



ANNEXURE D:
Supporting Studies, Reports and Letters of Support



NEMA Applicability Confirmation



REFERENCE: 16/3/3/6/1/F5/16/2080/24

DATE: 11 JULY 2024

The Board of Directors
Zero Carbon Charge
P. O. Box 671

VREDENDAL
8160

For Attention: Mr. Joubert Roux

Tel.: (027) 213 2431

E-mail: joubert@zerocc.co.za

Dear Sir

APPLICABILITY OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) ("NEMA") AND THE ENVIRONMENTAL IMPACT ASSESSMENT ("EIA") REGULATIONS, 2014 (AS AMENDED) FOR THE PROPOSED DEVELOPMENT OF AN ELECTRIC VEHICLE ("EV") CHARGING FACILITY, SOLAR PHOTOVOLTAIC ("PV") PLANT, FARM STALL AND ASSOCIATED INFRASTRUCTURE ON THE REMAINDER OF THE FARM NO. 1043, MALMESBURY

1. The Applicability Checklist and the supporting documentation, received by this Directorate via electronic mail correspondence on 28 May 2024, and the additional information received by this Directorate via electronic mail correspondence on 8 July 2024, refer.
2. This serves to confirm the applicability of the EIA Regulations, 2014 (as amended) with respect to the proposed development of an Electric Vehicle ("EV") Charging Facility, Solar Photovoltaic ("PV") Plant, farm stall and associated infrastructure on the Remainder of the Farm No. 1043, Malmesbury.
3. This Directorate has reviewed the checklist and based on the information provided, notes that the proposed development, with a development footprint of approximately 9781.24m², comprises of a solar PV energy generation plant, an EV charging infrastructure, including energy storage batteries, a parking area, an access road, a farm stall, the installation of a conservancy tank and associated infrastructure.
4. Based on the information contained in the Applicability Checklist and the supporting documentation as well as available mapping/GIS tools, the following is noted:
 - 4.1. The proposed site is zoned Agriculture 1 and is deemed to be located outside an Urban Area.
 - 4.2. There are no watercourses, including wetlands, on the site or within 32m of the site.
 - 4.3. The Solar PV facility will generate less than 10MW of electricity, with the transmission line being less than 2km in length with a capacity of 1kV.
 - 4.4. According to the available mapping tools, the site contains Saldanha Flats Strandveld, categorised as an Endangered ecosystem in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) ("NEM:BA"), List of Threatened

Ecosystems in Need of Protection, November 2022. The site has been transformed by agricultural activities. Consequently, no indigenous vegetation will be cleared on the site.

5. In light of the above, this Directorate is of the opinion that the proposed development of an Electric Vehicle ("EV") Charging Facility, Solar Photovoltaic ("PV") Plant, farm stall and associated infrastructure on the Remainder of the Farm No. 1043, Malmesbury will not trigger any Listed Activities in terms of the EIA Regulations, 2014 (as amended).
6. Written Environmental Authorisation **will not be required** from the Competent Authority (in this instance, this Directorate), prior to the proposed development being commenced with on the proposed site.
7. However, should the proposed development be amended in a manner that may constitute one or more Listed Activities, as defined in Listing Notices 1, 2 or 3 of the EIA Regulations, 2014 (as amended), an application for Environmental Authorisation must be submitted to the Competent Authority and Environmental Authorisation obtained for the applicable Listed Activity(ies) prior to the proposed development being commenced with on the proposed site.
8. Please note that it is the applicant's responsibility to ensure that all statutory requirements relevant to the proposal are met.
9. You are reminded of the general 'Duty of Care' towards the environment in terms of Section 28(1) of the NEMA, which states that –

"Every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment."
10. It is prohibited in terms of the NEMA to commence with a Listed Activity without a relevant Environmental Authorisation from the Competent Authority. Non-compliance in terms of the prohibition will be referred to the Department's Directorate: Environmental Law Enforcement for possible prosecution. The penalty for a person convicted of an offence in terms of the above is a fine not exceeding R10 000 000 or imprisonment for not more than 10 years, or both such fine and such imprisonment.
11. Kindly quote the abovementioned reference number in any future correspondence regarding the development proposal.
12. This Directorate reserves the right to revise or withdraw its comments and request further information from you based on any information received.

