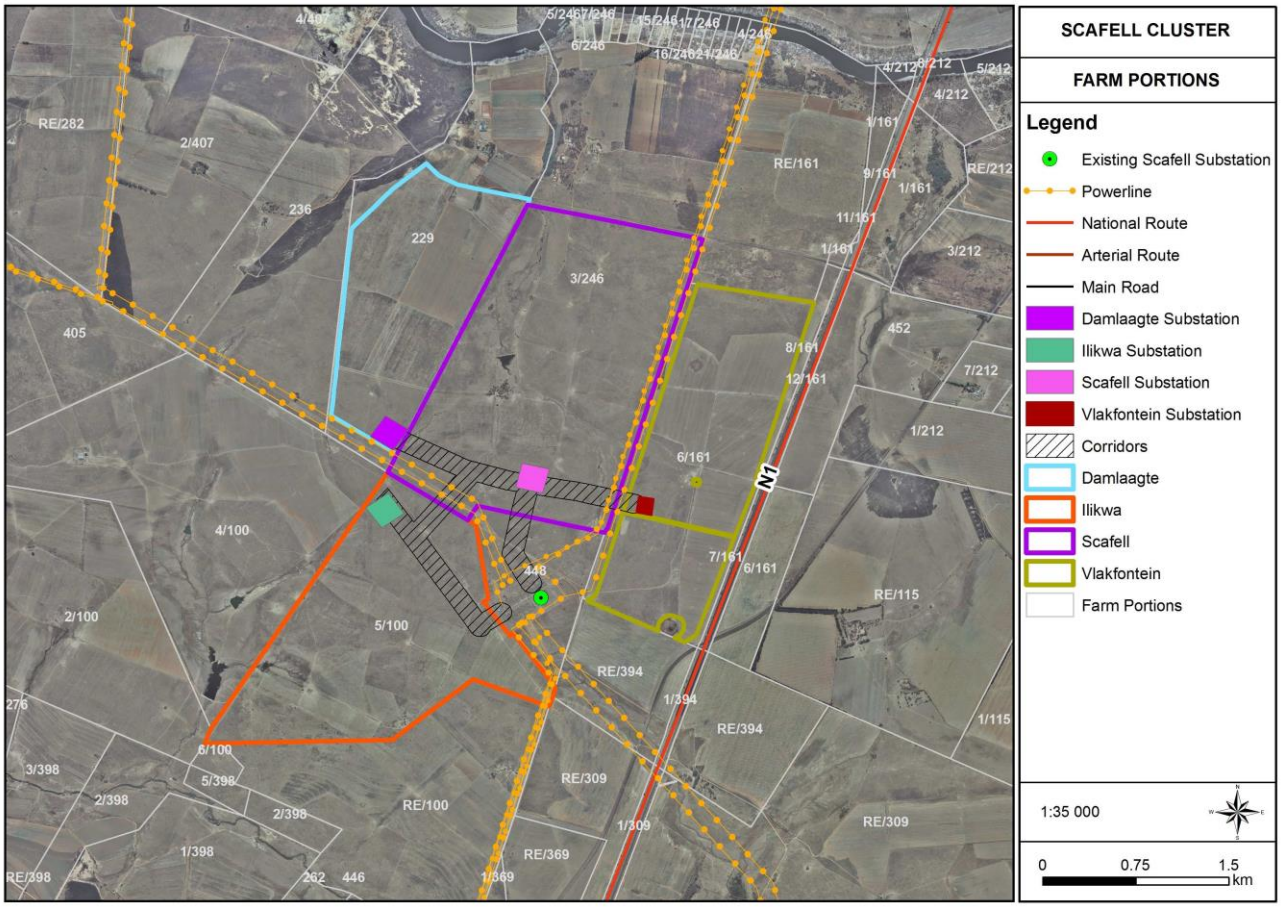
- Provision of clean drinkable water and maintenance of JoJo tanks.
- Allocation of residential sites.
- Construction of bridge near pump station.
- Construction of bridge near Barnard school.
- Speed up the issuing title deeds.
- Speed humps.
- Paving / gravelling of roads.
- Vending station.
- Recreational facilities.
- Dumping site to be fenced.
- Commonage, as there are numerous stray animals.
- Job creation / unemployment.
- Improvement of clinic services (long queues, poor services).

- Library.
- Open space turned into park.
- Solar geysers.
- Change operating hours of Lista Skosan Library.
- 50 kWhs (electricity) for indigents; and
- Distribution of dust bins in Zuma Section.

3 Project Description

The proposed Scafell Cluster Project will consist of four separate solar PV facilities and their associated grid connection infrastructure (Figure 2). They are all located near the existing Scafell Main Transmission Substation (MTS). There is an existing access road to the Scafell MTS that connects to Boundary Road.

Figure 2: Location of farm portions that form part of the proposed Scafell Cluster Project.



A summary of the details of the key infrastructure components and support services that will be required to support the operations of the four PV facilities and the associated grid connection infrastructure for a period of approximately 20 years are summarised in Table 1 below.

Table 1: Project description of proposed Scafell Cluster Project.

Component	Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
Property Information				
Farm name & portion number:	Damlaagte 229 Remaining Extent	Willow Grange 246 Portion 3	Vlakfontein 161 Portion 6	Proceederfontein 100 Portion 5
Property size:	282.22 ha	521.05 ha	299.95 ha	276.86 ha
Project Site size:	173 ha	361 ha	255 ha	195 ha
Development footprint size:	166 ha	257 ha	169 ha	132 ha
Technical Details – Solar PV Facility				
Capacity	Up to 150 MW_{ac}	Up to 150 MW_{ac}	Up to 150 MW_{ac}	Up to 100 MW_{ac}
Installed PV panel height	Up to 3 m			
Number of PV panels	Up to 304 452	Up to 304 252	Up to 304 252	Up to 154 440
Mounting structures	Single Axis Tracking, Dual Axis Tracking or Fixed Axis Mounting System Technology			
Inverters	Centralised or String Inverter Stations and Power Transformers			
Cabling	Underground Direct Current (DC) and Alternating Current (AC)_cables of up to 33 kV			
Battery Energy Storage System (BESS) footprint	Up to 2 ha			
BESS technology	Solid State or Redox Flow Batteries			
Substation capacity	Up to 33 / 132kV			
Substation footprint	Up to 2.5 ha			
Grid Connection	132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Bernina – Leeudoring Shaft / Scafell 132 kV power lines.	132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell – West Wits 2 132 kV power lines.	132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell / Tahiti 132 kV power lines or the Lochvaal Rural / Scafell 132 kV	132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell / Tahiti 132 kV power lines or the Lochvaal Rural / Scafell 132 kV

Component		Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
Grid Connection Corridor Length & Width		Up to 2 km and 150 m wide (and up to 500 m wide around the development area of the on-site substation)	Up to 1 km long and 150 m (and up to 500 m for the on-site substation)	Up to 1.7 km long and 150 m wide (and up to 500 m wide around the development area of the on-site substation)	Up to 1.3 km and up to 150 m wide (and up to 500 m wide around the development area of the on-site substation)
Laydown Area & Operations and Maintenance Buildings					
Size of laydown area		Up to 3 ha			
Operation and maintenance buildings		• Operations and Control Centre • Operation and Maintenance Area / Warehouse / Workshop / Control Centre and Office • Ablution Facilities • Substation Building			
Supporting Infrastructure					
Main access road		2.5 km long and up to 8 m wide			
Internal access road		12 km long and 5 m wide			
Support Services					
Water Demand	Construction	Water for Roads - 15ℓ / m^2 Water for Civil Works - 400 m^3 / project Water for Domestic Use - 225 m^3 / month			
	Operation	Water for PV module cleaning - 18 000 m^3 / annum Water for Domestic Use - 20 m^3 / month Water for Dust Suppression - 15ℓ / m^3			
Waste Generation	Construction	General Waste would be managed on site in accordance with the principles of the waste management hierarchy. In terms of specific waste streams, the major sources include: • Cardboard waste from the panels –Approximately 250 tons of cardboard (per 75 MW). A compactor would be used on site to compress the cardboard boxes in which the PVs are stored in order to reduce the space required for the temporary storage of this waste. • Rubber caps placed on all eight corners of the PV panels (total volumes are uncertain). • Wooden pallets on which the PV boxes arrive. • Plastic wrap. Hazardous Waste may be generated on site depending on the design / type of panel procured. Hazardous waste will be disposed of at a registered facility. Effluent would be managed by means of conservancy tanks (16 000 L in capacity which are cleaned once a month and disposed of at the nearest municipal facility).			
	Operation	Effluent would be managed using septic Tanks (16 000 L in capacity which are cleaned 2/3 times a week) or a Clarus Fusion System (16 000 L capacity which are cleaned once every six months), or similar, which utilises a chemical process to recycle water from the			

Component	Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
	Operations and Maintenance Buildings as well as Sub-Station Buildings. This treated water can then be used to water vegetation.			
Traffic	It is expected that there will be approximately 2 000 trucks in total over the 12-18-month construction phase, approximately 10-20 trucks per day.			
Employment Opportunities				
Construction Phase	• At least 230 people however the number of people employed at one time may vary as different contracts and subcontracts on the project are completed at a time onsite.			
Operation Phase	• At least 17 people and this is due to the fact that the staff will mainly be responsible for the daily operations and maintenance activities of the project.			
Recruitment for the duration of the project lifecycle will be undertaken in collaboration with local authorities, community leadership structures and agencies and no labourers will be hired onsite. Mainstream will therefore implement mitigation and management measures to ensure that no employee or job applicant is discriminated against on the basis of race, gender, nationality, age, religion, or sexual orientation.				

4 Alternatives

Various alternatives are being considered for the proposed Project. These include location and technology alternatives. Location alternatives being considered are for the grid connection infrastructure. Two 150 m wide (and up to 500 m wide at the footprint for each switching station) and up to 5 km long grid connection corridors are being assessed and considered for each solar PV facility. Other alternatives identified include battery energy storage systems, monofacial and bifacial PV panel modules and PV panel mounting technologies. The alternatives considered for the Scafell Cluster Project are described in the following sections:

4.1 Location / Site Alternatives

4.1.1 Damlaagte Solar PV Facility Grid Connection

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Damlaagte Solar PV Facility (refer to Figure 3). These corridors are described as follows:

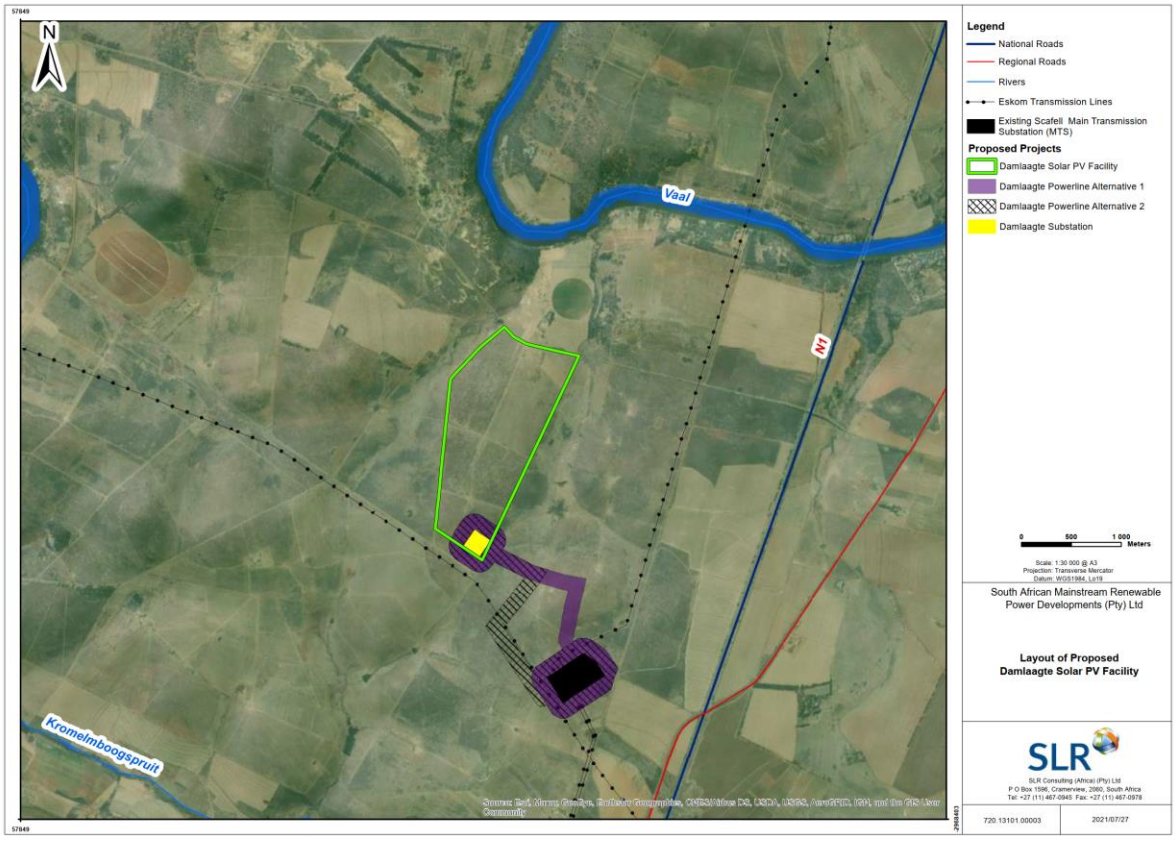
- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 2.0 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Damlaagte Solar Facility located on Damlaagte RE/229 and extends for about 1 km in an easterly direction across Willow Grange 3/246 before turning about 90° south for 0.6 km across Scafell RE/448, then turning slightly southeast for 0.3 km before terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**

This corridor is 150 m wide and is also approximately 2.5 km in length. This proposed grid connection starts at the on-site substation (Switching Station) of the proposed Damlaagte Solar Facility located on Damlaagte RE/229 and extends for about 0.6 km in an easterly direction across Willow Grange 3/246, then turns about 90° southwest for 0.7 km and then southeast for 0.9 km onto Procedeerfontein 5/100, and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

Figure 3: Locality Map illustrating the location of the grid connection corridor alternatives for the Damlaagte Solar PV Facility.



4.1.2 Scafell Solar PV Facility Grid Connection

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Scafell Solar PV Facility (refer to Figure 4). These corridors are described as follows:

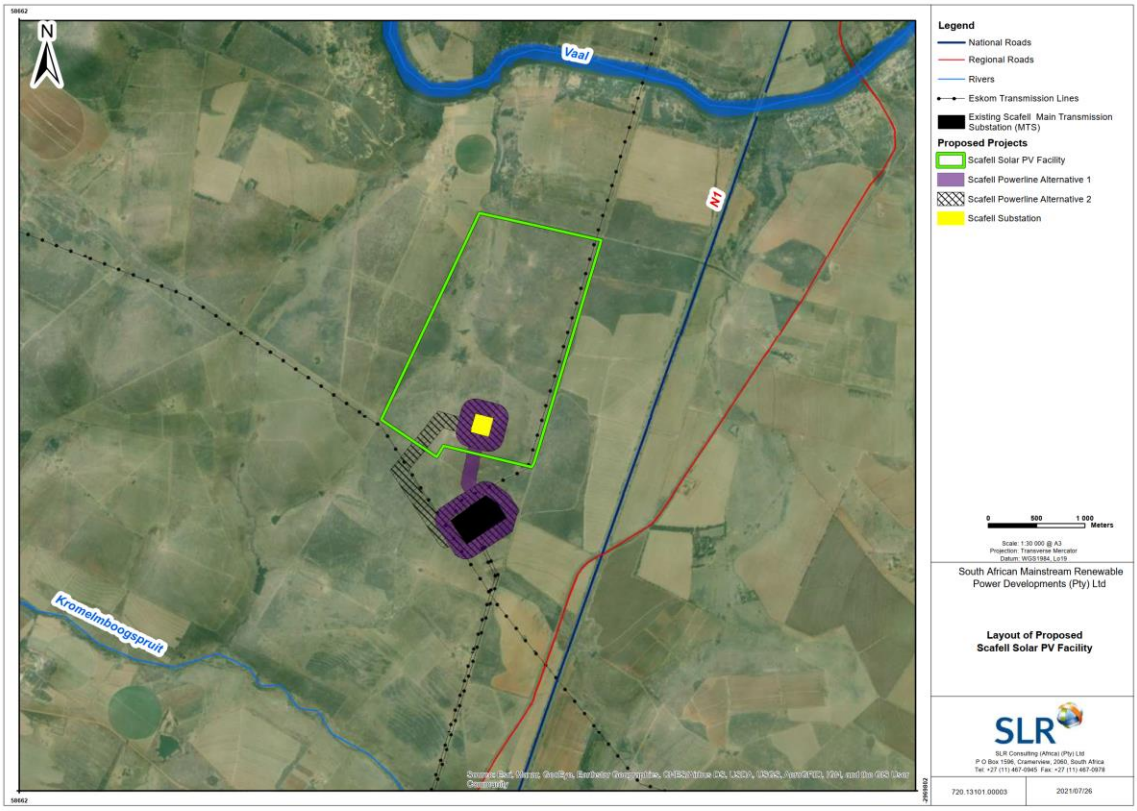
- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 0.9 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Scafell Solar Facility located on Willow Grange 3/246 and extends for about 0.6 km south across Scafell RE/448, then turning slightly southeast for 0.3 km, terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2:**

  This corridor is 150 m wide and is also approximately 2.2 km in length. This proposed grid connection starts at the on-site substation (Switching Station) of the proposed Scafell Solar Facility located on Willow Grange 3/246 and extends for about 0.4 km in a westerly direction across Willow Grange 3/246, then turns southwest for 0.7 km and then southeast for 0.9 km onto Procedeerfontein 5/100, and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

Figure 4: Locality Map illustrating the location of the grid connection corridor alternatives for the Scafell Solar PV Facility



4.1.3 Vlakfontein Solar PV Facility Grid Connection

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Vlakfontein Solar PV Facility (refer to Figure 5). These corridors are described as follows:

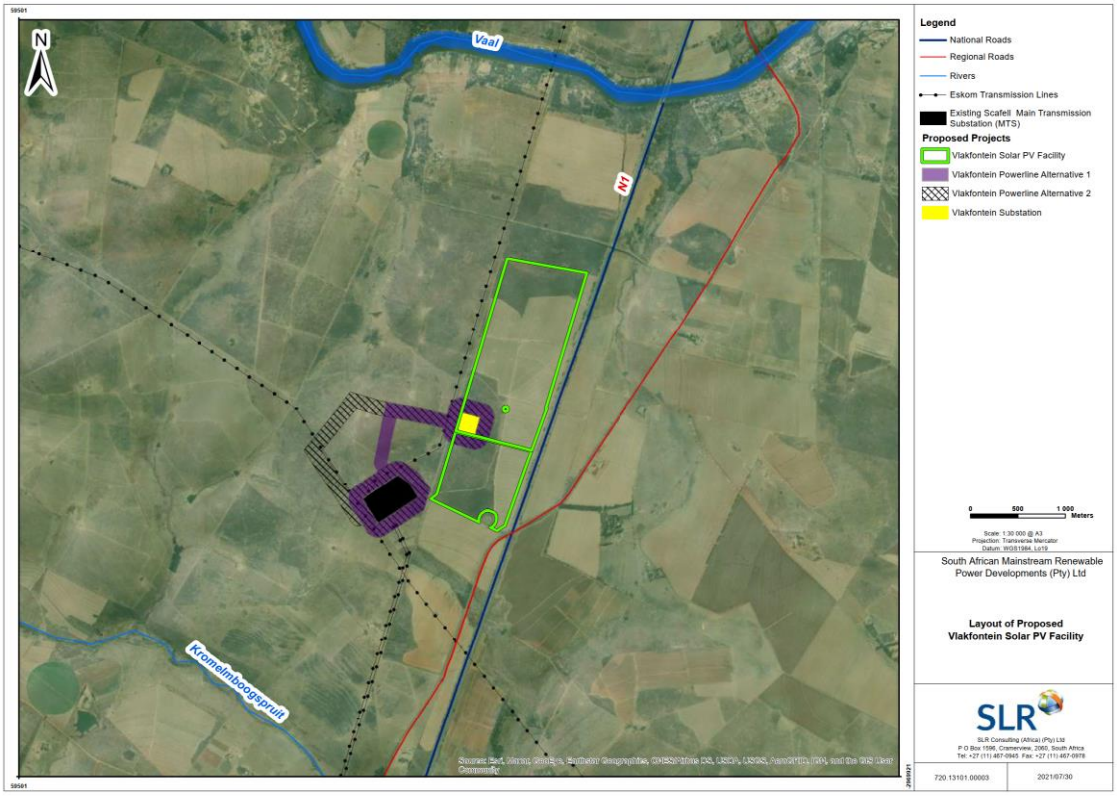
- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 2.0 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Vlakfontein Solar Facility located on Vlakfontein 6/161 and extends for about 0.8 km in a westerly direction across Willow Grange 3/246 before turning about 90° south for 0.6 km across Scafell RE/448, then turning slightly southeast for 0.3 km, terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**

This corridor is 150 m wide and is also approximately 2.5 km in length. This proposed grid connection starts at the on-site substation (Switching Station) of the proposed Damlaagte Solar Facility located on Damlaagte RE/229 and extends for about 0.6 km in an easterly direction across Willow Grange 3/246, then turns about 90° southwest for 0.7 km and then southeast for 0.9 km onto Procedeerfontein 5/100, and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

Figure 5: Locality Map illustrating the location of the grid connection corridor alternatives for the Vlakfontein Solar PV Facility.



4.1.4 Ilikwa Solar PV Facility Grid Connection

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Ilikwa Solar PV Facility (refer to Figure 6). These corridors are described as follows:

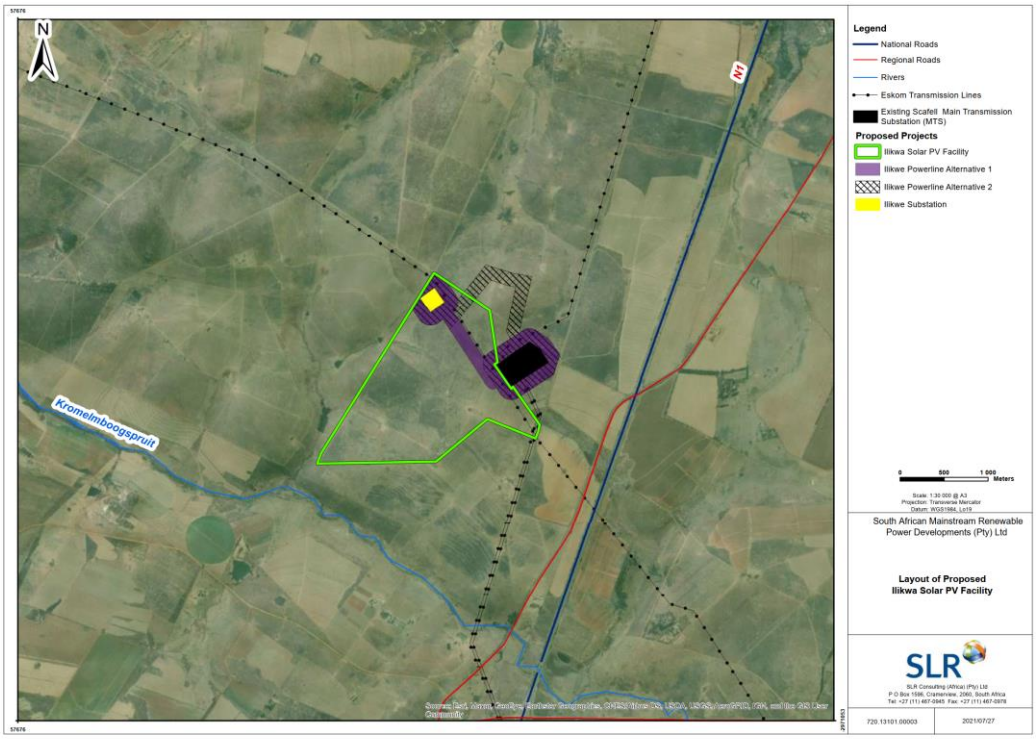
- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 2.3 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Ilikwa Solar Facility located on Procedeerfontein 5/100 and extends for about 0.3 km in a south-easterly direction before moving north-easterly for 0.7 km across Willow Grange 3/246, then turning east for 0.4 km then directly south for 0.6 km crossing Scafell RE/448, then a further 0.3 km in a south easterly direction, before terminating at the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**

  This corridor is 150 m wide and is approximately 1.4 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Ilikwa Solar Facility located on Procedeerfontein 5/100 and extends for about 1.2 km in a south-easterly direction before at 90° northeast for 0.2 km into the Scafell Eskom MTS located on Scafell RE/448.