Your interest in the future of the environment is greatly appreciated.

Yours faithfully

pp MR. ZAAHIR TOEFY
DIRECTOR: DEVELOPMENT MANAGEMENT (REGION 1)

Copied to:

- (1) Mr. Clinton Geyser (EnviroAfrica CC)
- (2) Mr. Joachim Paulus Bester (Bloemfontein Trust)
- (3) Administrative personal (Swartland Local Municipality)

E-mail: clinton@enviroafrica.co.za
E-mail: Karinabester7wp@gmail.com
E-mail: swartlandmun@swartland.org.za



MOUs & Letters of Support



AIDC Eastern Cape SOC Ltd

3198 Conyngham Road
Ascot Park
Building 6
Parsons Hill
Gqeberha
PO Box 63835
Greenacres
6057
Gqeberha
Tel: +27 (41) 393 2100
Fax: +27 (41) 363 0762
E-mail: info@aidcec.co.za
Reg. Nr. 2003/018741/30

Att: Mr. Joubert Roux
Co-Founder and Director

Zero Carbon Charge (PTY) Ltd
Vredendal
Western Cape
8160

Subject: Letter of Support for the Development of Off-grid, Green Electric Vehicle Charging Stations in the Eastern Cape

Dear Mr. Roux,

This letter bears reference to your correspondence dated and received on the 11 April 2024.

The Automotive Industry Development Centre (Eastern Cape), an entity of the Provincial Government of the Eastern Cape, supports the transition towards the electric vehicle eco-system in alignment to the Just Energy Transition Investment Plan 2023–2027 and the White Paper: Electric Vehicle.

A key component of the delivery of the EV Ecosystem programme includes the roll-out of charging infrastructure within the Eastern Cape province. The development and investment of charging infrastructure includes both government investment and support, and private sector investment.

Zero Carbon Charge (Pty) Ltd. is contributing to development of the Eastern Cape EV Ecosystem by developing and installing off-grid electric vehicle charging stations powered by PV solar panels in the Eastern Cape. The AIDC-EC supports Zero Carbon Charge (Pty) Ltd. establishing a network of EV charging stations in the Eastern Cape. The project plays a crucial role in encouraging the adoption of electric vehicles and accelerating the transition to a cleaner and more sustainable transportation system.

The AIDC Eastern Cape supports the Zero Carbon Charge (Pty) Ltd. in securing an investment of R2.3 billion that will also benefit the Eastern Cape province. The AIDC Eastern Cape will collaborate with Zero Carbon Charge (Pty) Ltd. in promoting the Eastern Cape as a destination for investment into the future of the automotive industry. We believe that these investments, coupled with promoting green mobility and renewable energy, will facilitate and attract additional investment into the province, to further develop and grow the automotive EV sector in the Eastern Cape, in partnership with Zero Carbon Charge (Pty) Ltd.

The province welcomes the potential investment by Zero Carbon Charge and the opportunities they will create for the advancement of electric vehicles and the contribution to the growth of the economy of the Eastern Cape in South Africa.

Yours sincerely,

.....
Mr Thabo Shenxane
Chief Executive Officer
AIDC Eastern Cape

Document Name: Letter Zero Carbon Charge (Pty) Ltd.

Rev. Nr.: 06

Revision Date: 15.01.2024

Document Number: GEN-FORM023

Document Status: Approved

Previous Revision Date: 05.10.2023

Page 1 of 1



destea

department of
Economic, Small Business Development,
Tourism and Environmental Affairs
FREE STATE PROVINCE

Mr. Joubert Roux
Co-founder & Director: Zero Carbon Charge
Groenhoeck Farm Vredendal
Western Cape
8160

Dear Mr. Roux

Subject: Support of the Electric Vehicle (EV) Infrastructure Development in the Free State through the Zero-Carbon Charge initiative.

I am writing to you today on behalf of the Free State Department of Small Business Development, Tourism and Environmental Affairs (DESTEA)) to express our support to the Zero Carbon Charge on the development of a significant electric vehicle (EV) charging infrastructure network in the Free State Province.