Figure 6: Locality Map illustrating the location of the grid connection corridor alternatives for the Ilikwa Solar PV Facility.



4.2 Technology Alternatives

4.2.1 Photovoltaic Panels / Modules

Three types of photovoltaic panels / modules are being considered and would be utilised for the proposed Project. These include the following:

- **Monocrystalline Modules** are made from pure silicon crystal ingots melted down and drawn out into a solid silicon crystal. The cells are then cut from the silicon crystal. The cells are rigid and mounted on a rigid frame. The modules are covered in glass to protect the cells from being damaged. The advantages and disadvantages of monocrystalline modules are made from pure silicon. The advantage of monocrystalline modules is that the modules are highly efficient. The disadvantage is that they are expensive to produce.

- **Polycrystalline Modules** are made with silicon along with added impurities. It is melted down and cut up into wafers which make up the blocks in a module. The cells are then cut from the silicon crystal with added impurities. The cells

are rigid and mounted on a rigid frame. The modules are covered in glass to protect the cells from being damaged. The advantages of polycrystalline modules are that they are silicon-based, however, they contain impurities. The advantage of this is that the modules are cheaper to produce. The disadvantage is that they are not as efficient as monocrystalline modules.

- **Thin Film Modules** are cells manufactured from a chemical ink compound that has similar properties to that of silicon cells. The ink compound gets printed onto a sheet metal to form the base of the module. This sheet is heated to turn into a semiconductor (like silicon). A layer of glass is also added to cover the cell surface. This allows thin-film modules to match the lifespan of silicon modules, allowing them to be competitive with silicon-based module technologies. The main advantage of thin-film modules is that, due to the manufacturing process of the modules, they are cheaper to produce and therefore cheaper to purchase compared to silicon-based modules. The disadvantage of thin-film modules is that they are slightly less efficient than silicon-based modules.

4.2.2 Photovoltaic Panel-Type

Mainstream is considering the use of **Monofacial** and **Bifacial** PV panel modules for the proposed solar PV facilities. Monofacial PV panel modules generate electricity from one side of the module, whereas bifacial PV panel modules generate electricity from the front and rear side of the module thus providing more output. Bifacial PV panel modules are regarded as having a higher energy yield in comparison to monofacial PV panel modules. Thus, the utilisation of bifacial PV panel modules will require the placement of reflective material beneath the PV panel module such as concrete to enhance the albedo effect from the rear surface of the module.

4.2.3 Mounting Structures

Mainstream is considering the use of either fixed tilt or dual tracking (single or dual axis) mounting structures for the proposed solar PV facilities. The mounting structures alternatives are described below:

Single-axis tracking – this system has a single degree of flexibility that serves as an axis of rotation and is usually aligned along a North-South path. The advantages of this system are that it is cheaper, more reliable, and has a longer lifespan than dual-axis systems. The disadvantages are that the system has a lower energy output and fewer technological advancements.

Dual-axis tracking – this system allows for two degrees of flexibility, offering a wider range of motion. The primary and secondary axes work together to allow these trackers to point the solar panels at specific points in the sky. The advantages of the dual axis include a higher degree of flexibility, allowing for a higher energy output and a higher degree of accuracy in directional pointing. The disadvantages of this system are that the system is mechanically complex making it more likely for something to go wrong, has a lower lifespan and reliability, and is unreliable during cloudy or overcast weather. Directions moves on a dual axis, meaning it can move in two different directions.

Fixed axis – a fixed-tilt system positions the modules at a “fixed” tilt and orientation.

4.2.4 Battery Energy Storage System

Mainstream is considering the use of either Solid State or Redox Flow Batteries for the Battery Energy Storage Systems (BESS) for each of the solar PV facilities. Each of the BESS-type technologies are described in detail below:

- **Solid State Batteries**

  Solid State Batteries are energy storage units that are associated with a range of containerised systems ranging from 500 kWh to 4 MWh. For a 150 MWac renewable energy facility, a total footprint area of up to 2 ha will be required for the placement of containerised solid-state batteries within each footprint

of the proposed solar PV facilities. In general, solid-state batteries consist of numerous battery cells that collectively form modules. Each cell contains an anode, cathode, and an electrolyte. The modules will be assembled and packed inside shipping-size containers (i.e., 17 m long, 3.5 m wide and 4 m high) and delivered to the study area for placement within each of the solar PV facilities proposed for the Scafell Cluster Project. Each container will be placed on a raised concrete plinth of up to 30 cm and may be stacked on top of each other to a maximum height of approximately 15 m. Additional infrastructure associated with the modules include inverters and temperature control equipment which will be positioned inside the containers.

- Redox Flow Batteries

  Redox Flow Batteries (RFB) are also being considered as an alternative for the proposed solar PV facilities. For this technology, energy is stored as an electrolyte in the flow cells. Specific options include Sodium polysulfide / bromine (PSB) flow batteries, Vanadium Redox (VRB) flow batteries, and Zinc-Bromine (ZNBR) flow batteries which would be contained in small bunded areas. RFBs generally consist of two half-cells containing liquid electrolyte systems. Once supplied with electrical energy a reduction - oxidation (redox) reaction between ions of the two electrolytes, separated by a membrane, charge the electrodes (i.e., cathode and anode) with energy. Energy discharge from an RFB is achieved by a reversed redox reaction between ions resulting in the potential for electrical energy to be drawn from the electrodes. The footprint of a RFB system is approximately 150 x 100 m, with a height of 15 m. The system consists of two electrolyte storage tanks that are contained within a 2.5 m high berm wall which prevents leakage of the electrolyte chemical into the surrounding environment.

Chapter 8 includes an assessment of the alternatives considered for the Scafell Cluster Project.

5 Methodology

Scientific social research methods were used for this assessment. To clarify the process to the reader, this section will start with a brief explanation of the processes that have been used in this study.

5.1 Information base

The information used in this study was based on the following:

1. A literature review (see list provided in the References);
2. Interviews with key stakeholders; and
3. Professional judgement based on experience gained with similar projects.

5.2 Assumptions and limitations

The following assumptions and limitations were relevant:

1. Not every individual in the community could be interviewed therefore only key people in the community were approached for discussion. Additional information was obtained using existing data.
2. The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes, for example changes in local political leadership, droughts or economic conditions. It is therefore difficult to predict all impacts to a high level of accuracy, although care has been taken to identify and address the most likely impacts in the most appropriate way for the current local context within the limitations. In addition, it is also important to manage social impacts for the life of the project, especially in the light of the changing social environment.
3. Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner.
4. Social impacts commence when the project enters the public domain. Some of

these impacts will occur irrespective of whether the project continues or not, and other impacts have already started. These impacts are difficult to mitigate and some would require immediate action to minimise the risk.

5. There are different groups with different interests in the community, and what one group may experience as a positive social impact, another group may experience as a negative impact. This duality will be pointed out in the impact assessment phase of the report.

6. Social impacts are not site-specific, but take place in the communities surrounding the proposed development.

5.3 Social Impact Assessment Model

The theoretical model used for this impact assessment was developed by Slootweg, Vanclay and Van Schooten and presented in the *International Handbook of Social Impact Assessment* (Vanclay & Becker, 2003). This model identifies pathways by which social impacts may result from proposed projects. The model differentiates between social change processes and social impacts, where the social change process is the pathway leading to the social impact. Detail of how the model works is not relevant to this study, but it is important to understand the key concepts, which will be explained in the following paragraphs.

Social change processes are set in motion by project activities or policies. A social change process is a discreet, observable, and describable process that changes the characteristics of a society, taking place regardless of the societal context (that is, independent of specific groups, religions etc.) These processes may, in certain circumstances and depending on the context, lead to the experience of social impacts (Vanclay, 2003). If managed properly, however, these changes may not create impacts. Whether impacts are caused will depend on the characteristics and history of the host community, and the extent of mitigation measures that are put in place (Vanclay, 2003). Social change processes can be measured objectively, independent of the local context. Examples of social change processes are an increase in the population, relocation, or the presence of temporary workers.

For this report, the following social change process categories were considered:

- Demographic processes;
- Economic processes;
- Geographic processes;
- Institutional and legal processes;
- Emancipatory and empowerment processes;
- Socio-cultural processes; and
- Other relevant processes.

The *International Association for Impact Assessment* (2003) states that Social Impact Assessment includes the processes of analysing, monitoring, and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by these interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment.

A social impact is something that is experienced or felt by humans. It can be positive or negative. Social impacts can be experienced in a physical or perceptual sense. Therefore, two types of social impacts can be distinguished:

- **Objective social impacts** – i.e. impacts that can be quantified and verified by independent observers in the local context, such as changes in employment patterns, in standard of living or in health and safety.
- **Subjective social impacts** – i.e. impacts that occur "in the heads" or emotions of people, such as negative public attitudes, psychological stress or reduced quality of life.

It is important to include subjective social impacts, as these can have far-reaching consequences in the form of opposition to, and social mobilisation against the project (Du Preez & Perold, 2005).

For this SIA, the following Social Impact Assessment categories were investigated:

- Health and social well-being;
- Quality of the living environment;
- Economic impacts and material well-being;
- Cultural impacts;
- Family and community impacts;
- Institutional, legal, political and equity impacts; and
- Gender impacts.

Relevant criteria for selecting significant social impacts included the following:

- Probability of the event occurring;
- Number of people that will be affected;
- Duration of the impact;
- Value of the benefits or costs to the impacted group;
- Extent to which identified social impacts are reversible or can be mitigated;
- Likelihood that an identified impact will lead to secondary or cumulative impacts;
- Relevance for present and future policy decisions;
- Uncertainty over possible effects; and
- Presence or absence of controversy over the issue.

For this study, the model was adapted to fit the South African context, and where processes and impacts were not relevant to the study, it was omitted. Each category has several sub-categories, which also have been investigated. The Equator Principles, International Finance Corporation Performance Standards and World Bank Environmental, Health and Safety guidelines were consulted in the writing of this report and the mitigation suggested adheres to these requirements.

5.4 Literature study

A literature search was undertaken to obtain secondary data for the baseline description of the socio-economic environment. The information in this report was acquired via statistical data obtained from Statistics South Africa, SIA literature (see References), and information from reputable sources on the World Wide Web.

5.5 Research approach

Traditionally there are two approaches to SIA, a technical approach, and a participatory approach. A technical approach entails that a scientist remains a neutral observer of social phenomena. The role of the scientist is to identify indicators, obtain objective measures relevant to the situation and provide an expert assessment on how the system will change (Becker, Harris, Nielsen & McLaughlin, 2004). A participatory approach uses the knowledge and experiences of individuals most affected by the proposed changes as the basis for projecting impacts. In this case the role of the scientist is facilitator of knowledge sharing, interpretation, and reporting of impacts (Becker et al, 2004).

The findings presented in this report are based on secondary (desk) research and limited primary research. A qualitative approach was followed for the primary research, while qualitative and quantitative data were used for the secondary research.

The layperson sometimes criticises qualitative research as “subjective” or “not really that scientific”. For this reason, it is vital to understand the distinction between qualitative and quantitative research and their respective areas of application.

Qualitative research as a research strategy is usually characterised by the inference of general laws from instances, forms theory from various conceptual elements, and explains meaning (David & Sutton, 2004). It usually emphasises words rather than quantification in the collection and analysis of data. Data collection takes place by using methods such as unstructured or semi-structured interviews, focus groups, observations, etc. Data is not recorded in any standardised coding format but is usually reported according to themes. Qualitative data express information about

feelings, values, and attitudes. This approach is used where insight and understanding of a situation is required (Malhotra, 1996). Participants are selected based on their exposure to the experience or situation under review. The aim of qualitative research is to understand, not to quantify and as such it is extremely suitable for assessing social impacts. A potential impact must be understood before it can be assessed appropriately.

Quantitative research as a research strategy usually makes inferences of particular instances by reference to general laws and principles and tends to emphasize what is external to or independent of the mind (objective) and incorporates a natural science model of the research process (David & Sutton, 2004). This usually makes it easier for a person with a natural or physical sciences background to relate to. This approach usually emphasises quantification in the collection and analysis of data. Data collection takes place by using methods such as structured questionnaires and data is recorded in a numeric or some other standardised coding format. Data is expressed in numerical format and statistical techniques are usually used to assist with data interpretation. This approach is used when information needs to be generalised to a specific population and participants are usually selected using probability sampling techniques (although non-probability methods can be used depending on the characteristics of the target population).

Although in theory the qualitative phase of this project could be followed by a quantitative phase, for several reasons it was not done. A quantitative phase would be more resource intensive in terms of labour, time and cost and the incremental precision obtained in terms of generalisability would not warrant the additional investment. Due to the strong emotional component relating to the perceived impacts, respondents may intentionally magnify the intensity of the impacts or indicate all impacts are equally severe to bias the results in their favour, which will reduce the utility of quantitative results as part of the primary research process.

5.6 Ethical issues

The most basic principle of research is that participants should not be harmed by participation in the research project. It is important that research not only does no

harm, but also potentially contributes to the wellbeing of others. At times this might place a researcher in a difficult position – what is beneficial to one group may not be beneficial to another (Bless, Higson-Smith & Kagee, 2006). Furthermore, an individual has the autonomy to decide whether to participate in research or not. No person should be forced, either overtly or covertly, to participate in research. Other important principles include justice (based on the assumption that all people are equals), fidelity (keeping promises or agreements, specifically between the researcher and the participant) and respect for participants' rights and dignity. In addition to these overarching ethical principles, important ethical principles that should be met are informed consent, confidentiality, anonymity, and discontinuance. This is in line with international as well as national research practice such as the World Association for Market, Social and Opinion Researchers (ESOMAR) and Southern African Marketing Research Association (SAMRA) codes of conduct. The researcher has an ethical obligation to develop well-designed projects and execute them with care. Researchers are not allowed to change their data or observations and should report on technical shortcomings, failures, limits of the study, negative findings, and methodological constraints. The honest and accurate reporting of data is also an essential component of scientifically accurate and ethically legitimate research and conclusions should be supported by data.

6 Description of the Affected Environment

When viewing the environment from a socio-economic perspective the question can be asked what exactly the social environment is. Different definitions for social environment exist, but a clear and comprehensive definition that is widely accepted remains elusive. Barnett & Casper (2001) offers the following definition of human social environment:

> *"Human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community. The social environment subsumes many aspects of the physical environment, given that contemporary landscapes, water resources, and other natural resources have been at least partially configured by human social processes. Embedded within contemporary social environments are historical social and power relations that have become institutionalized over time. Social environments can be experienced at multiple scales, often simultaneously, including households, kin networks, neighbourhoods, towns and cities, and regions. Social environments are dynamic and change over time as the result of both internal and external forces. There are relationships of dependency among the social environments of different local areas, because these areas are connected through larger regional, national, and international social and economic processes and power relations."*

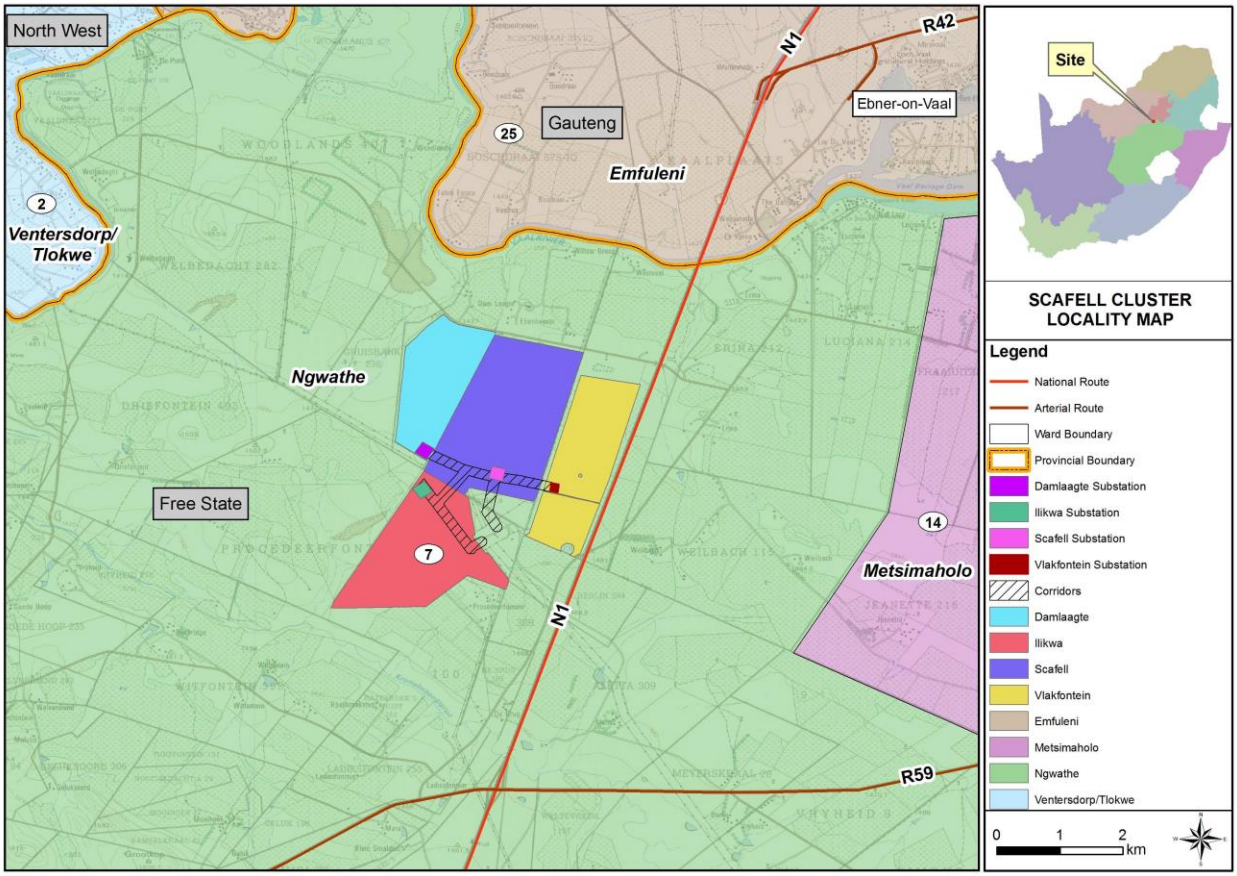
Environment-behaviour relationships are interrelationships (Bell, Fisher, Baum & Greene, 1996). The environment influences and constrains the behaviour of people, but behaviour also leads to changes in the environment. The impacts of a project on people can only be truly understood if their environmental context is understood. The

baseline description of the social environment will include a description of the area within a provincial, district and local context that will focus on the identity and history of the area as well as a description of the population of the area based on a number of demographic, social and economic variables.

6.1 Description of the area

It must be considered that the social environment is broader than the physical footprint of the project site and cannot be compartmentalised according to the physical footprint. Therefore, the description of the social environment for all four the facilities and their grid connections will be the same. The proposed projects will be in Ward 7 of the Ngwathe Local Municipality (Figure 7) that forms part of the Fezile Dabi District Municipality in the Free State Province. As the towns of Vanderbijlpark, Vereeniging and Sasolburg are in relatively close proximity to the site, the Metsimoholo LM and Emfuleni LM, as well as the wards in these municipalities that are closest to the site will also be included in the analysis. For the baseline description of the area, data from Census 2011, Community Survey 2016, municipal IDP's and other relevant sources were used.

Figure 7: Location of the proposed project in municipal context.



The **Free State Province** is in the geographical centre of South Africa and covers an area of 129 825 km^2 (www.municipalities.co.za). It shares an international border with Lesotho and borders the provinces of Gauteng, Mpumalanga, North West, KwaZulu Natal, Northern Cape and Eastern Cape. The capital of the province is Bloemfontein, which is also South Africa's judicial capital. Other major towns include Welkom, Kroonstad, Sasolburg, and Bethlehem.

The main drivers of the Free State economy are agriculture, mining, and manufacturing. About 90% of the province is under cultivation for crop production. Agricultural products include maize, wheat, sorghum, potatoes, red meat, groundnuts, and wool. The province is the world's fifth-largest producer of gold with mining being a major employer in the province. It is also home to the large synthetic-fuels company, Sasol.

The Free State is divided into one metropolitan area (Mangaung) and four districts, namely Fezile Dabi, Lejweleputswa, Thabo Mofutsanyana and Xhariep.

The **Fezile Dabi District Municipality** is in the northern part of the Free State Province (www.municipalities.co.za) and covers an area of 20 668 km^2. It shares a border with the North West, Gauteng, and Mpumalanga Provinces. Main towns in the area are Cornelia, Deneysville, Edenville, Frankfort, Heilbron, Koppies, Kragbron, Kroonstad, Oranjeville, Parys, Renovaal, Sasolburg, Steynsrus, Tweeling, Vierfontein, Viljoenskroon, Villiers and Vredefort. The main economic sectors in the area are trade, community services, manufacturing, households, and agriculture. The main attraction in the district is the Vredefort Dome, which is the third largest meteorite site in the world. The district consists of four local municipalities, namely Mafube, Metsimaholo, Moqhaka and Ngwathe.

The **Ngwathe Local Municipality** covers an area of 7 055 km^2 (www.municipalities.co.za) and is situated in the northern part of the Fezile Dabi District. The Vaal River forms the northern boundary of the area. The Renoster River also cuts through the municipality in the Koppies area where it serves the Weltevrede, Rooipoort and Koppies Dams. These dams and rivers are water sources for many uses such as tourism and agriculture. The Vredefort Dome is the prominent topographical feature in Ngwathe. The area is mainly of agricultural significance, while the Parys has an airfield that supports commercial and tourism development. Parys borders the Vaal River and has a number of guest houses, conference facilities, estates, restaurants, and fast-food outlets. The town has unique curio, antique and art shops that attract tourists from Gauteng as well as other parts of South Africa. The main economic sectors in the area are agriculture, mining, manufacturing, and services. Main towns in the municipality are Edenville, Heilbron, Koppies, Parys and Vredefort.

The **Metsimaholo Local Municipality** is the smallest municipality in the district, covering an area of 1 717 km^2. It was established in 2000 through the amalgamation of the then Sasolburg, Deneysville and Oranjeville Transitional Local Councils. The main economic sectors in the area are manufacturing, retail, and community services. Main towns are Deneysville, Kragbron, Oranjeville and Sasolburg. Sasolburg is a predominantly industrial town that owes its existence to the petro-chemical industry and is located approximately 20 km from the industrial areas of Vereeniging and

Vanderbijlpark. Apart from the internationally known coal-derived oil, a vast number of by-products including olefins, waxes, alcohols, tar products, inorganic chemicals, rubber, gases, plastics, fertilizers, etc are manufactured in the area (www.metsimaholo.gov.za).