The global transition towards sustainable energy and transportation solutions presents exciting opportunities for regions rich in natural resources such as ours. The Free State is particularly fortunate, boasting an abundance of grid availability potential, making it an ideal location for an extensive EV charging network. We at DESTEA recognize the immense potential of EVs to contribute to a cleaner and more sustainable future for South Africa. By supporting industry players like Zero Carbon Charge, the aim is to develop a robust EV charging infrastructure that will significantly enhance the potential EV experience in the Free State.

This initiative aligns perfectly with the vision outlined in the Free State plan to develop the Durban-Free State –Gauteng, R30, North-South (N1), N8 corridors development intended to promote not only better transport of goods between the end points, but will also boost economic development in the towns and rural areas along the way. A comprehensive EV network will further assist and accelerate the province's transition into providing carbon-neutral mobility solutions, not only contributing to decarbonization efforts but also creating a robust ecosystems.



destea

department of
Economic, Small Business Development,
Tourism and Environmental Affairs
FREE STATE PROVINCE

DESTEA is fully supports this initiative as it will assist the hard-to-abate sectors to transform their operations and develop new low-carbon technologies and we welcome this type of investment into the Free State Province.

Thank you for your time and consideration.

Sincerely

Mbulelo Nokwequ

HoD: DESTEA

Date: 25/4/2024

HEAD OFFICE

PO Box 760

Lebowakgomo

0737

Tel: +27 15 633 4700

www.leda.co.za



Mr. Joubert Roux
Co-founder & Director: Zero Carbon Charge
Groenhoeck Farm
Vredendal
Western Cape
8160

Dear Mr. Roux,

Subject: Expression of Support

I am writing to you on behalf of the Limpopo Economic Development Agency (LEDA) to express our full support for the Zero Carbon Charge initiative's efforts to establish a robust electric vehicle (EV) charging infrastructure network across the Limpopo Province.

Advancing Sustainability Initiatives

The global transition towards sustainable energy and transportation solutions opens up numerous opportunities for regions abundant in renewable energy resources. Limpopo, with its significant solar potential, is ideally positioned for the development of an extensive EV charging network. LEDA recognizes the transformative impact EVs can have in guiding South Africa towards a cleaner, more sustainable future. By endorsing industry leaders like Zero Carbon Charge, our goal is to facilitate the creation of a resilient EV charging infrastructure, thereby greatly enhancing the EV landscape in Limpopo.

Aligning with Environmental Objectives

This initiative perfectly aligns with the vision outlined in Limpopo's Green Energy Strategy and Masterplan. A comprehensive EV network will reinforce the province's commitment to sustainability by offering carbon-neutral mobility solutions, thereby not only advancing decarbonization efforts but also nurturing a vibrant ecosystem for green energy utilization. LEDA's Commitment

Registered address: Enterprise Development House, Main Road, Lebowakgomo, 0737, South Africa

Directors:

Mr CC Nkadameng (Deputy Chairman)
Mr M Maphutha, Adv TM Ncube, Mr MS Ralebipi, Ms N Magadagela CA(SA), Mr AC Chikane,
Mr TR Makhuvha (CEO) Mr F Magidi (CFO), Mr NB Mokobane (COO)

Interim Company Secretary: Moketla Mamabolo Attorneys

Support for Zero Carbon Charge

LEDA is firmly committed to supporting the development of this initiative. We strongly believe that this project aligns with the commercialization pathways outlined in the Green Energy Strategy, with a specific focus on decarbonizing energy sectors through the adoption of clean transportation solutions.

Thank you for your valuable time and consideration. We eagerly look forward to the opportunity to collaborate with you in driving Limpopo Province towards a sustainable future.