The **Gauteng Province** is the smallest, but most populous, of South Africa's provinces and it covers an area of 18 178 km^2. Gauteng is the heart of the country's commercial business and industrial sectors. Gold mining accounts for the greatest proportion of Gauteng's mineral production output. The province is divided into three metropolitan municipalities, namely City of Ekurhuleni, City of Johannesburg, and City of Tshwane, and two district municipalities, namely Sedibeng and West Rand.

The **Sedibeng District Municipality** is situated on the southern tip of the Gauteng province and borders the Free State, North West, and Mpumalanga Provinces. The district covers the area formerly known as the Vaal Triangle and is 4 173 km^2 in size. The area offers a variety of cultural heritage and historical sites. The predominant economic sector in the area is the manufacturing of fabricated metal and chemicals. Main cities and towns in the district include De Deur/Walkerville, Devon, Eikenhof, Evaton, Heidelberg, Meyerton, Sebokeng, Vaal Marina, Vaal Oewer, Vanderbijlpark, Vereeniging and Vischkuil.

The **Emfuleni Local Municipality** is in the western part of the Sedibeng district and covers an area of 966 km^2. The municipal area is rich in history as it includes the Anglo-Boer War sites and contains heritage assets such as the Sharpeville monument (www.municipalities.co.za). The municipality is strategically located with access to a well-maintained road network. The area is known for its contribution to the steel and iron industry in South Africa and its location allows many opportunities for tourism and other forms of economic development. Manufacturing, community services and finance are the key economic sectors in the area. Main towns and cities in the area include Evaton, Sebokeng, Vaal Oewer, Vanderbijlpark and Vereeniging.

6.2 Description of the population

The baseline description of the population will take place on three levels, namely provincial, district and local. Impacts can only truly be comprehended by understanding the differences and similarities between the different levels. The baseline description will focus on the Free State Province, Fezile Dabi District Municipality, Ngwathe Local Municipality, Ward 7 of the Ngwathe LM, Metsimaholo Local Municipality, Ward 14 of the Metsimaholo LM, the Gauteng Province, Sedibeng District Municipality, Emfuleni Local Municipality and Ward 25 of the Emfuleni LM.

The data used for the socio-economic description was sourced from Census 2011. Census 2011 was a de facto census (a census in which people are enumerated according to where they stay on census night) where the reference night was 9-10 October 2011. The results should be viewed as indicative of the population characteristics in the area and should not be interpreted as absolute.

In some municipalities the ward boundaries have changed in 2016 and StatsSA made Census 2011 data available that is grouped according to the 2016 boundaries. The ward level data will be shown for the 2016 ward delineations.

The following points regarding Census 2011 must be kept in mind (www.statssa.co.za):

- Comparisons of the results of labour market indicators in the post-apartheid population censuses over time have been a cause for concern. Improvements to key questions over the years mean that the labour market outcomes based on the post-apartheid censuses must be analysed with caution. The differences in the results over the years may be partly attributable to improvements in the questionnaire since 1996 rather than to actual developments in the labour market. The numbers published for the 1996, 2001, and 2011 censuses are therefore not comparable over time and are higher from those published by Statistics South Africa in the surveys designed specifically for capturing official labour market results.

- For purposes of comparison over the period 1996–2011, certain categories of answers to questions in the censuses of 1996, 2001 and 2011, have either been merged or separated.

- The tenure status question for 1996 has been dropped since the question asked was totally unrelated to that asked thereafter. Comparisons for 2001 and 2011 do however remain.

- All household variables are controlled for housing units only and hence exclude all collective living arrangements as well as transient populations.

- When making comparisons of any indicator it must be considered that the time period between the first two censuses is of five years and that between the second and third census is of ten years. Although Census captures information at one given point in time, the period available for an indicator to change is different.

Where available, the Census 2011 data will be supplemented with data from Community Survey 2016.

6.2.1 Population and household sizes

According to the Community Survey 2016, the population of South Africa is approximately 55,7 million and has shown an increase of about 7.5% since 2011. In 2016 the country had approximately 16,9 million households, representing an increase of about 17.12% since 2011. The household density for the country is estimated on approximately 3.29 people per household, indicating an average household size of 3-4 people (leaning towards 3) for most households, which is down from the 2011 average household size of 3.58 people per household. Smaller household sizes are in general associated with higher levels of urbanisation.

The greatest increase in population since 2011 has been in the Metsimaholo LM (Table 2), higher than both the national average and the averages for Gauteng and the Free State Province. The Ngwathe LM showed a slight decrease in population. Population density refers to the number of people per square kilometre and the population

density on a national level has increased from 42.45 people per km^2 in 2011 to 45.63 people per km^2 in 2016. In the study area the population density has increased in all areas since 2011, except the Ngwathe LM which showed a slight decrease.

Table 2: Population density and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Size in km^2	Population 2011	Population 2016	Population density 2011	Population density 2016	Growth in population (%)
Free State Province	**129,825**	**2,745,590**	**2,834,714**	**21.15**	**21.83**	**3.25**
Fezile Dabi DM	*20,668*	*488,036*	*494,777*	*23.61*	*23.94*	*1.38*
Ngwathe LM	7,055	120,520	118,907	17.08	16.85	-1.34
Metsimaholo LM	1,717	149,108	163,564	86.84	95.26	9.69
Gauteng Province	**18,178**	**12,272,263**	**13,399,724**	**675.12**	**737.14**	**9.19**
Sedibeng DM	4,173	916,484	957,528	219.62	229.46	4.48
Emfuleni LM	966	721,663	733,445	747.06	759.26	1.63

The number of households in the study area has increased on all levels (Table 3). The proportionate increases in households were greater than the increases in population on all levels, and greater than the increase in households on a national level, except in the Ngwathe and Emfuleni Local Municipalities where the increase in households were below the national average. The average household size has shown a decrease on all levels, which means there are more households, but with less members.

Table 3: Household sizes and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Households 2011	Households 2016	Average household size 2011	Average household size 2016	Growth in households (%)
Free State Province	823,316	946,639	3.33	2.99	14.98
Fezile Dabi DM	144,980	172,370	3.37	2.87	18.89
Ngwathe LM	37,102	40,910	3.25	2.91	10.26
Metsimaholo LM	45,757	59,113	3.26	2.77	29.19
Gauteng Province	3,909,022	4,951,137	3.14	2.71	26.66
Sedibeng DM	*279,768*	*330,828*	*3.28*	*2.89*	*18.25*
Emfuleni LM	220,135	253,488	3.28	2.89	15.15

The total dependency ratio is used to measure the pressure on the productive population and refer to the proportion of dependents per 100 working-age population. As the ratio increases, there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. A high dependency ratio can cause serious problems for a country as the

largest proportion of a government's expenditure is on health, social grants and education that are most used by the old and young population.

The total dependency ratio is the highest in the Ngwathe LM (Table 4) and the lowest in Ward 14 of the Metsimaholo LM. The same trend applies to the youth, aged and employment dependency ratios. Employed dependency ratio refers to the proportion of people dependent on the people who are employed, and not only those of working age. The dependency ratios suggest that the Ngwathe LM has the highest levels of poverty in the area.

Table 4: Dependency ratios (source: Census 2011).

Area	Total dependency	Youth dependency	Aged dependency	Employed dependency
Free State Province	**52.9**	**44.5**	**8.4**	**76.3**
Fezile Dabi DM	*51.9*	*42.7*	*9.2*	*75.9*
Ngwathe LM	60.2	48.2	12.0	78.7
Ward 7	56.2	49.9	6.3	73.0
Metsimaholo LM	44.3	38.0	6.3	70.3
Ward 14	34.8	25.9	8.9	50.0
Gauteng Province	**39.0**	**32.9**	**6.0**	**63.6**
Sedibeng DM	*43.8*	*36.5*	*7.4*	*70.4*
Emfuleni LM	43.8	36.8	7.1	71.9
Ward 25	47.4	39.6	7.8	70.3

Poverty is a complex issue that manifests itself in economic, social, and political ways and to define poverty by a unidimensional measure such as income or expenditure would be an oversimplification of the matter. Poor people themselves describe their experience of poverty as multidimensional. The South African Multidimensional Poverty Index (SAMPI) (Statistics South Africa, 2014) assess poverty on the dimensions of health, education, standard of living and economic activity using the indicators child mortality, years of schooling, school attendance, fuel for heating, lighting, and cooking, water access, sanitation, dwelling type, asset ownership and unemployment.

The poverty headcount refers to the proportion of households that can be defined as multi-dimensionally poor by using the SAMPI's poverty cut-offs (Statistics South Africa, 2014). The poverty headcount has increased in the areas located in the Free State since 2011 (Table 5), indicating an increase in the number of multi-dimensionally poor households. In the areas located in Gauteng, the poverty headcount has decreased.

The intensity of poverty experienced refers to the average proportion of indicators in which poor households are deprived (Statistics South Africa, 2014). The intensity of poverty has increased slightly in all areas, except the Fezile Dabi District and the Metsimaholo LM where it decreased slightly. The intensity of poverty and the poverty headcount is used to calculate the SAMPI score. A higher score indicates a very poor community that is deprived on many indicators. The SAMPI score has increased in the areas located in the Free State, indicating that households in these areas might be getting poorer, especially in the Ngwathe LM area. In Emfuleni the score has remained more or less the same.

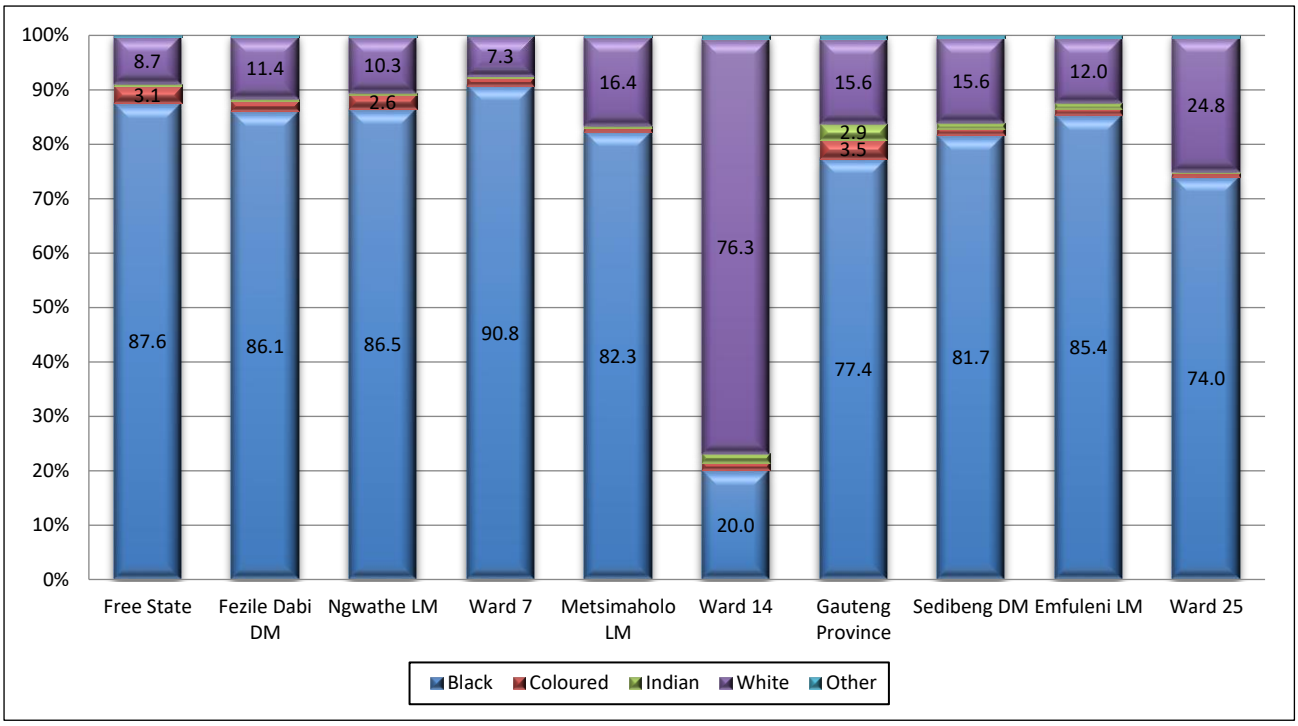
Table 5: Poverty and SAMPI scores (sources: Census 2011 and Community Survey 2016).

Area	Poverty headcount 2011 (%)	Poverty intensity 2011 (%)	SAMPI 2011	Poverty headcount 2016 (%)	Poverty intensity 2016 (%)	SAMPI 2016
Free State Province	**5.5**	**42.2**	**0.023**	**5.5**	**41.7**	**0.023**
Fezile Dabi DM	*4.4*	*42.2*	*0.019*	*4.9*	*41.9*	*0.021*
Ngwathe LM	4.7	42.2	0.020	5.4	42.5	0.023
Metsimaholo LM	5.1	42.8	0.022	5.8	41.6	0.024
Gauteng Province	**4.8**	**43.8**	**0.021**	**4.6**	**44.1**	**0.020**
Sedibeng DM	*3.9*	*42.5*	*0.017*	*3.5*	*42.9*	*0.015*
Emfuleni LM	3.4	42.3	0.014	3.2	43	0.014

6.2.2 Population composition, age, gender, and home language

On a ward level most of the population belong to the Black population group (Figure 8), except in Ward 14 of the Metsimaholo LM where most people belong to the White population group.

Figure 8: Population distribution (shown in percentage, source: Census 2011)



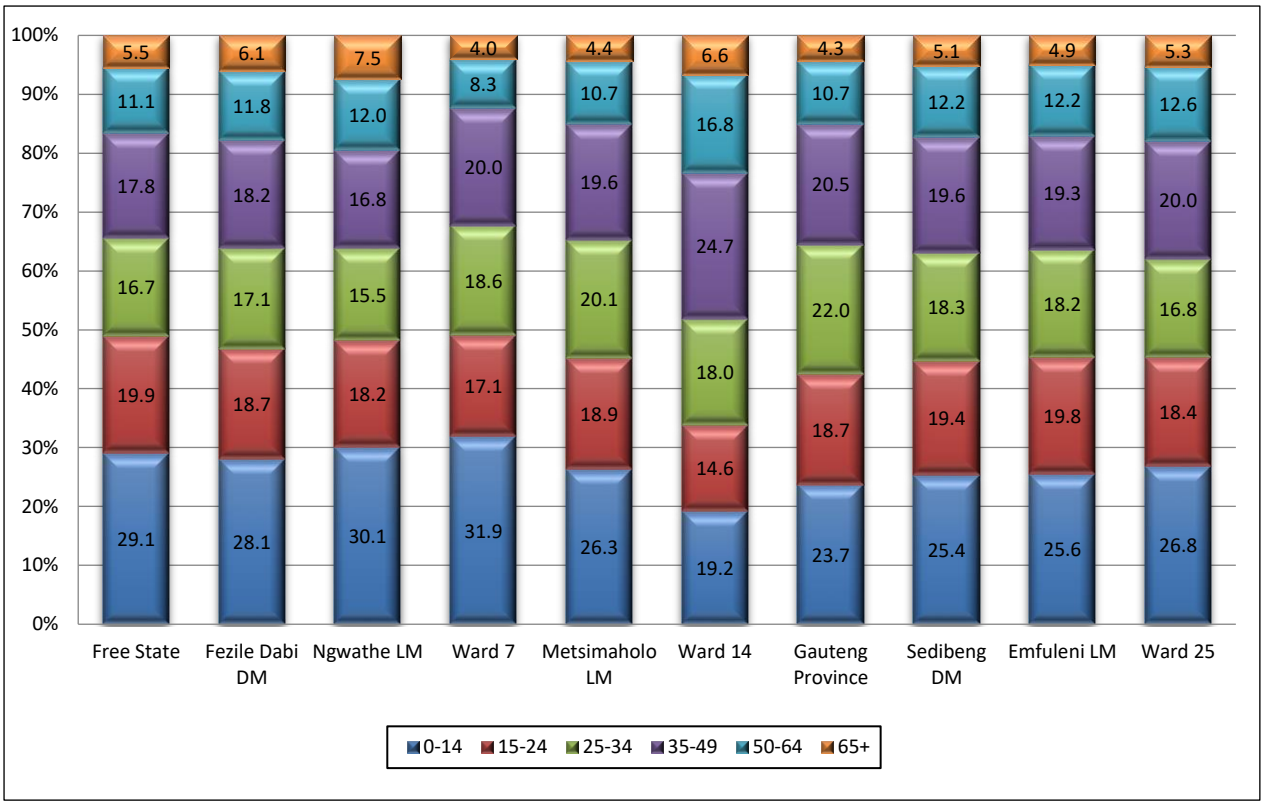
Ward 7 of the Ngwathe LM has the lowest average age while Ward 14 of the Metsimaholo LM has the highest average age (Table 6). Ward 7 consists mostly of farmland, but also include a portion of the Tumahole township in Parys, while Ward 14 includes a portion of the town of Sasolburg but also consists mainly of farmland.

Table 6: Average age (source: Census 2011).

Area	Average Age (in years)
Free State Province	**28.38**
Fezile Dabi DM	*29.22*
Ngwathe LM	29.32
Ward 7	26.78
Metsimaholo LM	28.64
Ward 14	34.08
Gauteng Province	**29.31**
Sedibeng DM	*29.58*
Emfuleni LM	29.36
Ward 25	29.61

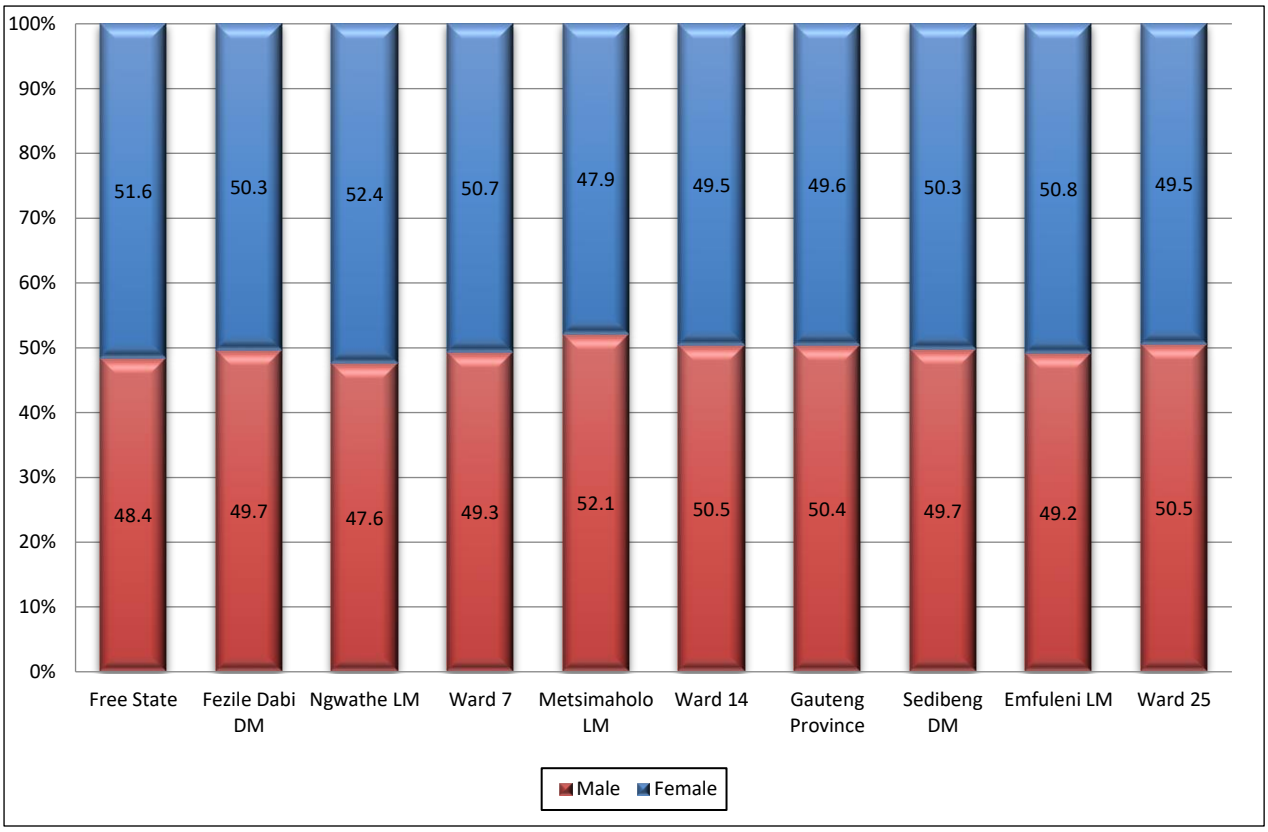
Although the Ngwathe LM has the greatest proportion of people of retirement age, almost a third of the population in Ward 7 is aged 14 years or younger (Figure 9). Such a young population holds the potential for a great future demand in terms of employment and other means of making a livelihood, and increased pressure on infrastructure.

Figure 9: Age distribution (shown in percentage, source: Census 2011)



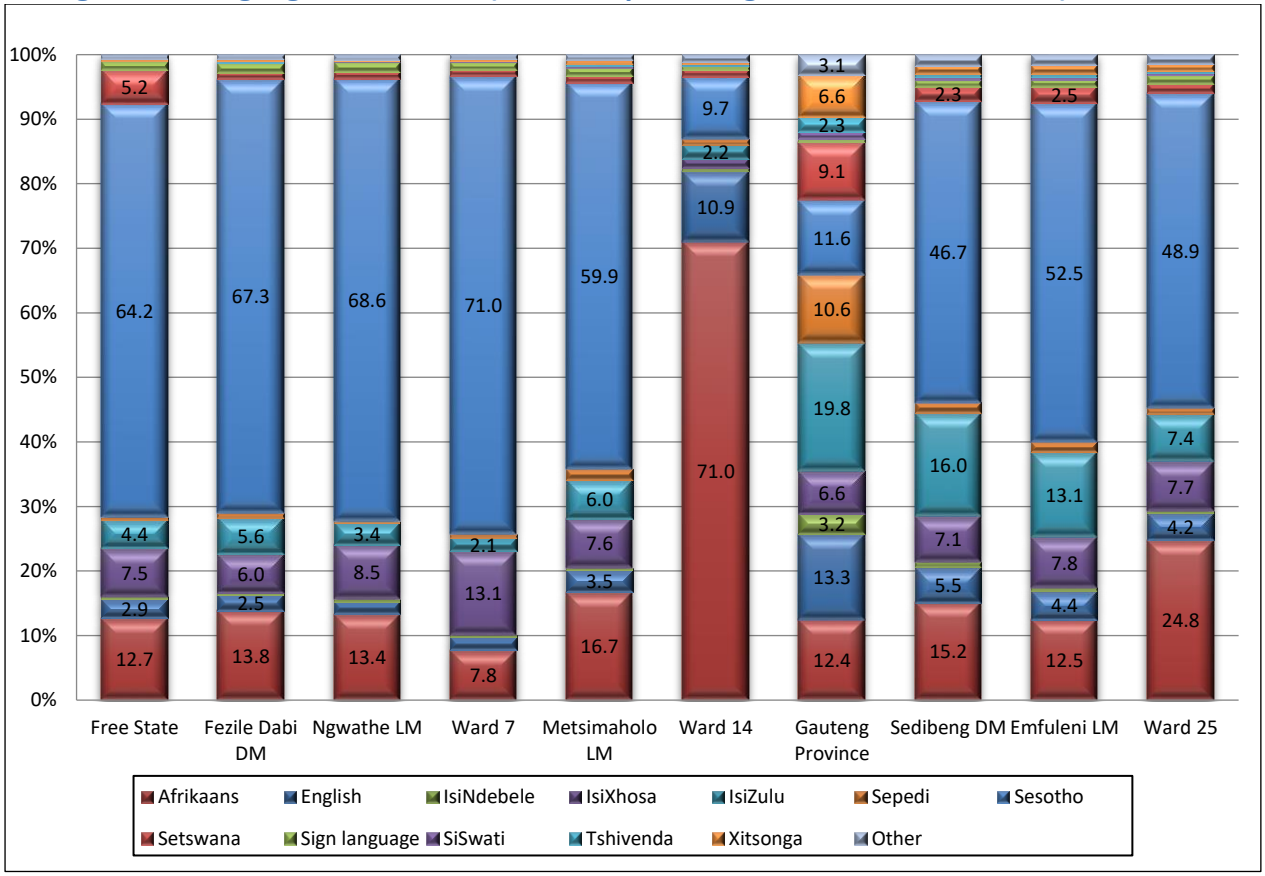
The sex distribution in the area is more or less equal (Figure 10), except in the Ngwathe LM where it is biased towards females. This trend is often observed in rural areas where males tend to migrate to urban areas to look for employment or other means of making a livelihood.

Figure 10: Sex distribution (shown in percentage, source: Census 2011)



Sesotho is the home language of most people in the Free State area (Figure 11), except in Ward 14 where Afrikaans is the home language of the majority. The language profiles in the Gauteng area look slightly different, with Sesotho, Afrikaans, IsiZulu and IsiXhosa being the main languages on a district and local level. Home language can indicate the degree of cultural diversity in an area.

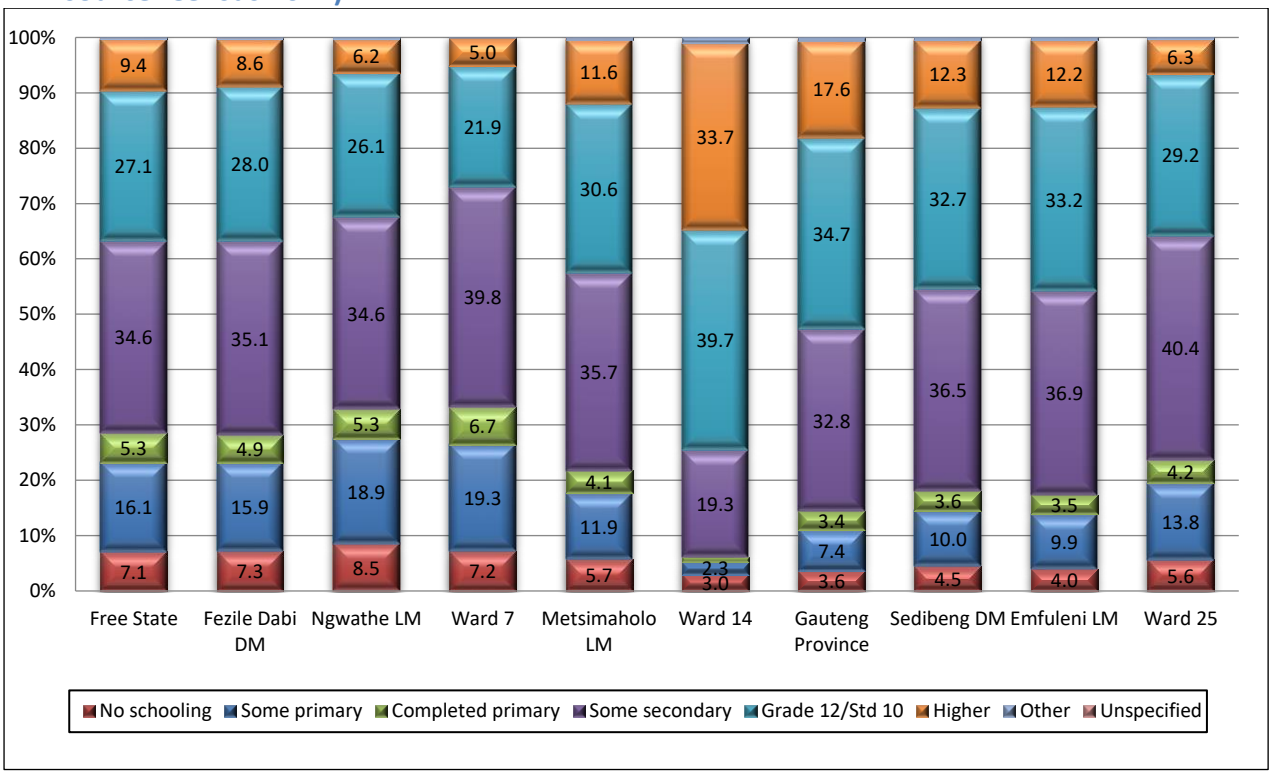
Figure 11: Language distribution (shown in percentage, source: Census 2011)



6.2.3 Education

In Ward 14 about a third of people aged 20 years or older have completed an education higher than Grade 12 (Figure 12), while Ward 7 has the highest proportion of people who has not completed their primary school education.

Figure 12: Education profiles (those aged 20 years or older, shown in percentage, source: Census 2011)



6.2.4 Employment, livelihoods, and economic activities

Ward 14 has the highest proportion of people aged between 15 – 65 years that are employed (Figure 13), with more than 80% of this group being employed in the formal sector (Figure 14). Ward 7 has the largest proportion of discouraged work seekers, indicating a shortage of employment opportunities in the area.

Figure 13: Labour status (those aged between 15 - 65 years, shown in percentage, source: Census 2011)

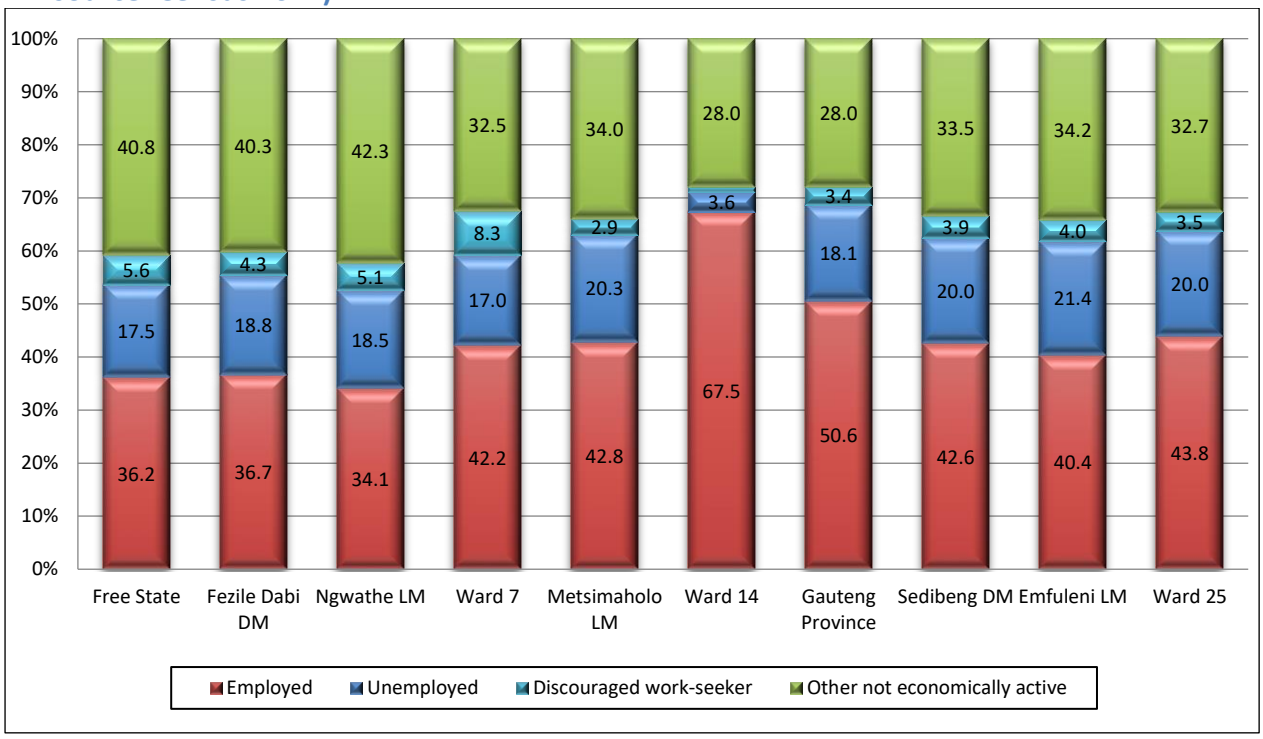
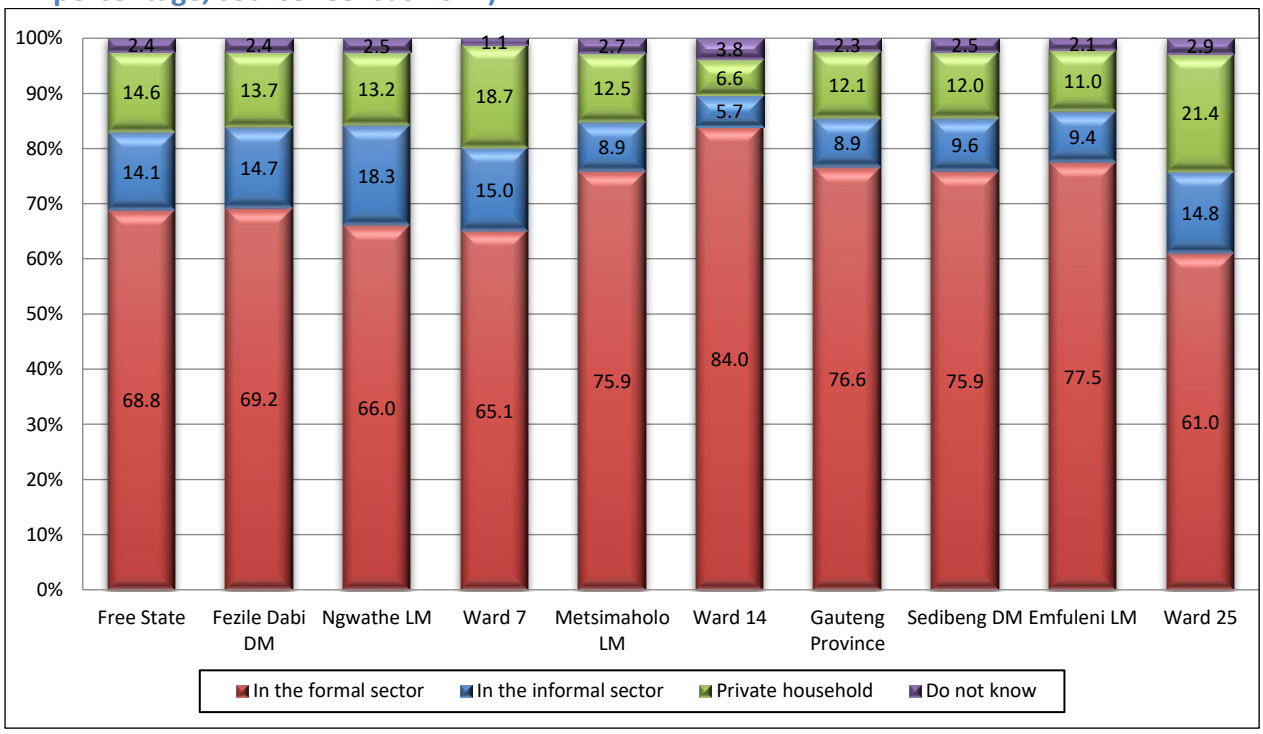
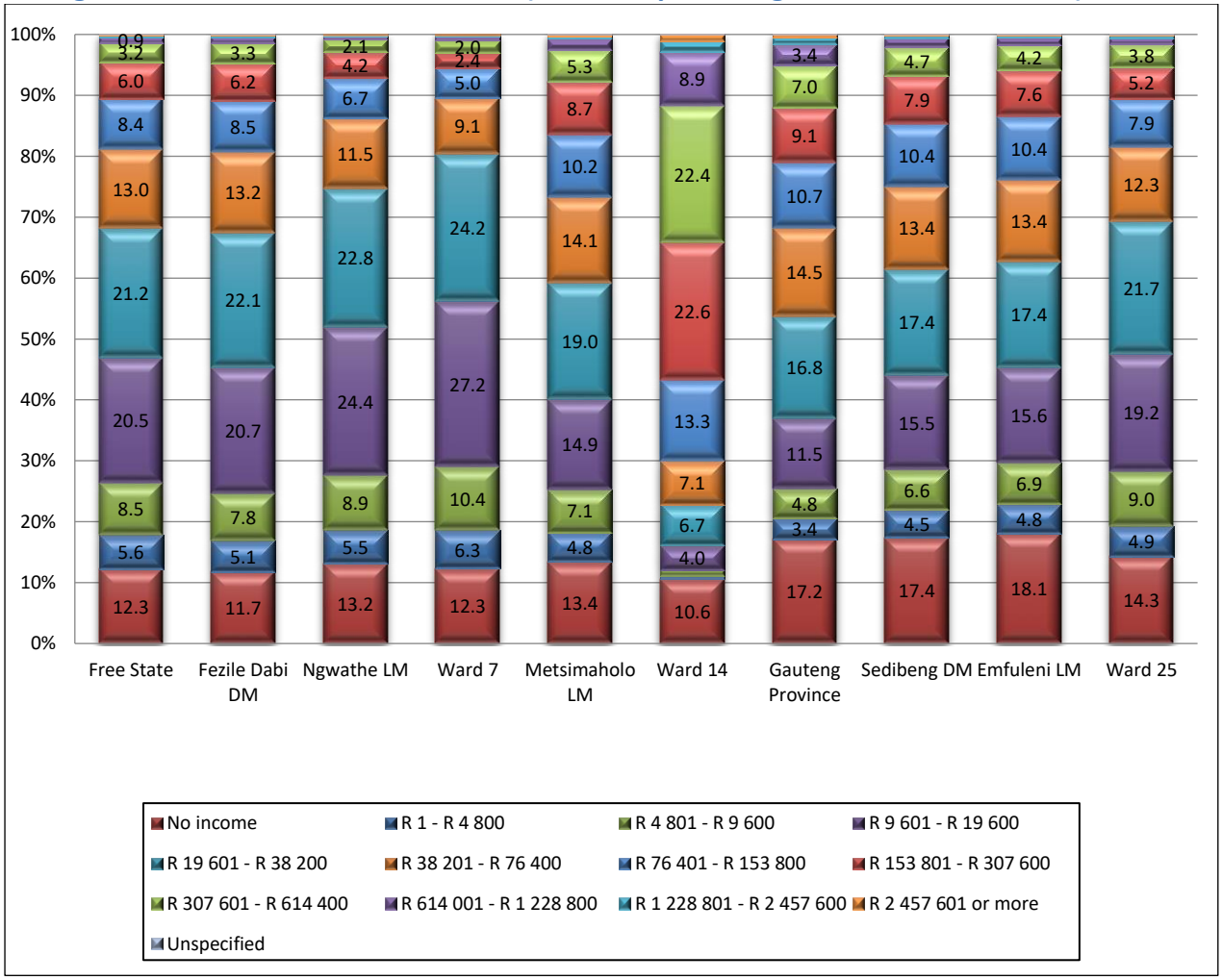


Figure 14: Employment sector (those aged between 15 - 65 years, shown in percentage, source: Census 2011)



More than 45% of the households on district, local and ward level had an annual household income of below R19 601 in 2011 (Figure 16), except in the Metsimaholo LM and Ward 14, where the proportion is lower.

Figure 15: Annual household income (shown in percentage, source: Census 2011)



Statistics South Africa (2015) has calculated the Food Poverty Line (FPL) for the Free State Province as R334 per capita per month for 2011 where the FPL is the Rand value below which individuals are unable to purchase or consume enough food to supply them with the minimum per-capita-per-day energy requirement for good health. The FPL is one of three poverty lines, the others being the upper bound poverty line (UBPL) and the lower bound poverty line (LBPL). The LBPL and UBPL both include a non-food component. Individuals at the LBPL do not have enough resources to consumer or purchase both adequate food and non-food items and are forced to sacrifice food to obtain essential non-food items, while individuals at the UBPL can purchase both adequate food and non-food items. The LBPL for the Limpopo Province was R520 per capita per month in 2011 and the UBPL R718 per capita per month respectively. The FPL for Gauteng was R339 per capita per month, the LBPL was R523 and the UPL was R963. More recent poverty lines than the rebased poverty lines for 2011 are not

available. Based on this, a household with four members needed an annual household income of approximately R17 000 in 2011 to be just above the FPL. When comparing this with the SAMPI data it seems as if there are more households below the poverty lines in the area than who are multi-dimensionally poor. This is due to the poverty lines using a financial measure and do not take into consideration payment in kind and livelihood strategies such as subsistence farming. If these were to be converted into a Rand value, the poverty line picture may have a closer resemblance to the SAMPI data.

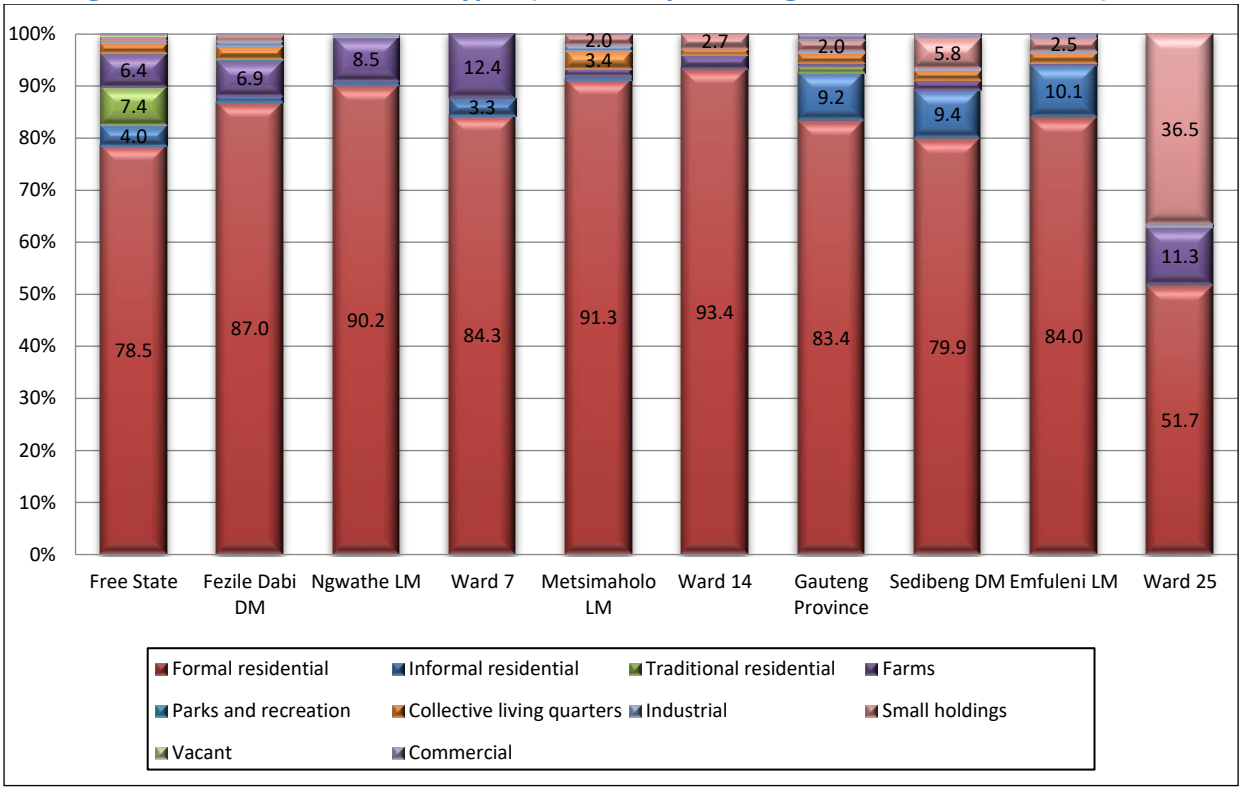
6.2.5 Housing

Most households live in urban areas, except in Ward 7 of the Ngwathe LM and Ward 25 of the Emfuleni LM where more than 14% of households live on farms (Table 7). Most households live in areas classified as formal residential (Figure 16), except in Ward 25 of the Emfuleni LM where about a third of households live on smallholdings.