Warm regards,



Mr. Thakhani Makhuvha
Group Chief Executive Officer
Date: 19/4/2024

Registered address: Enterprise Development House, Main Road, LebowaKomo, 0757, South Africa

Directors:

Mr CC Nkadimeng (Deputy Chairman)
Mr M Maphutha, Adv TM Ncube, Mr MS Ralebipi, Ms N Magadagela CA(SA), Mr AC Chikane,
Mr TR Makhuvha (CEO) Mr F Magidi (CFO), Mr NB Mokobane (COO)

Interim Company Secretary: Moketla Mamabolo Attorneys

Memorandum of Understanding (MOU)

Between



Zero Carbon Charge (PTY) Ltd

A South African private enterprise registered company (Reg Nr: 2022/232376/07) focused on developing the world's first off-grid, PV solar powered, and ultra-fast electric vehicle (EV) charging station network across South Africa

Herein represented by **Mr Joubert Roux and Mr Andries Malherbe** in their capacity as Co-founders and Directors and duly authorised thereto

(Herein referred to as "CHARGE")

And



LIMPOPO ECONOMIC DEVELOPMENT AGENCY

Established in terms of Section 2 of the Limpopo Economic Development Agency Act 5 of 2016, herein represented by **Thakhani R Makhuvha** in his capacity as **Chief Executive Officer** being duly authorised hereto

(Hereinafter referred to as "LEDA")

(Collectively referred to as "the Parties")

1. PREAMBLE

WHEREAS the CHARGE has a mandate to improve the migration towards green mobility and renewable energy by establishing off-grid EV charging stations powered by PV solar panels. Electric mobility will reduce carbon emissions to support net-zero transport in South Africa, while PV solar panels will create opportunities for the localization of energy within rural communities through the PV solar used to power the EV charging infrastructure.

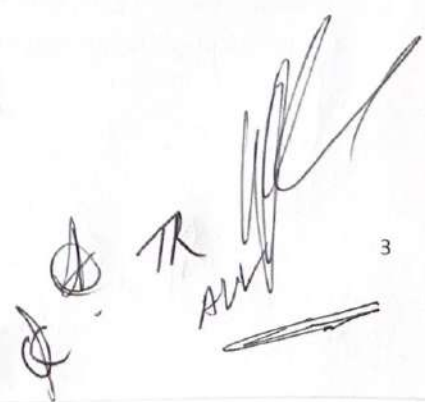
WHEREAS By developing EV charging stations across South Africa, and specifically the Limpopo Province, the opportunity to migrate transport to green mobility and creating local renewable energy points for communities, CHARGE will support the economies within rural areas of South Africa.

WHEREAS the LEDA will act as a facilitator and custodian over the project rollout for off-grid EV charging stations developed and privately funded by CHARGE throughout the Limpopo Province.

WHEREAS LEDA will facilitate engagements and education with local governments across the Limpopo Province as well as provincial commenting authorities.

AND WHEREAS CHARGE and **LEDA** have identified each other as entities that can co-operate and/or collaborate for the purpose of **developing EV charging infrastructure, renewable energy structures, green mobility, as well as the overall economic development to enhance economic growth for the people of the Limpopo Province; and**

NOW THEREFORE CHARGE and **LEDA** undertake to co-operate on mutually beneficial terms as set out hereunder.

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2. DEFINITIONS

- 2.1 **"CHARGE"** means the Zero Carbon Charge, A South African private enterprise registered company (Reg Nr: 2022/232376/07) focused on developing the world's first off-grid, PV solar powered, and ultra-fast electric vehicle (EV) charging station network across South Africa.
- 2.2 **"LEDA"** means the Limpopo Economic Development Agency.
- 2.3 **"DATE OF SIGNATURE"** means the date of the last Party signing this MOU;
- 2.4 **"MOU"** means this Memorandum of Understanding and includes all Annexure thereto, if applicable ;
- 2.5 **"PARTIES"** means the Parties to this MOU and a reference to a "Party" is a reference to either one of them as determined by the context;
- 2.6 **"EV"** means electric vehicles

3. PARTIES TO THE AGREEMENT

- 3.1 Zero Carbon Charge is a South African private enterprise registered company (Reg Nr: 2022/232376/07) focused on developing the world's first off-grid, PV solar powered, and ultra-fast electric vehicle (EV) charging station network across South Africa.
- 3.2 The LEDA is a public entity established in terms of section 3 of the Limpopo Economic Development Agency Act, No. 5 of 2016 and listed under schedule 3D of the Public Finance Management Act, No 1 of 1999. LEDA's mission is to accelerate economic growth, development and create employment.