Table 7: Geotypes (source: Census 2011, households)

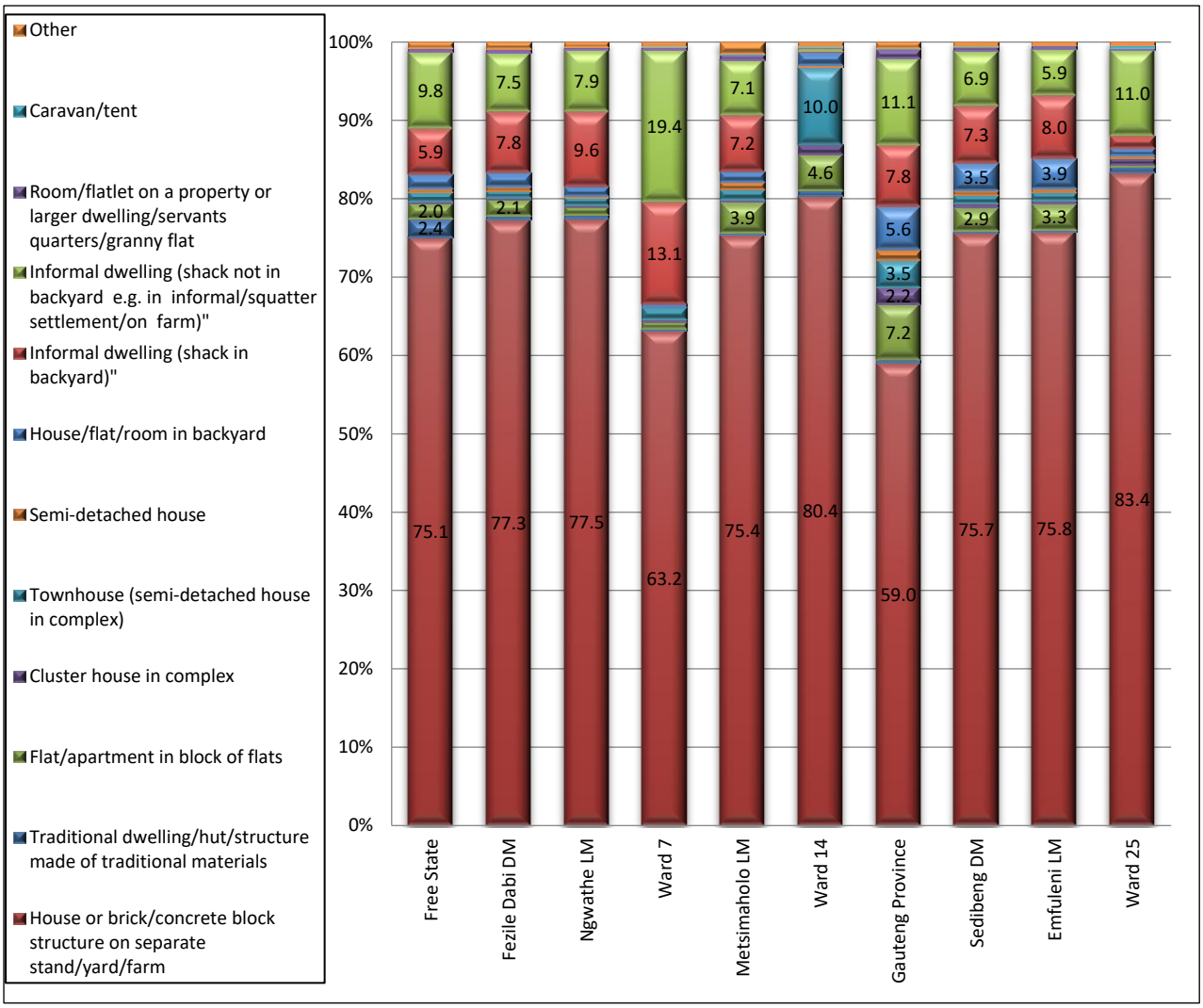
Area	Urban	Tribal/Traditional	Farm
Free State Province	84.5	8.8	6.7
Fezile Dabi DM	92.5	0.0	7.5
Ngwathe LM	90.7	0.0	9.3
Ward 7	85.1	0.0	14.9
Metsimaholo LM	97.7	0.0	2.3
Ward 14	97.9	0.0	2.1
Gauteng Province	97.6	0.9	1.5
Sedibeng DM	96.6	0.0	3.4
Emfuleni LM	99.4	0.0	0.6
Ward 25	85.9	0.0	14.1

Figure 16: Enumeration area types (shown in percentage, source: Census 2011)



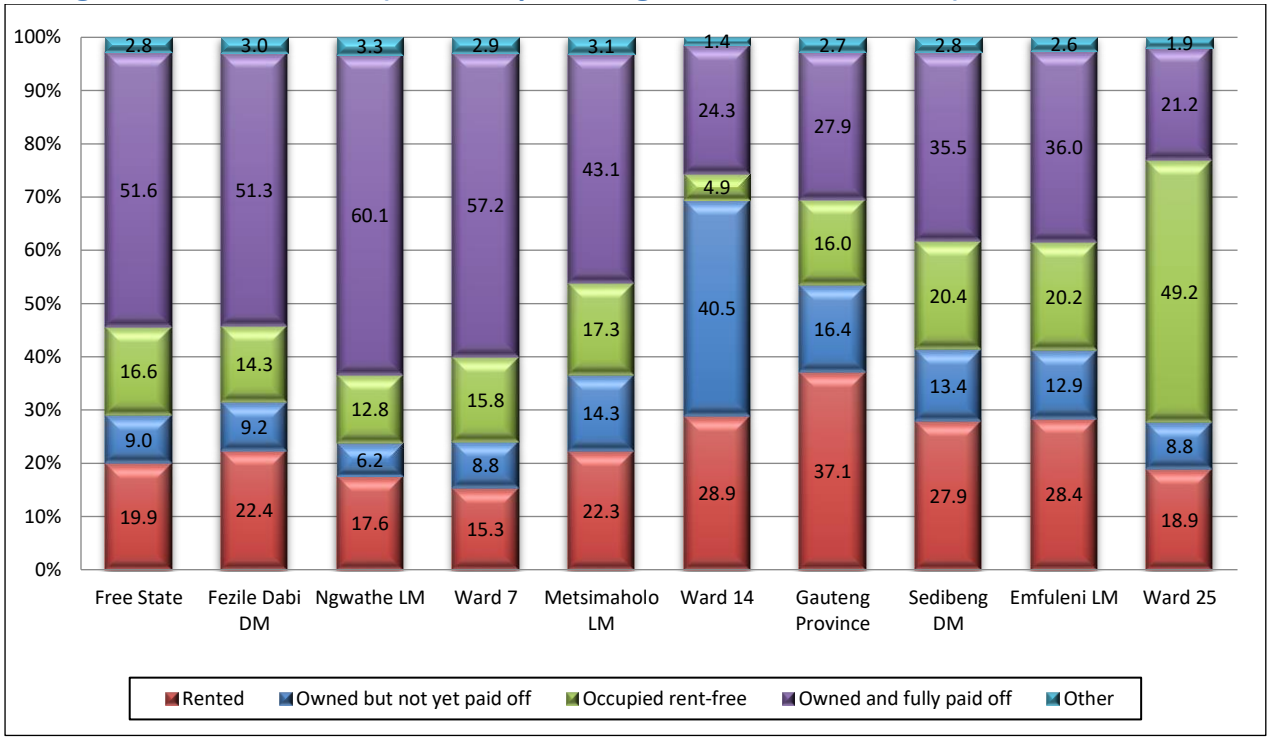
More than 75% of households on district or municipal level live in houses or brick structures on separate stands or yards (Figure 17), except in Ward 7 of the Ngwathe LM where approximately a third of households live in informal dwellings that are either in a backyard or informal settlement.

Figure 17: Dwelling types (shown in percentage, source: Census 2011)



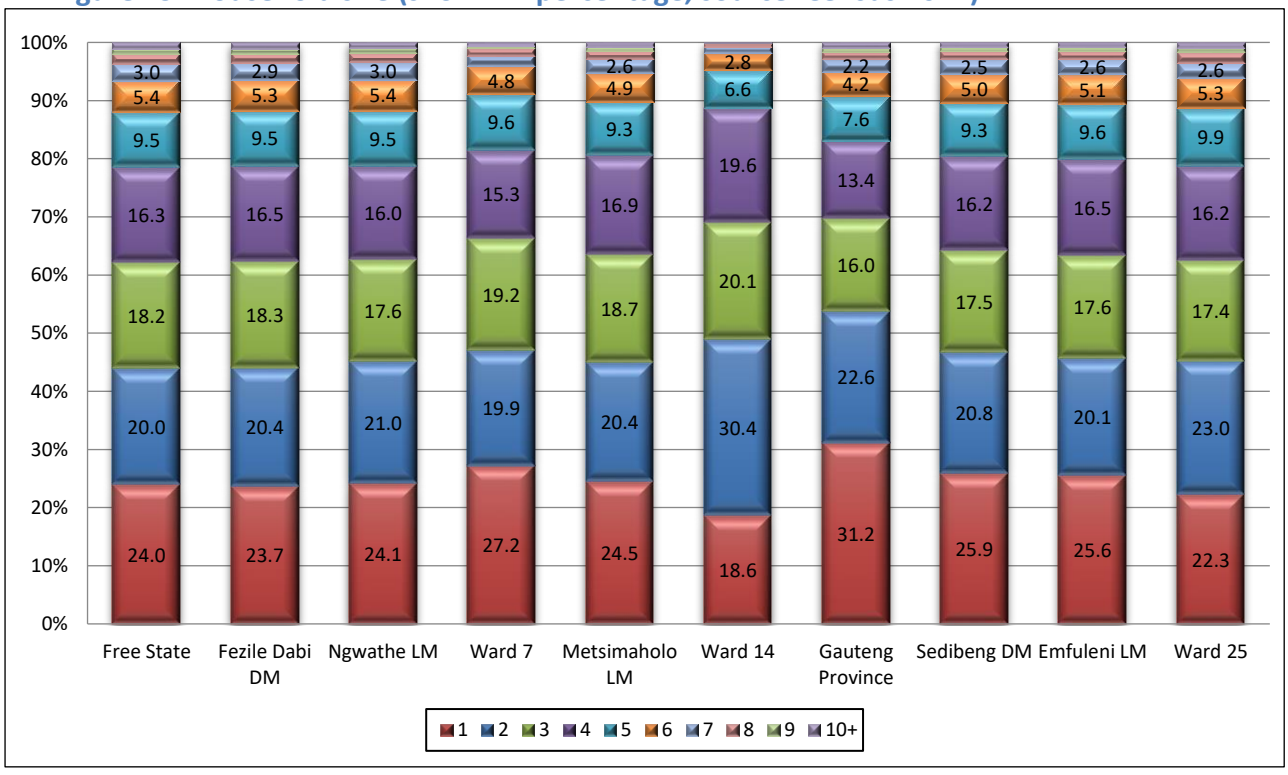
Most households own their dwellings or occupy it rent-free (Figure 18). Ward 14 of the Metsimaholo LM has the highest incidence of households renting their dwellings.

Figure 18: Tenure status (shown in percentage, source: Census 2011)



More than 60% of households in the area consist of up to three members (Figure 19), with larger household sizes in Ward 14.

Figure 19: Household size (shown in percentage, source: Census 2011)

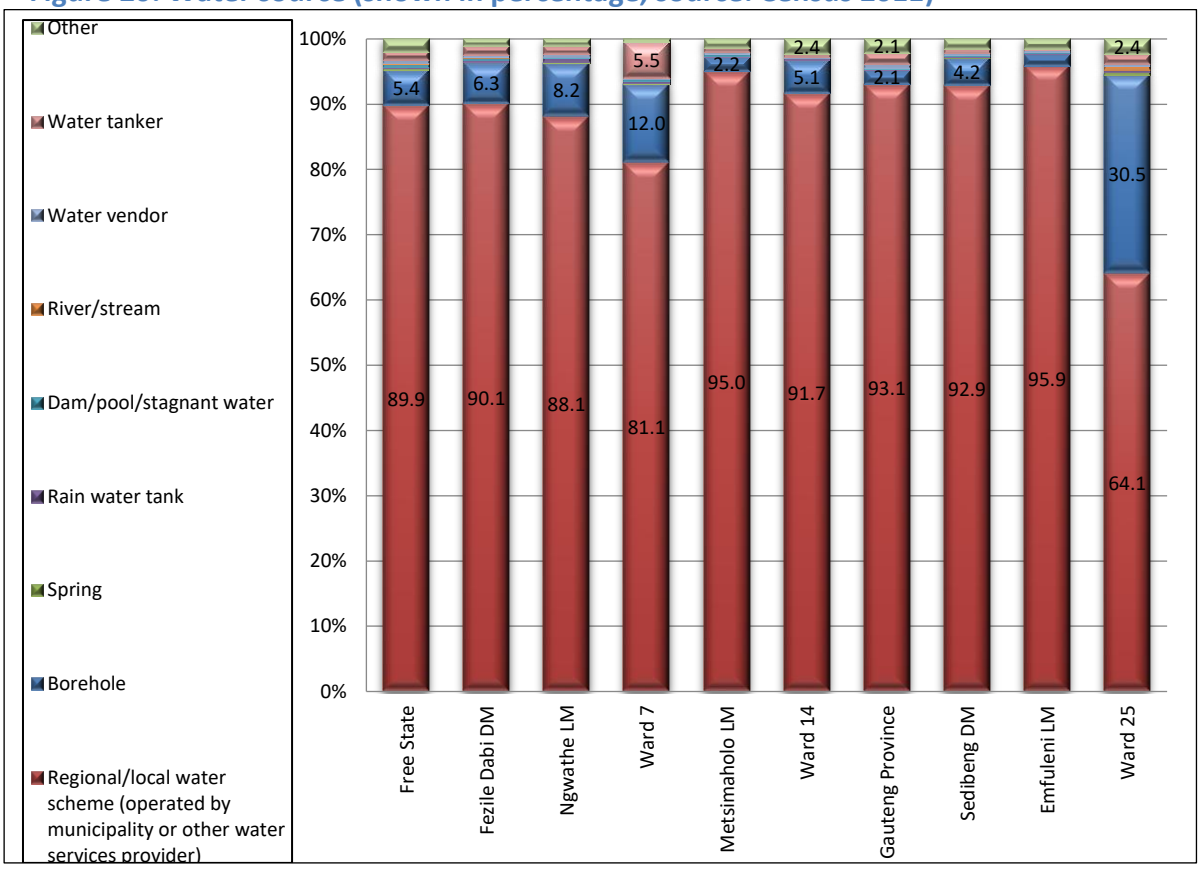


6.2.6 Access to basic services

Access to basic services such as water, sanitation and electricity relate to standard of living according to SAMPI (Statistics South Africa, 2014). Households that use paraffin, candles, or nothing for lighting; or fuels such as paraffin, wood, coal, dung or nothing for cooking or heating; have no piped water in the dwelling or on the stand and do not have flush toilets can be described as deprived in terms of these basic services.

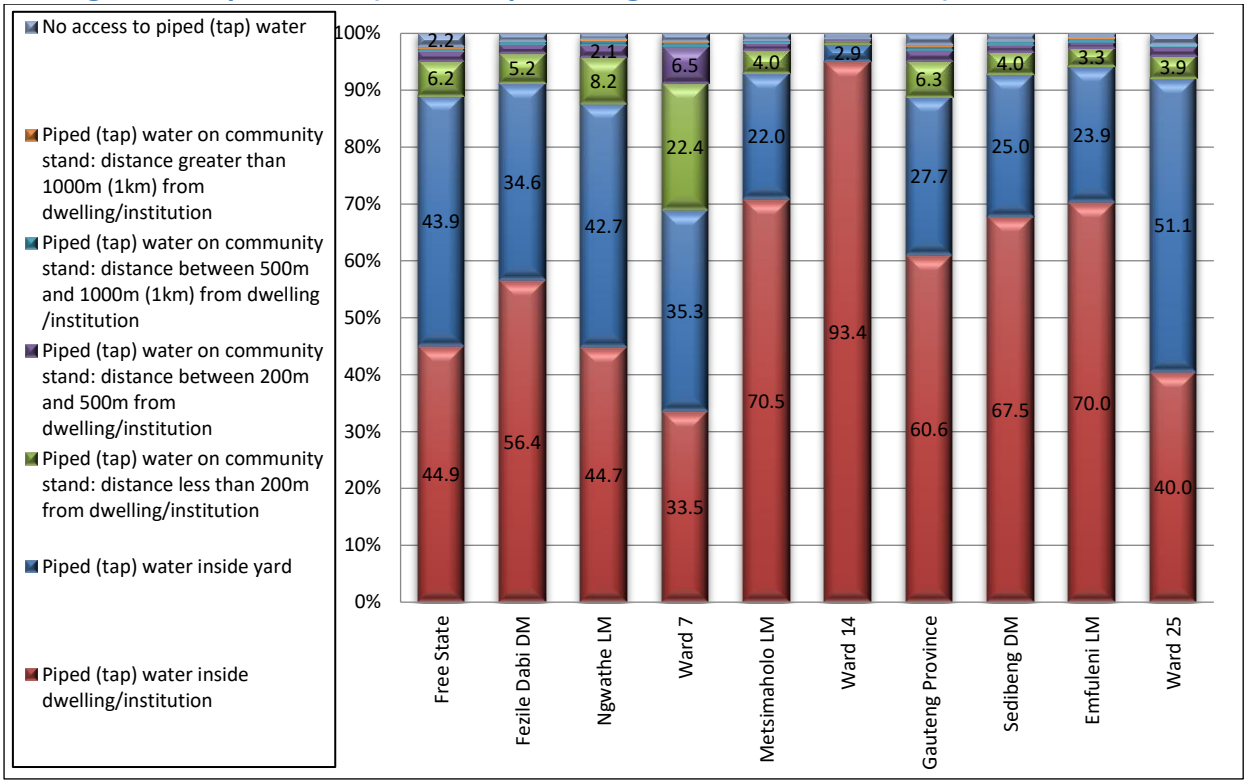
On a municipal level most, households get their water from a regional or local water scheme (Figure 20). Almost a third of households in Ward 25 of the Emfuleni LM get their water from a borehole. In Ward 7 of the Ngwathe LM, about 12% of households get their water from a borehole, while almost 6% get their water from a water tanker.

Figure 20: Water source (shown in percentage, source: Census 2011)



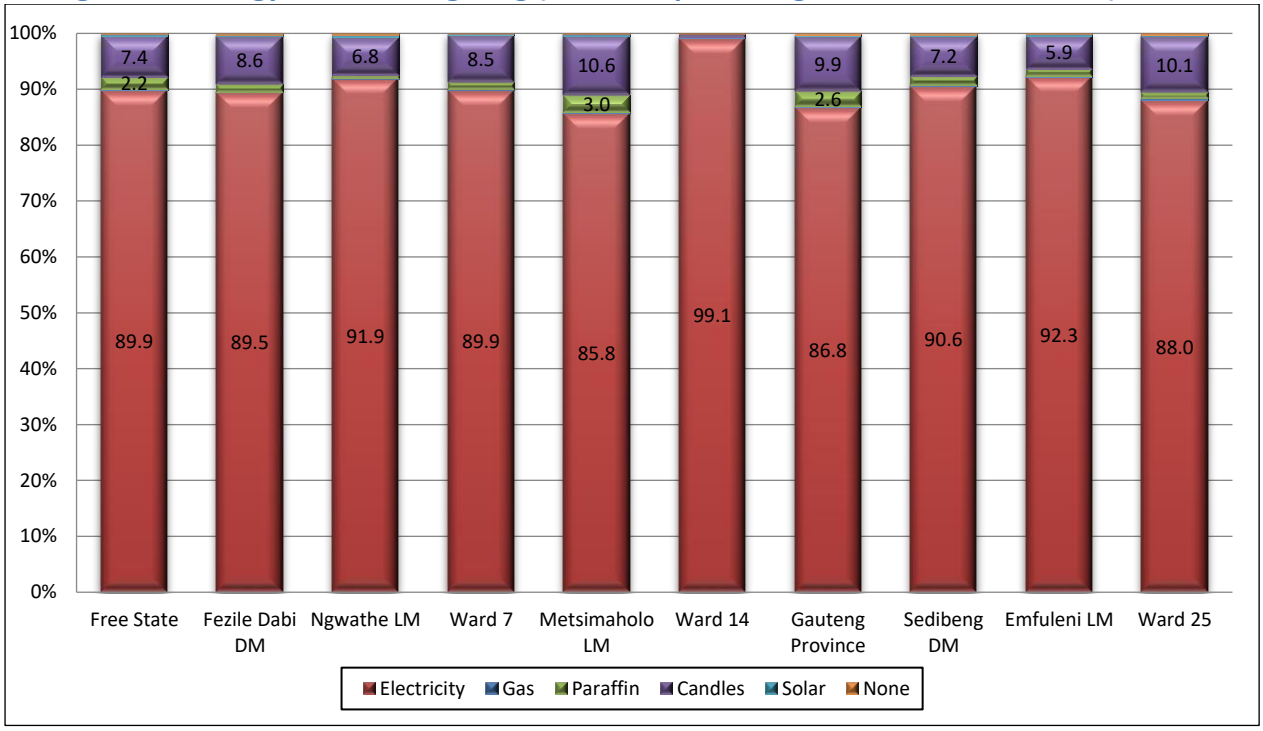
The incidence of households with access to piped water inside their dwellings on a ward level varies (Figure 21). More than 90% of households in Ward 14 of the Metsimaholo LM have piped water inside the dwelling, compared to just about a third in Ward 7 in the Ngwathe LM.

Figure 21: Piped water (shown in percentage, source: Census 2011)



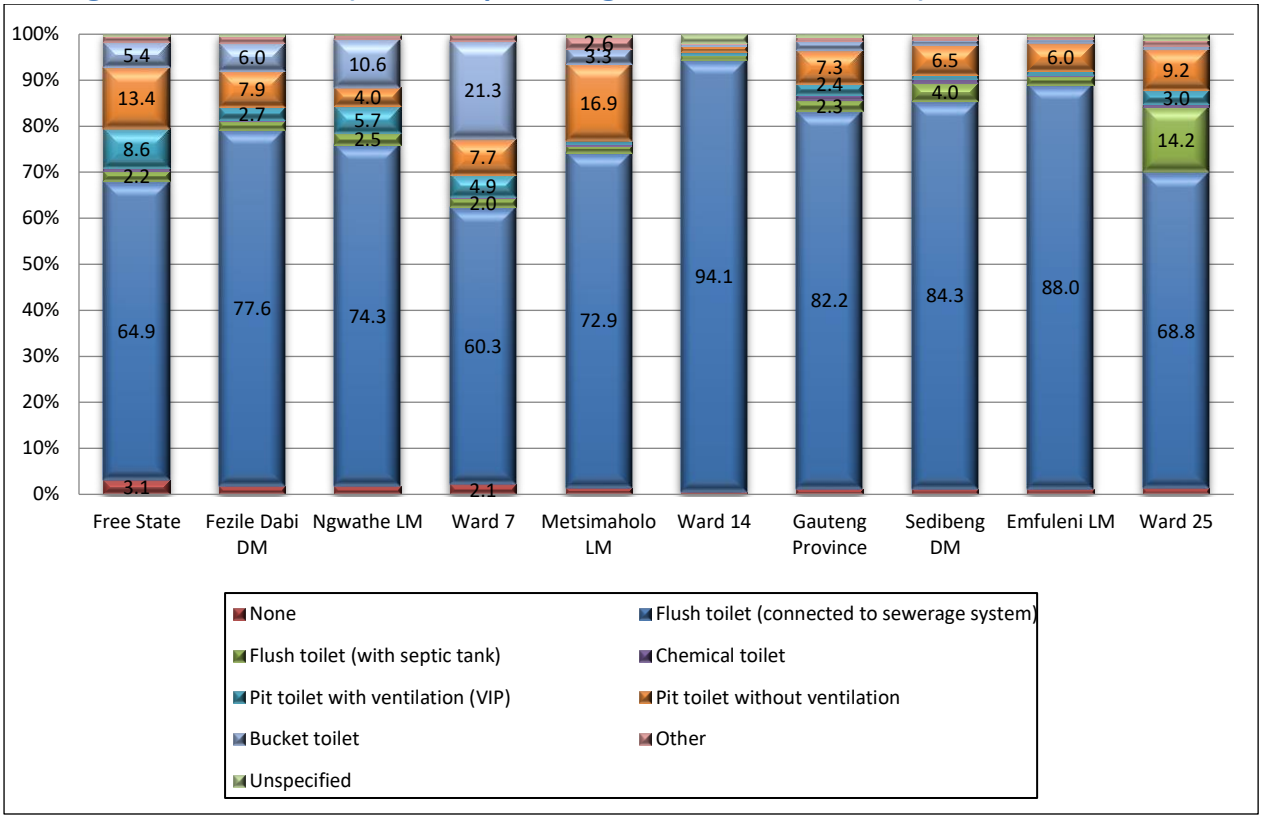
Access to electricity for lighting purposes give an indication of whether a household has access to electricity, as poor households sometimes only use electricity for lighting, but use other sources of energy for heat and cooking. More than 85% of households in the area have access to electricity for lighting purposes (Figure 22), with the highest incidence in Ward 14 of the Metsimaholo LM. Candles are the alternative that is most used for lighting purposes.