4. COMMENCEMENT AND DURATION

- 4.1 This MOU shall come into force upon signature hereof by the last Party signing and shall continue to remain in force for a period of five (5) years, after which it shall be renewed automatically unless terminated by either Party in terms of clause 6.

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- 4.2 This MOU shall be reviewed annually by the Parties on the anniversary of the MOU.

5 PURPOSE OF THE MEMORANDUM OF AGREEMENT

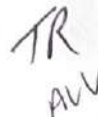
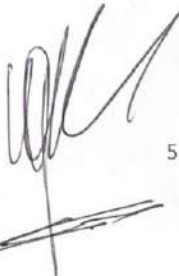
- 5.1 The purpose of this Memorandum of Understanding (MoU) is to set out how CHARGE and LEDA agree to cooperate and collaborate on issues related to EV charging infrastructure development, renewable energy infrastructure development and support from provincial and local governments in the Limpopo Province to be in line with the goals of achieving net-zero transport and energy resilience in the Limpopo Province.
- 5.2 This is a memorandum of general agreement and specific agreements will be concluded on a project-by-project basis. The MoU clarifies the benefits for the partner organisations and the roles they will play under this agreement.
- 5.3 The document serves to formalise the relationship between CHARGE & LEDA Memorandum of Understanding and will expire after five (5) years.

6. TERMINATION

- 6.1 This MOU may be terminated by either Party by giving thirty (30) days written notice to the other Party;
- 6.2 The termination of this MOU shall not affect any on-going projects or activities undertaken prior to the termination of this MOU, unless otherwise agreed upon in writing by the Parties.

7. AMENDMENTS AND VARIATION

- 7.1 The Party wishing to amend or vary this MOU must request such amendment or variation in writing. Such amendment must be considered by the other Party and the other Party shall not unreasonably withhold consent to the amendment or variation.

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- 7.2 Once the amendment or variation is accepted by the Parties it must be reduced to writing and attached to this MOU as an Annexure.

8. IDENTIFIED AREAS OF COLLABORATION

- 8.1 Reducing red tape and barriers to entry by provincial and local governments that hinder the development of CHARGE off-grid EV charging infrastructure in Limpopo
- 8.2 To assist in identifying and advising on additional sites on which further EV charging infrastructure can be developed in the province – extending to electric truck stops too.
- 8.3 Acting as a custodian of the CHARGE project in Limpopo as a "one stop shop" for all engagements, grievances, and communications.
- 8.4 To foster a positive, investment friendly environment in the province for the successful and speedy rollout of our car sites, with the future intention of expanding to truck charging sites that are also off-grid.

9. GOVERNANCE ARRANGEMENTS

- 9.1 In order to facilitate cooperation and collaboration, a standing committee consisting of CHARGE and LEDA should assign officials to ensure implementation for the duration of the MoU.
- 9.2 A project level steering committee may be established for each activity and the terms of reference for such committees will have to be agreed by both parties. The steering committees may include people not in the standing committee, as a governance arrangement.
- 9.3 The host party shall be responsible for arranging logistics and secretariat services for these meetings.

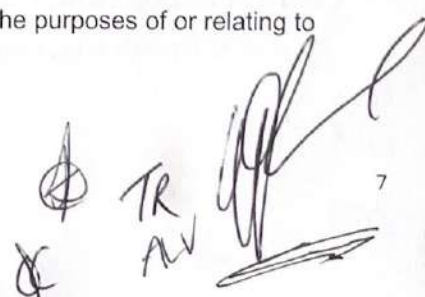
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10. ROLES IN THE STANDING COMMITTEE

- 10.1 **CHAIR:** Meetings to be chaired on a rotation basis by the CHARGE and LEDA delegates (co-chairs may be designated on an annual basis).
- 10.2 **SECRETARIAT:** The CHARGE and LEDA will alternate on the provision of secretariat services to the standing committee.
- 10.3 **MEETINGS** Meetings will take place twice in a year, for the first financial year to ensure implementation of the objectives, thereafter meetings will be held once a year.