Figure 22: Energy source for lighting (shown in percentage, source: Census 2011)



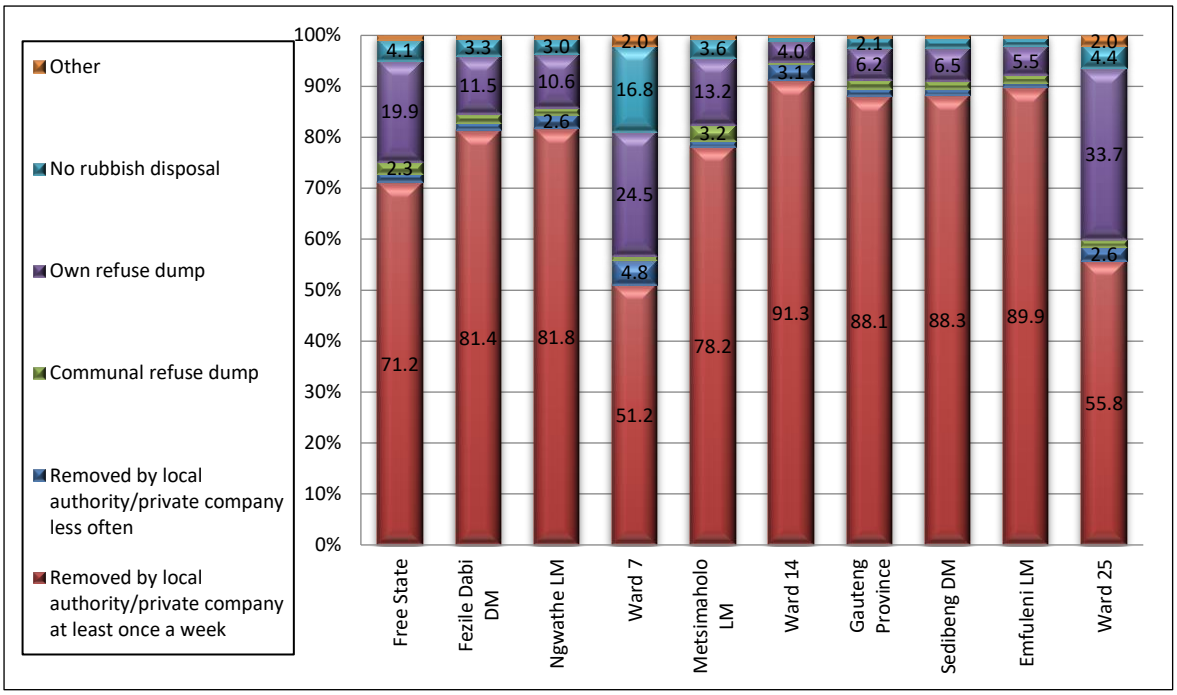
Most households in the area have access to a pit toilet with or without ventilation (Figure 23). Ward 7 of the Ngwathe LM has the greatest proportion of households (21.3%) using a bucket toilet.

Figure 23: Sanitation (shown in percentage, source: Census 2011)



Most households in the area have their refuse removed by a local authority or private company (Figure 24), with the lowest incidences in Ward 7 of the Ngwathe LM and Ward 25 of the Emfuleni LM. A large proportion of households in these two wards either have their own refuse dumps or no rubbish disposal.

Figure 24: Refuse removal (shown in percentage, source: Census 2011)



6.3 Discussion of receiving environment

The receiving environment for the proposed Scafell Cluster Project is in Ward 7 of the Ngwathe Local Municipality that is in the Fezile Dabi District Municipality in the Free State Province. Ward 7 consists mostly of agricultural land, but also includes a part of Tumahole township in Parys. The closest towns to the proposed site are Parys, Sasolburg, Vereeniging and Vanderbijlpark. The area is mainly of agricultural significance, although tourism and commerce also form part of the economy. There are sand mining activities in relatively close proximity to the site.

The population in the Ngwathe LM showed a slight decrease between 2011 and 2016, while the number of households have increased with just over 10%. The Ngwathe LM has the highest dependency ratios in the area, which suggests fewer employment opportunities in this area and high levels of poverty. A greater proportion of households in the Ngwathe area are living in poverty in 2016 compared to 2011. It is anticipated that poverty levels in the area have increased even further because of the COVID-19 pandemic.

Most of the population in the area belong to the Black population group, followed by the White population group. Sesotho is the home language of more than two thirds

of the population in the Ngwathe LM, followed by Afrikaans. There is a bias towards females in the area, which is characteristic of rural areas as many males migrated to urban areas in search of employment.

Education levels are relatively low in the Ngwathe LM with more than two thirds having completed education up to some secondary. Only about a third of adults of working age in Ngwathe is employed. A large proportion of households live below the poverty line.

The detailed description of the area highlights the following important aspects:

- Documentation used for communicating about the project should be available in English, Afrikaans, and Sesotho.
- Given the levels of poverty in the area, and limited employment opportunities, some competition for resources can be expected.

7 Stakeholder Identification and Analysis

7.1.1 Approach

Stakeholders include all individuals and groups who are affected by, or can affect, a given operation. Stakeholders consist of individuals, interest groups and organizations (Vanclay, Esteves, Aucamp & Franks, 2015). Stakeholder analysis is a deliberate process of identifying all stakeholders of a project - the individuals and groups that are likely to impact or be impacted by it - and understanding their concerns about the project and/or relationship with it (Vanclay et al, 2015). Stakeholder analysis assists the proponent with understanding the local cultural and political context. It is acknowledged that different stakeholder groups have different interests, and that there are individual differences within stakeholder groups. The purpose of this section of the report is to introduce the stakeholder groups that will be affected by the proposed projects. The following stakeholder groups were identified and their interest in the projects will be discussed briefly in the section below.

7.2 Stakeholder groups

7.2.1 Government and Parastatal groups

The projects fall within the **Free State Province**, and the provincial government is a key stakeholder. The province has significant potential for the harnessing of solar energy. The provincial government need to ensure that all solar projects are aligned and be cognisant of the potential cumulative impacts of the proposed projects.

The **Fezile Dabi District Municipality** is also a stakeholder. The municipality must coordinate the projects that contribute to the socio-economic development in the district and assist with identifying and implementing social development projects for the greater good. Like the provincial government, the district municipality must also ensure that projects are aligned, that cumulative impacts are considered and that social development initiatives are coordinated.

The governmental body the closest to the project area is the **Ngwathe Local Municipality.** The South African Local Government Association (SALGA) has expressed concerns on how the Ngwathe LM has been addressing service delivery issues. Its lack

of revenue collection, provision of basic municipal services and infrastructure development are some of the issues that came into the spotlight. The municipality is amongst Free State municipalities listed in the Auditor-General's report as those needing urgent intervention due to their escalating debt to service providers. It would be crucial for Mainstream to liaise closely with the municipality at the time of project planning and implementation to ensure that any benefits given to the Ngwathe LM are redirected appropriately.

Eskom is a Parastatal organisation and the South African electricity public utility. It generates approximately 95% of the electricity used in South Africa (http://www.eskom.co.za/OurCompany/CompanyInformation/Pages/Company_Information.aspx). In 2008 South Africa initiated a process to introduced renewable energy feed-in-tariffs (REFIT) in order to facilitate the introduction of renewable energy in the power system (Department of Energy, 2015). The actual implementation of introducing renewable energy into the electricity grid was done through a competitive tendering system named the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). The proposed project will form part of the REIPPPP (including other private bidding programmes), making Eskom a key stakeholder in the project.

7.2.2 Civil society

The proposed project site is between the towns of Parys, Sasolburg, Vereeniging and Vanderbijlpark. The labour for the project will live in one of the affected towns since labour will be bussed in from town and there will be no permanent construction camp on site. Any new labourers that come and work on the project will also need to live in one of the four towns. From all the towns, Parys is the smallest and most vulnerable to social disruption. Sasolburg, Vereeniging and Vanderbijlpark are bigger towns with existing industrial activities, thus it is most likely that the labour will concentrate there. Benefits of the project should be shared between the towns. Any social impacts, positive or negative, on a community level will be felt in these four towns to a lesser or greater extent.

Four **private landowners** will be affected by the physical footprint of the project. The prevailing land use is agricultural, specifically farming with livestock (cattle). On Willow Grange 264 there is a tenant with livestock such as sheep, cattle, and pigs. The only landowner that resides close to the affected property is the owner of Damlaagte 229, and it is also the only farm where there are farm workers living on the property, but only during the week. The four farm workers' families do not live on the farm. The other farmers transport their workers daily, as necessary. Farm workers are seen as a vulnerable and marginalised group.

7.2.3 Businesses

There are small businesses in the area that can provide services to Mainstream and other contractors. These services include accommodation, fencing, earth works, transport and the hospitality industry amongst others. The proposed project will bring direct benefits to the local service providers, but only if Mainstream make use of these services.

7.2.4 Internal stakeholders

Mainstream is the project proponent, and as such a key stakeholder. The focus of this report is on external stakeholders, but it is important to acknowledge that the project will have a positive impact on Mainstream and all its employees and shareholders.

8 Social Impact Assessment

The following section of the report focuses on the identification and analysis of social impacts. Mitigation and management measures will also be discussed. It must be considered that most social impacts are of a cumulative nature, as many existing social challenges are present in the affected community.

8.1 Impact Assessment Criteria

The impact tables and ratings were adapted from the environmental sciences, and it is not always possible to compartmentalise the social impacts. For the sake of consistency this has been attempted, but it is not innate to social sciences. Allowance for the changing and adaptive nature of social impacts should be made when interpreting the impact tables.

The assessment of the significance of impacts for a proposed development is by its nature, a matter of judgement. SLR uses the following methodology to assess potential impacts on the proposed projects:

In assigning significance ratings to potential impacts before and after mitigation the approach presented below is to be followed.

- **Determine the impact consequence rating:** This is a function of the "intensity", "duration" and "extent" of the impact. Consequence attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration, and intensity.

- **Determine impact significance rating:** The significance of an impact is a function of the consequence of the impact occurring and the probability of occurrence In certain cases it may not be possible to determine the significance of an impact. In these instances, the significance is **UNKNOWN.**

- **Modify significance rating (if necessary):** Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals

might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through project design, selection of appropriate alternatives and / or management.

- **Determine degree of confidence of the significance assessment:** Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact.

Table 8: Summary of impact assessment criteria

Criteria	Rating	Description
Criteria for ranking of the INTENSITY (SEVERITY) of environmental impacts	**ZERO TO VERY LOW**	Negligible change, disturbance or nuisance. The impact affects the environment in such a way that natural functions and processes are not affected. People / communities are able to adapt with relative ease and maintain pre-impact livelihoods.
	LOW	Minor (Slight) change, disturbance or nuisance. The impact on the environment is not detectable or there is no perceptible change to people's livelihood.
	MEDIUM	Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way. People/communities are able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support.
	HIGH	Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease. Affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.
Criteria for ranking the DURATION of impacts	**SHORT TERM**	< 5 years.
	MEDIUM TERM	5 to < 15 years.
	LONG TERM	> 15 years, but where the impact will eventually cease either because of natural processes or by human intervention.
	PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.
Criteria for ranking the EXTENT / SPATIAL SCALE of impacts	**LOCAL**	Impact is confined to project or study area or part thereof, e.g. limited to the area of interest and its immediate surroundings.
	REGIONAL	Impact is confined to the region, e.g. catchment, municipal region, etc.
	NATIONAL	Impact is confined to the country as a whole, e.g. South Africa, etc.
	INTERNATIONAL	Impact extends beyond the national scale.
Criteria for determining the PROBABILITY of impacts	**IMPROBABLE**	Where the possibility of the impact to materialise is very low either because of design or historic experience, i.e. ≤ 30% chance of occurring.
	POSSIBLE	Where there is a distinct possibility that the impact would occur, i.e. > 30 to ≤ 60% chance of occurring.

Criteria	Rating	Description
	PROBABLE	Where it is most likely that the impact would occur, i.e. > 60 to ≤ 80% chance of occurring.
	DEFINITE	Where the impact would occur regardless of any prevention measures, i.e. > 80% chance of occurring.
Criteria for determining the DEGREE OF CONFIDENCE of the assessment	**LOW**	≤ 35% sure of impact prediction.
	MEDIUM	> 35% and ≤ 70% sure of impact prediction.
	HIGH	> 70% sure of impact prediction.
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED - the degree to which an impact can be reduced / enhanced	**NONE**	No change in impact after mitigation.
	VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
	LOW	Where the significance rating drops by one level, after mitigation.
	MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
	HIGH	Where the significance rating drops by more than three levels, after mitigation.
Criteria for LOSS OF RESOURCES - the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable	**LOW**	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
	MEDIUM	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
	HIGH	Where the activity results in an irreplaceable loss of a resource.
Criteria for REVERSIBILITY - the degree to which an impact can be reversed	**IRREVERSIBLE**	Where the impact is permanent.
	PARTIALLY REVERSIBLE	Where the impact can be partially reversed.
	FULLY REVERSIBLE	Where the impact can be completely reversed.

Table 9: Determining Consequence

Rating	Description *
VERY HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***long term***; OR of ***high intensity*** at a ***national level*** in the ***medium term***; OR of ***medium intensity*** at a ***national level*** in the ***long term.***
HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***high intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***national level*** in the ***long term***; OR of ***high intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***regional level*** in the ***long term.***
MEDIUM	Impacts could be EITHER: of ***high intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***medium intensity*** at a ***regional level*** in the ***medium term***; OR of ***high intensity*** at a ***regional level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***local level*** in the ***long term***;

Rating	Description *
	OR of ***low intensity*** at a ***national level*** in the ***medium term;***
	OR of ***low intensity*** at a ***regional level*** in the ***long term.***
LOW	Impacts could be EITHER of ***low intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***national level*** in the ***short term***; OR of ***high intensity*** at a ***local level*** and endure in the ***short term***; OR of ***medium intensity*** at a ***regional level*** in the ***short term***; OR of ***low intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***local level*** and endure in the ***medium term.***
VERY LOW	Impacts could be EITHER of ***low intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***regional level*** and endure in the ***short term***; OR of ***low to medium intensity*** at a ***local level*** and endure in the ***short term.*** OR **Zero to very low intensity** with any combination of extent and duration.

* Note: For any impact that is considered to be "Permanent" or "International" apply the "Long-Term" and "National" ratings, respectively.

Table 10: Determining Significance

		PROBABILITY			
		IMPROBABLE	**POSSIBLE**	**PROBABLE**	**DEFINITE**
CONSEQUENCE	**VERY LOW**	**INSIGNIFICANT**	**INSIGNIFICANT**	**VERY LOW**	**VERY LOW**
	LOW	**VERY LOW**	**VERY LOW**	**LOW**	**LOW**
	MEDIUM	**LOW**	**LOW**	**MEDIUM**	**MEDIUM**
	HIGH	**MEDIUM**	**MEDIUM**	**HIGH**	**HIGH**
	VERY HIGH	**HIGH**	**HIGH**	**VERY HIGH**	**VERY HIGH**

8.2 Description of potential impacts

> *"Almost all projects almost always cause almost all impacts. Therefore, more important than predicting impacts is having on-going monitoring and adaptive management."* Frank Vanclay

This section describes and assesses the specific social impacts that will be associated with the proposed solar electricity generation facilities and associated infrastructure. Although there are four different solar facilities (Damlaagte, Scafell, Vlakfontein and Ilikwa) the social environment cannot be compartmentalised by the physical footprint, and therefore the social impacts created by the projects will be similar for all the sites. Unlike environmental impacts, social impacts can occur before any physical work on site is done, and rumours of development is enough to set off some social change processes and social impacts. The social impacts and mitigation measures will be discussed in this section, and in the next section the impacts will be assessed per site. When the mitigation and management of social impacts are considered, one must take into consideration that social impacts occur in communities surrounding the proposed projects, and although the project proponent may be the catalyst for some impacts, there may be external factors contributing to the impact. Many of these factors are outside the control of the project proponent. Many of the social impacts the proponent cannot mitigate alone, and partnerships with local government and Non-Profit Organisations are often required. Social impacts must be managed in the long term. This complex process requires insight in the social environment and community dynamics. The social environment adapts to change quickly, and social impacts therefore evolve and change throughout the project cycle.

Table 11: Summary of social impacts in different phases of the projects:

Impacts	Phases			
	Planning and design	Construction	Operation	Decommission
Local and national economic opportunities				
Employment and skills transfer				
Visual impacts and sense of place				
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment				
Safety and security (crime)				
Impact on residents in closest urban areas				
Impact on agricultural activities (waste, water, grazing, fire)				
Development of clean renewable energy				

8.2.1 Local and National Economic opportunities

Description of impact

The injection of income into the area in the form of both wages and new business sales will represent some opportunity for economic growth in the area. Direct impacts would include the creation of new jobs for construction workers and the associated income generated by the solar project. Indirect and induced impacts would occur because of the new economic development and would include new jobs at businesses that support the expanded workforce or provide project materials, and associated income.

New business sales will take place due to the introduction of a new economic activity in the region. New business sales leads to additional business turnover due to change in the economy, which means that over and above the originally invested money during the construction phase, revenue is generated due to the multiplier effect in the different sectors of the economy. The sectors that will experience the highest demand for additional output are manufacturing (for example supply of building materials during construction, trade (for example supply of goods and services), finance, and business services (such as professional services).

It is expected that the proposed development will lead to positive impacts on the economy, which will lead to increased business sales, increased employment opportunities, increased government income, and increased standards of living.

Increased employment is associated with increased income and therefore with increased buying power in the area, thus leading to new business sales. With the increased employment and a subsequent increase in monthly income, increased business opportunities can be experienced.

This impact is essentially relevant to the following phases:

- Planning phase
- Construction phase
- Operational phase

During the **planning and design phase**, several non-local consultants such as environmental practitioners, architects, engineers, town and regional planners, development economists, heritage specialists, etc. have been employed to do preliminary assessments and planning to plan for the proposed development.

During the **construction phase**, the project has the potential to have a positive impact on economic activity in the local area, region, province, nationally, and internationally given the size of the new spending injection associated.

There are also likely to be economic multiplier effects, albeit limited locally, from the use of national goods and services which includes, but is not limited to, construction materials and equipment and workforce essentials such as food, clothing, safety equipment, and other goods. Off-site accommodation would also be required for those construction staff not located in the area, and there is a large amount of accommodation available in Sasolburg, Parys, Vereeniging and Vanderbijlpark.

Transport services to the site from town would also be required as there is limited public transport in the area. This additional spend would provide an indirect boost to the local economy. Over and above the originally invested money during the

construction phase, additional revenue is generated due to the multiplier effect in the different sectors of the economy.

An indicator that is used to indicate economic growth and value is the Gross Domestic Product per Region (GDP-R). The proposed development will translate to economic contribution and income generation which will result in an increase in the GDP-R. The capital investment will have a positive impact on the economy since it will trigger other beneficial economic activities.

It is anticipated that the economy will be stimulated in the following ways:

- Increased financial spending.
    - Expenditure on resources that is required for the construction of the development to take place. These include the purchasing of building material, payment of services provided and infrastructure amongst others.
- Increased expenditure by construction workers.
    - Income that would be earned by employees would be mostly spent within the region.

The capital investment will have a positive impact to the economy, since it will trigger other beneficial economic activities, equate to additional new business turnover and GDP.

The construction phase will have a positive impact on the economy due to increased financial spending in the economy related to increased infrastructure investment; civil construction; and increased expenditure by employees.

The local area and its activities (businesses and shops, etc.) are expected to be stimulated economically, due to the increased spending expected from the increased salaries and wages paid to employees during construction. Service industries in the region will benefit from this, which in turn will have a knock-on effect on suppliers of goods and services in other areas. This positive impact is likely to be experienced in

terms of the increased markets for the sale of local goods to construction staff and direct employment by construction contractors.

The proposed development will also lead to increased government income which can be seen as an economic injection into the area. An increase in government income is generated from an increase in the tax base and an increase in economic activity. The budgeted capital investment for the project would be injected into the economy, thereby causing a positive economic impact that leads to fiscal impacts. Fiscal impacts are changes in government revenues and expenditures. Economic impacts on total business sales, wealth or personal income can affect government revenues by expanding or contracting the tax base. Due to the jobs that will be created because of the proposed development, and the increased business activity levels, the salaries, and wages of those jobs along with the increased turnover of the companies, can be translated into increased personal and business income tax. Government income will be increased as result of the increase in tax it will receive from the proposed development. The increased government income from tax will mostly be because of increased economic activity. Increased tax received by the government will be in the form of company tax, unemployment insurance fund, rates, and taxes, etc.

During the **operation phase**, the economy will be stimulated to a smaller degree since operational expenditure is expected to be significantly lower than the construction phase. Additional energy generation has knock-on effects on economic stimulation and income generation. Long term positive impacts can only flow from the project if it is financially sustainable (i.e., financially viable in the long term with enough income to cover costs). The opportunity costs need to be taken into consideration in this regard. The opportunity costs associated with the development of the site for solar energy can be defined as the potential foregone benefits that would be associated with the next best alternative land use. In the study area this means agriculture.

Impact mitigation

It is recommended that a local procurement policy be adopted to maximise the benefit to the local economy.

Mainstream should seek to develop a database of local companies, specifically Broad Based Black Economic Empowerment (BBBEE) companies, which qualify as potential service providers (e.g., construction companies, security etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work. As many goods and services as possible must be sourced from the local area. Mainstream must engage with local authorities and business organisations to investigate the possibility of procurement of construction materials, goods, and products from local suppliers where feasible.

8.2.2 Employment and skills transfer

Description of impact

The proposed employment opportunities from the development, and those that will arise from new business sales, albeit not all local, will be positive. In additional to employment, the proposed development also holds the potential for skills transfer. This impact is essentially relevant to the following phases:

- Construction phase
- Operational phase
- Decommissioning phase

Employment generation reflects the number of jobs created or lost because of the change in the economy created by the solar facilities. The **construction** period of this project is assumed to be between 12 and 18 months. It is expected that approximately 230 jobs will be created, but the number of people employed at one time may vary as different contracts and subcontracts on the project are completed at a time onsite.

Not all these employment opportunities are necessarily available for employment of local workforce within the immediate surrounds of the project. The actual number is also likely to vary based on final designs and size of the proposed project, as well as based on the level of skills and resources of the contractor.

Although no exact numbers were provided, it is estimated that highly skilled or skilled labour such as engineers, technical staff and project managers will constitute about 30% of the work force; semi-skilled staff would typically be required to operate machinery, and this will constitute about 10% of employees; while the remainder will be low skilled construction and security staff that will constitute about 60% of the work force. It is likely that some of the low skilled workforce could be employed from the surrounding area. The level of education in the Local Municipality is poor which is linked to limited skills base. This is combined with a high level of unemployment. Although the more specialised tasks are likely to require skills from outside the Local Municipal area, there are potential opportunities for low skilled (construction and security workers) staff which would require associated training. The injection of income into the area in the form of wages will represent a growth opportunity for the local economy and businesses in the area.

During the construction phase, the employment opportunities would be temporary in nature. The increased employment in the area will also result in increased expenditure, which will mean that more than just the proposed direct jobs required for the construction will be created due to the economic spin-offs. It is important to realise that the construction impact is experienced during the construction period. Thus, it is only sustainable for the duration of the construction phase.

The benefit of increased jobs can also be translated into economic terms. The additional jobs would in essence result in additional income creation. This increase in income in the area can be translated in a specific impact ranging from Broad Based Black Economic Empowerment (BBBEE) to poverty alleviation depending on the procurement policy and the construction technology applied.

In all likelihood, skills will be transferred in the form of on-the-job training during the construction phase. These skills will enable these individuals to seek other construction and related employment once the construction phase is complete. The construction related work opportunities could also lead to capacity building. Capacity building refers to the conscious increasing of knowledge, networking capability and the skills base.

The **operation** phase of the project will require a very small direct workforce of approximately 17 people. Routine activities would include operation of the solar facility to produce power, and regular monitoring and maintenance activities to ensure safe and consistent operation. Maintenance would probably need to be carried out throughout the lifetime of the solar energy plant. Typical activities during maintenance include washing solar panels routinely (in the evening) and vegetation control and maintenance. Indirect and induced job creation potential, albeit very small, also exists from the increased energy production during the operation phase.

The Department of Mineral Resources and Energy (DMRE), through the RFP document, requires that all renewable energy bidders must illustrate how the project will benefit the local community. At present, the DMRE is stipulating that one percent of revenue generated by the project must be contributed towards socio-economic development. In accordance with the relevant BBBEE legislation and guidelines, up to four percent of profit after tax could be used for community development over and above that associated with expenditure in the area. The BBBEE Scorecard specifies the following contributions (totalling four percent):

- Enterprise development – maximum of 15 points awarded for the contribution of three percent of profit after tax, or more; and
- Socio-economic development – maximum of five points awarded for the contribution of one percent of profit after tax, or more.

If these contributions are realised, the project could make a real difference in the local community.

The major social impacts associated with the **decommissioning** phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. Given the relatively small number of people to be employed during the operation phase, the social impacts at a community level associated with decommissioning are likely to be limited/negligible. In addition, potential impacts

associated with the decommissioning phase can be effectively managed with the implementation of a retrenchment and downscaling programme.

Impact mitigation

Mainstream need to liaise with the Local Economic Development section of the municipality, local leaders and NGO's about their recruitment policy to ensure it is in line with the local practices and tap into existing knowledge. The recruitment policy must set reasonable targets for the employment of local people and women. Mainstream and the municipality should identify these targets before recruitment commences. The definition of "local" must be clarified with the affected stakeholders. Mainstream must provide the local municipality with a list of skills required before the construction period commences, and the municipality must distribute the list to all stakeholders to allow them to prepare for the opportunities. All labour opportunities must be accessed through labour desks in the nearby towns, and no recruitment must be allowed on site. Mainstream must implement mitigation and management measures to ensure that no employee or job applicant is discriminated against based on race, gender, nationality, age, religion, or sexual orientation.

- Where reasonable and practical the contractors appointed by the proponent should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, many skilled posts are likely to be filled by people from outside the area.

- Opportunities for training of workers should be maximised.

- Ways to enhance local community benefits with a focus on broad based BEE need to be explored.

- Local construction companies should be used whenever possible, especially for subcontracting work.

- Local suppliers should be used as far as possible.

- Labour based construction methods should be used whenever practically possible. It is important to follow the principles of the Expanded Public Works Programme and apply effective labour-based construction technologies to increase the job creation effects.

- The use of local labour should be approached in such a manner that large numbers of residents can benefit from this action rather than only a select few.

- While preference to local employees and companies is recommended, it is recognised that a competitive tender process may not guarantee the employment of local labour for the construction phase.

- Benefits to local communities are required to be real and tangible. It is recommended that Mainstream should achieve this through the establishment of a community trust. The final percentage contribution to the trust could only be calculated upon finalisation of the feed-in tariff as part of the Power Purchase Agreement, which is assumed not to be calculated at the time of writing of this report. The trust should be administered by a board that should comprise of a range of representatives including representatives from the local community. The structure and operational objectives of the Community Trust should be determined at the time. It is envisaged that the development objectives/ projects identified and supported by the trust will be identified in collaboration with the local municipality, community representatives and NPOs in the area. Projects should be aligned with key needs as identified in the municipal Integrated Development Plan (IDP) and with input from local NPOs to ensure benefits are locally relevant.

- All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning.

8.2.3 Visual impact and sense of place

Description of impact

Sense of place is defined as an individual's personal relationship with their local environment, both social and natural, which the individual experiences in their everyday daily life (Vanclay et al., 2015). Many things can impact on a person's perception of sense of place. Farms are generally noisy places if one considers animal-sounds and farming activities. From the receptors' perspective, this kind of noise is acceptable and even attractive, because this is what living on a farm is all about. Noises such as alarms and reverse hooters are not "normal" and disturb the sense of place and the value that people place on the auditory environment. Although lights are used as a security measure on farms, one of the things people value is the absence of bright lights and that they can see the stars. Lights for any other use than lightening up their direct environment is seen as invasive and disturbs the sense of place. Visual aspects are an important consideration in the experience of sense of place. If people are used to unspoiled vistas, or seeing open fields, the establishment of any buildings or infrastructure that they feel do not belong there can alter their sense of place. The project will permanently alter the sense of place. Especially in the beginning this impact will be expressed in a severe manner, but as time goes on people will get used to the changing environment and adapt to it.

This impact is essentially relevant to the following phases:

- Construction phase
- Operation phase
- Decommission phase

The **construction phase** will see a total transformation from the current setting and landscape of the proposed sites. It is inevitable that the visual impact during the construction phase will be affected by dust, increase in vehicle traffic and other construction activities. Potential visual impacts caused by construction activities will include the visual changes brought about by clearance of vegetation for the solar arrays, ancillary buildings, and laydown areas; visual disturbance caused by

construction of roads, buildings, energy collectors, power lines, increased traffic (and number of large vehicles), worker presence and activity, and dust emissions. Other visual disturbances may include soil stockpiles (from excavation for building foundations and other structures), soil scars, as well as potential for invasive plant species to develop on disturbed soils and soil stockpiles, which may contrast with existing vegetation.

There are several components of the proposed facilities that will potentially cause visual intrusion on views of sensitive visual receptors in the area during the **operational** lifetime of the facilities. The solar panels will likely be the most significant of these as the area they will cover is large. The modules are designed to absorb the solar radiation and hence are not susceptible to reflection or glinting. Nonetheless, the contrast between the solar arrays and surrounding vegetation will exist, in colour, form, line and texture. Existing vegetation will not provide much screening since it consists mostly of low bushes and shrubs, or grass.

Although there are some smallholdings adjacent to the river, the visual impact for this group will be low to negligible (GYLA, 2021). The following sensitive viewers or viewpoints will be exposed to the solar energy facility:

- Residents from Damlaagte (no one resides on any of the other farms)
- Motorists using the roads in the region

With regards to motorists and residents of Damlaagte, visual exposure and visual intrusion exists. There is no existing vegetation that provide screening to motorists or residents of Damlaagte from the development. However, motorists are more focused on the road than the surrounding landscape. Motorists thus have a lower sensitivity due to short exposure time and the fact that their focus on landscape is reduced. The visual integrity of the area has from a motorist perspective has also been impacted by the existing Scafell Substation and its infrastructure, as well as the existing ESKOM high voltage transmission lines that are present in the area. The residents of Damlaagte don’t have a short exposure time and their property are facing the Ilikwa Solar Facility, which will impact on their current views and sense of place.

There are various actions related to **decommissioning** of the facility that have an impact on sensitive visual receptors. Immediate visual impacts during decommissioning will be like those caused during construction of the facility, but of a much shorter duration. Impacts may include road redevelopment, removal of aboveground structures and equipment, movement and activities of workers, increased traffic, dust emissions and presence of dismantled equipment. Rehabilitation of the decommissioned site could entail grading, scarifying, seeding, and planting. Disturbed and rehabilitated areas may take a long time to recover to pre-project conditions, and contrast between existing and newly planted vegetation may persist many seasons.

Decommissioning and removal of the facilities will include all the structures for PV and buildings and related concrete foundations. Reversibility of the visual impact is therefore moderate to high, keeping in mind that it may take several years for the vegetation to fully recover.

In the case of Damlaagte, the location of the proposed site is however associated with scenic views or views that are highly valued by sensitive viewers for their natural beauty. The effect of decommissioning the plant could have a positive permanent improvement to the visual resources.

Impact mitigation

It is difficult to mitigate the impact on sense of place as it is experienced on a personal level. In general, the mitigation measures suggested in the other relevant specialist studies such as visual, terrestrial ecology and heritage should be adhered to. The relevant specialists will provide scientific mitigation measures for the aspects relevant to their studies. From a social perspective it is important to create a Community Liaison Forum (CLF) that communicates the mitigation and monitoring measures to the affected parties. This forum can also act as a platform to discuss environmental issues. The CLF can meet twice a year to discuss all the concerns about the project and to share new project information. It can be an important aspect assisting Mainstream with obtaining a social license to operate. Sense of place is a personal experience, but successful rehabilitation will go a long way in recreating a rural sense of place. The

public perception would be negative or positive depending on the successful implementation of the rehabilitation after construction. Specific mitigation measures include:

- Dust suppression measures must be implemented when required.
- Residents near the development site should be notified 24 hours prior to any planned activities that will be visible.
- Plant tall trees as barriers to reduce visual intrusion. In this regard consider planting tall trees as barriers along the boundary the proposed solar facility on Proceederfontein 100 Portion 5. A barrier of trees (or other) could also be considered as screens to the highway. Indigenous trees such as Black Karee, Common Wild Currant (Taaibos) or Riverbush Willow (Vaderlandswilg) should be planted before the construction period commence to allow the trees to grow before the operation phase commences.
- Mainstream should demarcate construction boundaries and minimise areas of surface disturbance.
- Construction of new roads should be minimised, and existing roads should be used where possible.
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
- All structures and infrastructure associated with the proposed facilities should be dismantled and transported off-site on decommissioning.
- Rehabilitation of the decommissioned site could entail grading, scarifying, seeding, and planting.

8.2.4 Impact of nuisance factors such as noise, dust, traffic on the quality of living environment

Description of impact

Social impacts experienced in the physical environment relate to exposure to dust, noise, odour, vibration, artificial light etc. The impacts related to the quality of the living environment refer to how appropriate, from a social point of view, the study area is to live in. These impacts relate directly to the biophysical environment and are assessed according to both a perceived and actual dimension. This impact is essentially relevant to the construction phase. Visual impacts on the physical environment are addressed separately in the section above.

Impacts associated with **construction** related activities include noise, dust, an increase in traffic and disruption to adjacent properties. Noise in this regard can be described as any loud, unpleasant, or disagreeable sounds that occur because of demolishing activities, transport and movement and construction.

Site clearing increase the risk of dust being generated, which can in turn impact on adjacent properties. The movement of heavy construction vehicles during construction phase also has the potential to create noise, damage to roads and dust. The primary sources of noise during construction would be from the construction equipment and vehicles. Generation of dust would come from construction activities. Short-term increases in the use of local roads would occur during the construction period. However heavy equipment would most likely remain at the site for the construction period.

In terms of noise impact, the National Noise Regulations define an increase of 7 dB as disturbing. It is therefore advised that noise levels be kept within 7 dB of the baseline ambient noise level during the construction phase. Noise reduction is essential, and contractors must endeavour to limit unnecessary noise, especially loud talking, shouting, whistling, radios, sirens, hooters of vehicles amongst others.

Access to the project site is provided via an unnamed road to the north of the project site, which also routes above the N1 for 4 km in a westerly direction. This unnamed

road connects to the Boundary Road at the Vaal Eden intersection. The access road provides access to the Scafell Substation and some of the farmers in the area use it to access their properties. Stakeholders are concerned about the quality of the roads, which is already not very good, especially if heavy construction vehicles are used. The construction phase will generate significant additional traffic on the roads – just the transport of the workers will mean two trips per day, and then the delivery of construction material and management activities must also be considered. Another concern is the generation of dust. Although the proposed site is far from any communities, it is relatively close to some of the farmers, but the biggest concern is the impact that the dust will have on the quality of the grazing and pecan crops during the dry months.

It is expected that there will be a decrease in the quality of the physical environment during the construction phase. Noise levels, traffic volumes and dust will increase as result of the construction activities.

Impact mitigation

- Dust suppression measures must be implemented when (and if) required.
- The Community Liaison Forum should be utilised to discuss traffic, dust, noise, and other construction related concerns.
- Construction related activities should be limited to workdays (Monday to Friday daylight hours) and the impact on traffic patterns should be mitigated by instating traffic off-peak times.
- Adequate monitoring of the biophysical impacts should occur to address any unnecessary inconveniences to stakeholders.
- Plant tall trees as barriers in public spaces to reduce visual and light intrusion, as well as noise impacts.
- If landowners are currently allowed to use servitude roads to access their properties, they must continue to be allowed to do so.

It is acknowledged that Mainstream will not be the only road user, but it must be considered that their presence will add significant wear and tear to the road. Mainstream must contribute to the maintenance of the roads for the life of the project. This is especially important in the construction phase, where the most severe impacts are expected. This agreement must be formalised between Mainstream and the parties currently responsible for road maintenance. If possible, local service providers must be used for road maintenance and dust suppression activities. Vehicles must be clearly marked, and the necessary road signage must be erected on the affected roads to warn road users about the construction activities and traffic. Mainstream must have a Traffic Management Plan to address the flow of traffic and road safety. Aspects such as speeding, driving while tired, transport of passengers, driving on un-tarred roads and general road safety must be included in the plan and in the induction of workers.

8.2.5 Safety and security

Description of impact

Farm safety is a concern in the rural areas of South Africa. The residents describe the area where the proposed solar facilities will be erected as a crime hotspot due to its proximity to the highway and the fact that many people do not reside on the properties. More people moving around in the area during the **construction phase** will make it easier for opportunistic criminals to enter the area without being noticed. Stock theft is a significant problem in the area. Most of the landowners breed cattle. There is an existing security system consisting of cameras, and some of the livestock also wear security collars linked to cell phone towers. Despite this, there are often security incidents where fences are cut, and cattle are herded towards the highway or hacked. Farmers are concerned that the presence of the construction workers in the area will cause an increase in stock theft, due to people becoming aware of where the stock are kept. On the other hand, they are of the opinion that the presence of the solar facilities during the **operation phase** will increase security in the area and that it will benefit the landowners to have the extra security. During the **decommissioning phase** the security provided by the solar facilities will be removed and this benefit would cease to exist.

Impact mitigation

Mainstream should work with existing farmers' security groups and farmers' associations to create a farm access protocol for everybody that need to access the properties, and a safety plan. Mainstream should also become a member of these forums. Mainstream should give a roster to the directly affected landowners stating dates and approximate times that contractors will be on the farms. Farmers emphasised that they need to know of people accessing the farm ahead of time. It is too late to inform them when entering the property. All access arrangements should be made at least 24 hours before access is required.

Mainstream must meet with the landowners before the construction phase commence and formalise security arrangements. The perimeter of the construction site should be appropriately secured to prevent any unauthorised access to the site; the fencing of the site should be erected before construction commence and maintained throughout the construction period. Security lighting should be implemented. No construction workers other than security services should be allowed to stay on the farms. Construction workers must stay in one of the adjacent towns and be transported to work daily. To minimise the risk of petty crime and violent behaviour, proper procedures such as screening prior to hiring should be undertaken, and proper monitoring procedures should be adhered to during this phase.

All contractors and employees need to wear photo identification cards. Mainstream and its contractors must develop an induction programme that includes a Code of Conduct for all workers (including sub-contractors). Any person that does any work on site must sign the Code of Conduct and presented with a copy. The Code of Conduct must include the following aspects:

- Respect for residents, their customs and property.
- Respect for farm infrastructure and agricultural activities.
- No hunting or un-authorised taking of products or livestock.

- Zero tolerance of illegal activities by construction personnel including: prostitution; illegal sale or purchase of alcohol; sale, purchase, or consumption of drugs; illegal gambling or fighting.

- Compliance with the Traffic Management Plan and all road regulations; and

- Description of disciplinary measures for violation of the Code of Conduct and company rules.

If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal. Stock theft should be noted as a dismissible offence.

Vehicles should be marked as construction vehicles and should have Mainstream or the contractor's logo clearly exhibited. Entry and exit points of the site should be controlled. Areas where materials are stockpiled must be fenced, or suitably bunded with appropriate barriers. If a security company is used, their schedules should be communicated to the landowners.

No unauthorised entry to the site is to be allowed; access control and a method of identification of maintenance personnel must always be required for the duration of the project life cycle.

8.2.6 Impact on residents in closest urban areas

Description of impact

The safety concerns in the towns closest to the construction site include social ills such as prostitution, relationships with minors, alcohol and drug abuse, gambling and fighting due to the presence of people from outside the area. The magnitude of these impacts varies depending on the size of the town and the number of construction workers living in the town near each other – in the smaller town of Parys impacts might be felt more intensely. Many of the people in town are poor and depend on social grants to survive, and the project will introduce people who have more money

available. While there are definite benefits, which are discussed under the economic impacts, there are also potential threats and social disturbance.

A massive influx of people is not expected, since there should be some skilled labour in the area. It is not expected that there will be a significant impact on basic services such as schools, health care, sanitation, and other municipal services, due to the fact that a small number of temporary workers will enter the area for a limited period.

Impact mitigation

Mainstream and its contractors must develop an induction programme that includes a Code of Conduct for all workers (including sub-contractors). The induction programme must include HIV/AIDS awareness programmes, education on tuberculosis, alcohol and substance abuse. Any person that does work on site must sign the Code of Conduct and presented with a copy. The Code of Conduct must include the following aspects:

- Respect for residents, their customs and property.
- Respect for farm infrastructure and agricultural activities.
- No hunting or un-authorised taking of products or livestock.
- Zero tolerance of illegal activities by construction personnel including: relationships with minors; prostitution; illegal sale or purchase of alcohol; sale, purchase, or consumption of drugs; illegal gambling or fighting.
- Compliance with the Traffic Management Plan and all road regulations; and
- Description of disciplinary measures for violation of the Code of Conduct and company rules.

If workers are found to be in contravention of the Code of Conduct, which they will be required to sign at the beginning of their contract, they will face disciplinary procedures that could result in dismissal.

The movement of construction workers on and off the site should be closely managed and monitored by the contractors. In this regard the contractors should be responsible for making the necessary arrangements for transporting workers to and from site daily. The contractor should make necessary arrangements to enable workers from outside the area to return home over weekends and or on a regular basis during the construction phase. This would reduce the risk posed by non-local construction workers to local family structures and social networks. The contractor should make the necessary arrangements for ensuring that all non-local construction workers are transported back to their place of residence once the construction phase is completed.

Stock theft should be noted as a dismissible offence. Mainstream must also establish a grievance mechanism and appoint a community liaison officer that the community can access easily. The grievance mechanism must be communicated to the affected communities.

8.2.7 Impact on agricultural activities (waste, water, grazing, fire)

Description of impact

The proposed sites are situated in a rural area on cattle farms. The sites are currently used mostly for grazing purposes. The construction of solar electricity generating facilities and its associated infrastructure will lead to a change of land use. The areas available for grazing will be less if the projects are implemented. In addition, changing the land use may have tax implications for the farmers, as industrial land uses are taxed higher than agricultural land uses.

The effects on the farmland would however not represent a loss in production and would not lead to a reduction in the permanent workforce of any of the farms. Damlaagte is the only farm where farm workers reside, but only during the week. The solar energy facilities will be created on portions of each of the farms while the remaining land not affected by the footprint continues with farming production.

During the **construction phase** the movement of workers and vehicles on the site could cause damage to farm infrastructure (e.g., fencing, water troughs and gates). There is also a risk of stock loss due to farm gates being left open, or not being closed

properly by construction teams. Another risk is that cattle or livestock can ingest some waste material, especially plastic, which could cause fatalities.

All the farm portions earmarked for the solar facilities have boreholes on them. Currently this water is used for livestock. Farmers are concerned that there would not be enough water left for their livestock should the solar facilities need huge amounts of water from these boreholes.

Veld fires are an existing problem in the area, especially during the drier winter months. There is an active and effective fire fighter's association in the area – the Vaal-Eden Fire Fighters Association. The affected farmers all feel very strongly that Mainstream must join their fire fighter's association and adhere to the rules.

During the **operation** phase there should be less movement and the water requirements should be settled. It is important for Mainstream to remain part of the Vaal-Eden Fire Fighters Association during this phase. Some farmers mentioned the possibility of using the grazing on parts of the site not used for the solar panels, but in the end the conclusion was that it would probably safer and more practical if no grazing will be allowed to protect the structures against the livestock, and the farmers against potential damage claims.

Impact mitigation

While it is true that the landowners will lose productive grazing areas, it must be considered that they will be compensated for the use of the land through a commercial transaction with Mainstream. If any long grass or vegetation must be cut for maintenance the farmers must be given the option to utilise the grass for their livestock.

Mainstream must ensure effective waste management on the site during construction and operation, especially with regards to plastic waste or anything that is poisonous to the livestock. They must ensure that open fires on the site for heating, smoking, or cooking are not allowed except in designated areas.

If any damage to farm infrastructure or stock losses occurs, Mainstream must compensate the affected landowner for his losses. Mainstream must develop a grievance mechanism and a complaints procedure that allows the landowners to log their grievance and submit a claim for damages. The construction teams must be educated about the impact of damages to fences, water troughs and gates on the activities of the farmers through toolbox talks. Inspections of boundary fences and gates should be done daily in areas where there are activities.

Water use must be negotiated with the farmers and written into their contracts with Mainstream. During a drought water for livestock must be prioritised.

Mainstream must join the Vaal-Eden Fire Fighters Association and adhere to their rules. They must become active members of the fire fighter's association. Safety at and around the site should be ensured by limiting any fire risks, fencing off the site to avoid unauthorised access and employing security personnel. The security must be provided with adequate firefighting equipment on site and be provided with firefighting training.

8.2.8 Generation of renewable energy

Description of impact

South Africa are under immense pressure nationally and internationally due to its carbon footprint. South Africa's carbon emissions are higher than those of most developed countries partly because of the energy-intensive sectors which rely heavily on low quality coal. Use of low-quality coals is the main contributor of GHG emissions. The energy-intensive sectors of the economy emit carbon emissions that are higher than those of most developed economies.

The use of solar radiation for power generation is considered a non-consumptive use of a natural resource which produces zero greenhouse gas emissions. The advancement of renewable energy is a priority for South Africa. The government considers the use of renewable energy as a contribution to sustainable development. The benefits of photovoltaics tend to far outweigh risks especially when compared to conventional fossil fuel technologies. Photovoltaics generate significantly fewer

harmful air emissions per kilowatt-hour (kWh) than conventional fossil fuel fired technologies. Furthermore, renewable resources generally operate from an unlimited resource base and, as such, can increasingly contribute towards a long-term sustainable energy future.

The support for renewable energy policy is guided by a rationale that South Africa has a very attractive range of renewable resources, particularly solar and wind and that renewable applications are in fact the least cost energy service and mostly also better when social and environmental costs are considered.

South Africa relies heavily on non-renewable fossils fuels (primarily coal) for energy generation purposes. National and International pressure regarding global warming and environmental impacts associated with 'dirty' fuels and energy security have elevated renewable energy solutions to a far more prominent position both within energy policy and in the economic development arena.

Nationally, the country is currently facing considerable constraints in the availability and stability of electricity supply. This is a consequence of South Africa's electricity generation and supply system being overstretched. The project therefore has the potential to contribute to greater energy supply stability, and higher levels of energy security which will benefit electricity consumers. The proposed project will generate renewable energy that will feed into the national electricity grid. This is in line with the National Development Plan and sustainable development. As such it is a positive impact.

Impact mitigation/enhancement

This is a positive impact, and no mitigation is required. Local benefits will enhance the positive effects.

8.2.9 Cumulative impacts

Most social impacts will take place in the communities closest to the proposed development – Parys, Sasolburg, Vereeniging and Vanderbijlpark – and in the farming community that resides close to the project site. There are no other solar projects close-by, but the Vaal Triangle which is an industrial hub is in the area. Movement in

and out of the area are routine. There are also some sand mines along the Vaal River. The most significant impact of the mines reported by community members is on the quality of the road infrastructure and the communities think that most of the mines operate illegally. Scafell Substation with its associated infrastructure and powerlines are already established adjacent to the proposed sites. There is therefore an existing visual impact, and impacts associated with substation maintenance. There are existing servitude roads and access arrangements. It must be acknowledged that it is almost impossible for the proponent to control the cumulative social impacts in the neighbouring towns. Therefore, it is important that the proponent have a good working relationship with the local authorities, and landowners and that they mitigate the impacts that they can control, as suggested in the Social Impact Management Plan (SIMP). Implementing a Corporate Social Responsibility strategy (see Section 8) will also assist with mitigating and managing cumulative impacts in the broader community.

8.2.10 Impact Ratings

It must be noted that the impact ratings used for this report is not suitable for rating the social impacts as they do not provide an accurate reflection of the consequence and significance of the social impacts. The tables would for example indicate the significance of an impact as low, where it is in fact high from a social perspective. The tables below give the impact ratings and a summary of the impacts. Where the consequence and significance differ from a social perspective, it is indicated as such.

Table 12: Summary of impact ratings for the Damlaagte Solar PV Facility and Grid Connection

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Pre-construction										
Local and national economic opportunities	Low	Short term	Regional	Definite	High	High	Low	Irreversible	Very low	Very low
Construction										
Local and national economic opportunities	High	Short term	National	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Short term	Regional	Definite	High	High	Low	Irreversible	Low (High from a social persective)	Low (High from a social perspective) Positive
Visual impacts and sense of place	High	Short term	Local	Definite	Medium	Low	Medium	Partially reversible	Low (Medium from a social perspective)	Low (Medium from a social perspective)

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Medium	Short term	Local	Definite	Medium	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)
Safety and security (crime)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (Medium from a social perspective)
Impact on residents in closest urban areas	Medium	Short term	Regional	Possible	Medium	Low	Low	Partially reversible	Low	Very low (Low from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)
Operation										
Local and national economic	Medium	Long term	Regional	Definite	High	High	Low	Irreversible	High (Very high from a	High (Very high from a

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
opportunities									social perspective)	social perspective) Positive
Employment and skills transfer	Medium	Long term	Local	Probable	High	High	Low	Irreversible	Medium (High from a social perspective)	Medium (High from a social perspective) Positive
Visual impacts and sense of place	High	Long term	Local	Definite	Medium	Low	Medium	Partially reversible	High (Medium from a social perspective)	High (Medium from a social perspective)
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Low	Long term	Local	Possible	Low	High	Low	Partially reversible	Low (Medium from a social perspective)	Very low (Medium from a social perspective)
Safety and security (crime)	High	Long term	Local	Definite	High	High	Low	Partially reversible	High	High (Very high from a social perspective) Positive

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Long term	Local	Possible	Medium	Medium	Low	Partially reversible	Medium (Low from a social perspective)	Low
Development of clean renewable energy	High	Long term	National	Definite	High	High	Low	Partially reversible	Very high	Very high Positive
Decommissioning										
Employment and skills transfer	Low	Short term	Local	Probable	Medium	High	Low	Irreversible	Very low (Low from a social perspective)	Very low (Medium from a social perspective) Positive
Visual impacts and sense of place	Low	Short term	Local	Definite	High	High	Low	Fully reversible	Very low (High from a social perspective)	Very low (High from a social perspective)
Impact of nuisance factors such as noise, dust, traffic	Medium	Medium term	Local	Probable	Medium	Medium	Low	Partially reversible	Low (Medium from a social perspective)	Low (Medium from a social perspective)

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
on the quality of living environment										
Safety and security (crime)	Medium	Short term	Local	Probable	Medium	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (High from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	Medium	Medium	Low	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Table 13: Summary of impact ratings of the Scafell Solar PV Facility and Grid Connection

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Pre-construction										
Local and national economic opportunities	Low	Short term	Regional	Definite	High	High	Low	Irreversible	Very low	Very low
Construction										
Local and national economic opportunities	High	Short term	National	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Short term	Regional	Definite	High	High	Low	Irreversible	Low (High from a social persective)	Low (High from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of	Medium	Short term	Local	Definite	Medium	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
living environment										
Safety and security (crime)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (Medium from a social perspective)
Impact on residents in closest urban areas	Medium	Short term	Regional	Possible	Medium	Low	Low	Partially reversible	Low	Very low (Low from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)
Operation										
Local and national economic opportunities	Medium	Long term	Regional	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Long term	Local	Probable	High	High	Low	Irreversible	Medium (High from a social	Medium (High from a social

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
									perspective)	perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Low	Long term	Local	Possible	Low	High	Low	Partially reversible	Low (Medium from a social perspective)	Very low (Medium from a social perspective)
Safety and security (crime)	High	Long term	Local	Definite	High	High	Low	Partially reversible	High	High (Very high from a social perspective) Positive
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Long term	Local	Possible	Medium	Medium	Low	Partially reversible	Medium (Low from a social perspective)	Low
Development of clean renewable energy	High	Long term	National	Definite	High	High	Low	Partially reversible	Very high	Very high Positive

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Decommissioning										
Employment and skills transfer	Low	Short term	Local	Probable	Medium	High	Low	Irreversible	Very low (Low from a social perspective)	Very low (Medium from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Medium	Medium term	Local	Probable	Medium	Medium	Low	Partially reversible	Low (Medium from a social perspective)	Low (Medium from a social perspective)
Safety and security (crime)	Medium	Short term	Local	Probable	Medium	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (High from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	Medium	Medium	Low	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Table 14: Summary of impact ratings of the Vlakfontein Solar PV Facility and Grid Connection

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Pre-construction										
Local and national economic opportunities	Low	Short term	Regional	Definite	High	High	Low	Irreversible	Very low	Very low
Construction										
Local and national economic opportunities	High	Short term	National	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Short term	Regional	Definite	High	High	Low	Irreversible	Low (High from a social persective)	Low (High from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of	Medium	Short term	Local	Definite	Medium	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
living environment										
Safety and security (crime)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (Medium from a social perspective)
Impact on residents in closest urban areas	Medium	Short term	Regional	Possible	Medium	Low	Low	Partially reversible	Low	Very low (Low from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)
Operation										
Local and national economic opportunities	Medium	Long term	Regional	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Long term	Local	Probable	High	High	Low	Irreversible	Medium (High from a social	Medium (High from a social

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
									perspective)	perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Low	Long term	Local	Possible	Low	High	Low	Partially reversible	Low (Medium from a social perspective)	Very low (Medium from a social perspective)
Safety and security (crime)	High	Long term	Local	Definite	High	High	Low	Partially reversible	High	High (Very high from a social perspective) Positive
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Long term	Local	Possible	Medium	Medium	Low	Partially reversible	Medium (Low from a social perspective)	Low
Development of clean renewable energy	High	Long term	National	Definite	High	High	Low	Partially reversible	Very high	Very high Positive

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Decommissioning										
Employment and skills transfer	Low	Short term	Local	Probable	Medium	High	Low	Irreversible	Very low (Low from a social perspective)	Very low (Medium from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Medium	Medium term	Local	Probable	Medium	Medium	Low	Partially reversible	Low (Medium from a social perspective)	Low (Medium from a social perspective)
Safety and security (crime)	Medium	Short term	Local	Probable	Medium	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (High from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	Medium	Medium	Low	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Table 15: Summary of impact ratings of the Ilikwa Solar PV Facility and Grid Connection

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Pre-construction										
Local and national economic opportunities	Low	Short term	Regional	Definite	High	High	Low	Irreversible	Very low	Very low
Construction										
Local and national economic opportunities	High	Short term	National	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Short term	Regional	Definite	High	High	Low	Irreversible	Low (High from a social persective)	Low (High from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of	Medium	Short term	Local	Definite	Medium	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
living environment										
Safety and security (crime)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (Medium from a social perspective)
Impact on residents in closest urban areas	Medium	Short term	Regional	Possible	Medium	Low	Low	Partially reversible	Low	Very low (Low from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	High	Medium	Medium	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)
Operation										
Local and national economic opportunities	Medium	Long term	Regional	Definite	High	High	Low	Irreversible	High (Very high from a social perspective)	High (Very high from a social perspective) Positive
Employment and skills transfer	Medium	Long term	Local	Probable	High	High	Low	Irreversible	Medium (High from a social	Medium (High from a social

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
									perspective)	perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Low	Long term	Local	Possible	Low	High	Low	Partially reversible	Low (Medium from a social perspective)	Very low (Medium from a social perspective)
Safety and security (crime)	High	Long term	Local	Definite	High	High	Low	Partially reversible	High	High (Very high from a social perspective) Positive
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Long term	Local	Possible	Medium	Medium	Low	Partially reversible	Medium (Low from a social perspective)	Low
Development of clean renewable energy	High	Long term	National	Definite	High	High	Low	Partially reversible	Very high	Very high Positive

Impact	Intensity	Duration	Extent	Probability	Confidence	Mitigatability	Loss of resource	Reversibility	Consequence	Significance
Decommissioning										
Employment and skills transfer	Low	Short term	Local	Probable	Medium	High	Low	Irreversible	Very low (Low from a social perspective)	Very low (Medium from a social perspective) Positive
Impact of nuisance factors such as noise, dust, traffic on the quality of living environment	Medium	Medium term	Local	Probable	Medium	Medium	Low	Partially reversible	Low (Medium from a social perspective)	Low (Medium from a social perspective)
Safety and security (crime)	Medium	Short term	Local	Probable	Medium	Medium	Medium	Partially reversible	Very low (High from a social perspective)	Very low (High from a social perspective)
Impact on agricultural activities (waste, water, grazing, fire)	Medium	Short term	Local	Probable	Medium	Medium	Low	Partially reversible	Very low (Medium from a social perspective)	Very low (Medium from a social perspective)

8.2.11 Assessment of Alternatives

For the proposed Scafell Cluster Project, it is understood that Mainstream will consider location / site alternatives for the placement of the grid connection infrastructure, and the use of various technology alternatives for the PV panel modules, mounting structures and the BESS. From a social perspective, the technically preferred alternative for the grid connection corridor for each solar PV facility is acceptable, as the alternatives follow existing transmission lines within the study area. Selection of the preferred grid connection corridor will not pose additional and significant social impacts that were not identified in this Report. The preferred technology options for each solar PV facility are preferred as the selection of the preferred technology options for the PV panel modules, panel type, mounting technologies and the BESS will not pose additional and significant social impacts that were not identified in this report. Therefore, from a social perspective, the technically preferred site / location and technology alternatives for the Scafell Cluster Project are acceptable and should be authorised by the relevant Competent Authority.

8.3 Mitigation measures

The list below represents a summary of the mitigation measures that are discussed in more detail per impact in Section 8.2:

- Adopt a local procurement policy to maximise the benefit to the local economy.
- Liaise with the Local Economic Development section of the municipality, local leaders and NGO's about their recruitment policy to ensure it is in line with the local practices and tap into existing knowledge. The recruitment policy must set reasonable targets for the employment of local people and women.
- Create a Community Liaison Forum that communicates the mitigation and monitoring measures to the affected parties. It should also be utilised to discuss traffic, dust, noise, and other construction related concerns.
- Dust suppression measures must be implemented when required.
- Residents near the development site should be notified 24 hours prior to any planned activities that will be visible.
- Mainstream should demarcate construction boundaries and minimise areas of surface disturbance.
- Construction of new roads should be minimised, and existing roads should be used where possible.
- Night lighting of the construction sites should be minimised within requirements of safety and efficiency.
- All structures and infrastructure associated with the proposed facilities should be dismantled and transported off-site on decommissioning.
- Rehabilitation of the decommissioned site could entail grading, scarifying, seeding, and planting.

- Adequate monitoring of the biophysical impacts should occur to address any unnecessary inconveniences to stakeholders.

- Plant tall trees as barriers in public spaces to reduce visual and light intrusion, as well as noise impacts.

- If landowners are currently allowed to use servitude roads to access their properties, they must continue to be allowed to do so.

- Work with existing farmers' security groups and farmers' associations to create a farm access protocol for everybody that need to access the properties, and a safety plan. Mainstream should give a roster to the directly affected landowners stating dates and approximate times that contractors will be on the farms.

- Develop an induction programme that includes a Code of Conduct for all workers (including subcontractors).

- Ensure effective waste management on the site during construction and operation, especially with regards to plastic waste or anything that is poisonous to the livestock.

- Do not allow open fires on the site for heating, smoking, or cooking are not allowed except in designated areas.

- Develop grievance mechanism and complaints procedure that allows the landowners to log their grievance and submit a claim for damages.

- Water must be negotiated with the farmers and written into their contracts with Mainstream. During a drought water for livestock must be prioritised.

- Mainstream must join the Vaal-Eden Fire Fighters Association and adhere to their rules.

- Adhere to the mitigation measures of other relevant specialist studies such as visual, terrestrial ecology, and heritage to mitigate the social components of biophysical impacts.

8.4 Social Impact Management Plan

The table below presents the social impact management plan that is suggested for the life of the project. The social impact management plan does not replace the social mitigation measures but must be implemented in addition to the suggested mitigation measures.

Table 16: Social impact management plan

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
Planning and Design Phase	Develop social impact management plan	As soon as project enters public domain	Applicant	CLO *Internal once appointed* Social expert *External but not legally required*
	Appoint appropriately qualified Community Liaison Officer (CLO) to deal with	Before consultation with stakeholders start (excluding EIA consultation)	Applicant	Not required apart from usual HR processes

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
	social aspects of the project throughout the life of the project		Appointment for the life of the project	
	Develop community relations strategy	Before consultation with stakeholders start (excluding EIA consultation)	Applicant Continued for the life of project	CLO *Internal (Once off)* *No external review required*
	Develop safety plan, access protocols, grievance mechanism and compensation policy	In consultation with stakeholders	Applicant Continued for the life of project	CLO *Internal (Once off)* *No external review required*
Construction Phase	Monitoring of social mitigation and management measures	Throughout construction	Applicant (CLO)	Management *Once a year or as required*

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
			Continued for the life of project	
	Implementation of community relations strategy	Throughout construction	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*
	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout construction	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*
Operation Phase	Monitoring of social mitigation and management measures	Throughout operation	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
	Implementation of community relations strategy	Throughout operation	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*
	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout operation	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*
Decommissioning, Closure and Rehabilitation Phase	Implement safety plan, access protocols, grievance mechanism and compensation policy	Throughout decommissioning until all rehabilitation activities have ceased	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*
	Continue community relations strategy until all	Throughout decommissioning until all	Applicant (CLO)	Management *Once a year or as required*

Phase	Management action	Timeframe for implementation	Responsible party for implementation (frequency)	Responsible party for monitor/audit/review (frequency)
	activities on site cease and rehabilitation is completed	rehabilitation activities have ceased	Continued for the life of project	
	Implement social mitigation for closure	Throughout decommissioning	Applicant (CLO) Continued for the life of project	Management *Once a year or as required*

9 Recommendations regarding Corporate Social Responsibility Projects (CSR)

Corporate Social Responsibility (CSR) is a form of corporate self-regulation incorporated into a business model. CSR policy functions as a built-in, self-regulating mechanism whereby a business monitors and ensures its active compliance with the spirit of the law, ethical standards, and international norms. Through the RFP document the Department of Mineral Resources and Energy (DMRE), requires that all renewable energy bidders must illustrate how the project will benefit the local community. This must be done through:

- Enterprise development; and
- Socio-economic development.

When considering potential projects to invest in, Mainstream should keep in mind that social development is a long-term process, and not something that can be achieved in a couple of years. The recommendation is therefore that Mainstream identifies a sustainable project that they can be involved with and grow throughout the life of their project. Given that enterprise and socio-economic development are not the core business of Mainstream, the best option is to liaise with a local NGO/NPO that have the expert knowledge on how to implement these kinds of projects. This will ensure that money and resources are not wasted but used optimally from the start of the project.

10 Social No-go Option

The impacts of pursuing the No-go Option are both positive and negative as follows:

- The benefits would be that there is no change in status quo in terms of the negative impacts described above during all project phases which would be experienced by neighbours, society, and the landscape – namely through disruption, noise, visual, road safety, and tourism impacts. The impact is therefore neutral.

- There would be an opportunity loss in terms of contributing to the renewable energy targets nationally. The impact is therefore negative.

- There would also be an opportunity loss in terms of job creation, skills development and associated economic multipliers for the local economy. The impact is therefore negative.

In short, the no-go development option would represent a lost opportunity for South Africa to supplement its current energy needs with clean, renewable energy. Given South Africa's position as one of the highest per capita producer of carbon emissions in the world, this would represent a high negative social cost. Foregoing the proposed solar PV energy facilities would not necessarily compromise the development of renewable energy facilities in South Africa. However, the socio-economic benefits for local communities and the Ngwathe Local Municipality would be forfeited.

11 Stakeholder Engagement Plan

Social impacts already start in the planning phase of a project and as such it is imperative to start with stakeholder engagement as early in the process as possible. A stakeholder engagement plan will assist Mainstream to outline their approach towards communicating in the most efficient way possible with stakeholders throughout the life of the project. Such a plan cannot be considered a once off activity and should be updated on a yearly basis to ensure that it stays relevant and to capture

new information. Stakeholders must provide input in the Stakeholder Engagement Plan.

The Mainstream Stakeholder Engagement Plan should have the following objectives:

- To identify and assess the processes and/or mechanisms that will improve the communication between local communities, the wider community and Mainstream. The definition of local need to be defined by Mainstream with input from the stakeholders when they develop their stakeholder engagement plan.

- To improve relations between Mainstream staff and the people living in the local communities.

- To provide a guideline for the dissemination of information crucial to the local communities in a timely, respectful, and efficient manner.

- To provide a format for the timely recollection of information from the local communities in such a way that the communities are included in the decision-making process.

The Stakeholder Engagement Plan should be compiled in line with International Finance Corporation (IFC) Guidelines and should consist of the following components:

- Stakeholder Identification and Analysis – time should be invested in identifying and prioritising stakeholders and assessing their interests and concerns.

- Information Disclosure – information must be communicated to stakeholders early in the decision-making process in ways that are meaningful and accessible, and this communication should be continued throughout the life of the project.

- Stakeholder Consultation – each consultation process should be planned out, consultation should be inclusive, the process should be documented, and follow-up should be communicated.

- Negotiation and Partnerships – add value to mitigation or project benefits by forming strategic partnerships and for controversial and complex issues, enter good faith negotiations that satisfy the interest of all parties.

- Grievance Management – accessible and responsive means for stakeholders to raise concerns and grievances about the project must be established throughout the life of the project.

- Stakeholder Involvement in Project Monitoring – directly affected stakeholders must be involved in monitoring project impacts, mitigation, and benefits. External monitors must be involved where they can enhance transparency and credibility.

- Reporting to Stakeholders – report back to stakeholders on environmental, social, and economic performance, both those consulted and those with more general interests in the project and parent company.

- Management Functions – sufficient capacity within the company must be built and maintained to manage processes of stakeholder engagement, track commitments and report on progress.

It is of critical importance that stakeholder engagement takes place in each phase of the project cycle and it must be noted that the approach will differ according to each phase. The stakeholder analysis done in Section 6 of this report must inform the stakeholder engagement strategy.

12 Proposed Grievance Mechanism

In accordance with international good practice Mainstream should establish a specific mechanism for dealing with grievances. A grievance is a complaint or concern raised by an individual or organisation that judges that they have been adversely affected by the project during any stage of its development. Grievances may take the form of specific complaints for actual damages or injury, general concerns about project activities, incidents and impacts, or perceived impacts. The IFC standards require

Grievance Mechanisms to provide a structured way of receiving and resolving grievances. Complaints should be addressed promptly using an understandable and transparent process that is culturally appropriate and readily acceptable to all segments of affected communities and is at no cost and without retribution. The mechanism should be appropriate to the scale of impacts and risks presented by a project and beneficial for both the company and stakeholders. The mechanism must not impede access to other judicial or administrative remedies.

The grievance mechanism should be based on the following principles:

- Transparency and fairness.
- Accessibility and cultural appropriateness.
- Openness and communication regularity.
- Written records.
- Dialogue and site visits; and
- Timely resolution.

Based on the principles described above, the grievance mechanism process involves four stages:

- Receiving and recording the grievance.
- Acknowledgement and registration.
- Site inspection and investigation; and
- Response.

The Grievance Mechanism should be communicated to all stakeholders.

13 Need and desirability

The proposed development provides a significant source of additional income while introducing relatively minimal risks with adequate mitigation. Minimal negative impacts are anticipated on surrounding farms as all activities and production will be able to continue as at present.

Herewith a summary of responses to need and desirability components for the proposed solar energy project:

- The development is in line with priorities contained in the IDP and SDF of the area and the development of a diversified, renewable energy source appears to address the need for greater energy supply from non-renewables.

- Given the energy crisis being faced, the development should occur at the proposed site at this point in time as it is ideally located to feed into the grid at the Scafell Main Transmission Substation.

- The local area needs the activity as it will generate additional employment and knock-on effect to businesses. The local policy documents also highlight the need for renewable energy production.

- The necessary services with adequate capacity are currently available (at time of application), so no additional capacity needs to be created to cater for the development.

- The proposed development is not provided for in the infrastructure planning of the municipality, but there is no anticipated negative impact on municipal infrastructure.

- The development will assist with an issue of national concern, namely non-renewable energy production. The National Integrated Resource Plan for Electricity (IRP2) (2011) suggests that 42 % of national energy supply must come from renewable energy sources between 2010 and 2030.

- The location factors that favour this land use include high solar resources, flat topography requiring very little excavation work, landowner consent obtained, nearby the grid, opportunity for economic upliftment of the local communities.

- The development will impact on people's health and wellbeing in terms of noise, odours, visual character, and sense of place. During construction of the solar facility noise and dust emissions might occur due to the transport of material and workers to/from the site, however this issue will be of temporary duration. This will specifically be relevant for nearby residents on Damlaagte. During the operation phase the solar facility would not generate any noise, odours, emissions, or significant fire risks. Furthermore, socio-economic benefits are likely to result from the development of the solar energy facility such as creation of jobs and regional economic development. The presence of the solar field in a rural landscape might be perceived by some as visually intrusive or disturbing and subsequently as a negative visual impact.

- The proposed activity will not result in unacceptable opportunity costs as the solar energy facilities can be dismantled and completely removed from the land in question and do not permanently prevent alternative land-uses on the proposed site post operation.

- The proposed land use will not result in unacceptable cumulative impacts.

14 Conclusions and recommendations

The aim of this report is to identify potential social impacts associated with the proposed establishment of a solar electricity generation facility and associated infrastructure. The project will have a positive economic impact in the rural area. None of the potential negative social impacts are severe, and all the impacts can be mitigated. The proposed development is unlikely to result in any permanent damaging social impacts. Positive impacts could be enhanced by implementing appropriate enhancement measures and through careful planning.

Based on the social assessment, the following general conclusions and findings can be made:

- The potential negative social impacts associated with the construction phase are typical of construction related projects and not just focussed on the construction of PV facilities (these relate to influx of non-local workforce and jobseekers, intrusion and disturbance impacts, safety, and security) and could be reduced with the implementation of the mitigation measures proposed.

- New business sales and employment opportunities will be created in the construction and operation phase and the impact are rated as positive even if only relatively few individuals benefit in this regard.

- The proposed project could assist the local economy in creating entrepreneurial development, especially if local business could be involved in the provision of general material and services during the construction and operational phases. Capacity building and skills training among employees are critical and would be highly beneficial to those involved, especially if they receive portable skills to enable them to also find work elsewhere and in other sectors.

- The proposed development also represents an investment in infrastructure for the generation of clean, renewable energy, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

- When considering the overall costs and benefits of the project it is found that the latter is more prominent allowing for the achievement of a net benefit. With respect to risks and negative impacts, these should prove relatively low with mitigation.

Based on the conclusions and findings of this study, the following key recommendations are made:

- Mitigation about safety and security must be implemented as soon as construction commences. The process must involve local security groups and landowners.

- A Community Liaison Officer that is trusted by the community and has the necessary skills and education must be appointed before construction commences.

- Protocols on farm access, compensation, communication, and road maintenance must be agreed upon and be in place before construction commences.

- A grievance mechanism and claims procedure must be in place and shared with all the stakeholders before the construction commences; and

- Economic benefits must be enhanced, and local labour and procurement should be prioritised.

None of the social impacts identified are so severe that the project should not continue. It is therefore recommended that the proposed projects are supported, subject to the implementation of the recommended enhancement and mitigation measures contained in the report. In terms of the potential social impacts arising from the project, it is found that there is no obvious reason for the competent authority to reject the application on social grounds.

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