11. CONFIDENTIALITY

- 11.1 The Parties undertake and warrant that they will not directly or indirectly divulge, communicate, or use for their own purpose confidential information (unless as provided for in the terms of reference), or otherwise permit to be divulged or communicated by them or by any consultant, officer, employee or agent of either party, any confidential information supplied to it by the other in respect of the terms of reference to any unauthorised person.
- 11.2 The restriction in clause 13.1 shall not apply to information to the extent that the party to this Agreement in possession of it ("hereinafter referred to as the Possessing Party") can show that:
- 11.2.1 the information is in the public domain otherwise than by virtue of a breach of this Agreement; or
 - 11.2.2 the information was expressly permitted to be disclosed by the other; or
 - 11.2.3 the information was independently developed or created by the possessing party otherwise than for the purposes of or relating to this Agreement; or

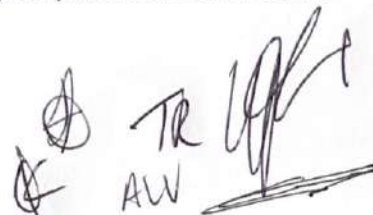
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- 11.2.4 required to be disclosed in response to a valid order of court or other governmental
- 11.2.5 agency, or if disclosure thereof by the disclosing Party is otherwise required by law; or
- 11.2.6 such information related only to this Agreement and is required by any regulatory body;
- 11.2.7 the disclosure of same by the possessing Party to its legal advisers, auditors or other professional advisors for any purpose connected with this Agreement provided that they in turn keep the same confidential in accordance with this clause 6.

- 11.3 The undertakings contained in this clause 13 shall terminate by written consent from both parties within 30 (thirty) days' notice.
- 11.4 If a Party is obliged to divulge Confidential Information in terms of it shall, before the divulgence of the Confidential Information, inform the other Party of its obligation to so divulge the Confidential Information.
- 11.5 Each Party undertakes to the other to make all its relevant Personnel aware of the confidentiality of the Confidential Information and the provisions of this clause 8 and to take all such steps as shall from time to time be necessary to ensure compliance by its Personnel with the provisions of this clause 8.

12. VIS MAJOR

A Party shall not be liable for any failure to fulfil any of their obligations under this Agreement insofar as such failure is due to force majeure, for which purpose force majeure shall include but not be limited to all events beyond the reasonable control of the Party claiming force majeure which cannot be foreseen, or if foreseeable cannot reasonably be avoided, which occur after the Effective Date and that prevents or hinders the carrying out of the obligations of the Party claiming force majeure, and without limitation

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shall include acts of God or acts of nature (the elements), war (whether declared or not), blockage, embargo, boycott, revolution, invasion, insurrection, riot, civil commotion, mob violence, sabotage, epidemics, quarantine or other similar reasons. If the suspension of performance due to an event of force majeure continues for more than 15 (fifteen) days, then either Party may summarily terminate this Agreement by written notice to the other Party, prior to the cessation of the force majeure, but the non-affected Party shall not be entitled to claim damages against the Affected Party as a result of the delay or failure in the performance of any obligations arising from this Agreement due to or resulting from the force majeure

13. NON-EXCLUSIVITY

It is recorded, for the avoidance of doubt that this Agreement does not purport to create an exclusive relationship between the Parties. In the circumstances all Parties shall be free to embark on potential terms of reference with other Parties. The Parties hereby agree that this is not an exclusive agreement and other Parties can be brought in to participate in terms of this Agreement by amending by becoming signatories as well.

14. NON - BINDING

It is recorded that this MOU does not constitute a legally actionable document and any misunderstandings and breaches will be mutually resolved amongst the parties with no recourse to a court of law.

15. TRANSPARENCY AND GOOD FAITH

Each Party hereby undertakes during the existence of this Agreement

15.1 to show to each other, at all times, the utmost good faith in its dealings with each other;

15.2 to do all such reasonable things, perform all such reasonable actions and

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15.3 take all such reasonable steps as may be open to it and necessary for and incidental to the implementation of the terms and conditions of this Agreement.

16. NON-WAIVER

16.1 Neither Party shall be regarded as having viewed, or be precluded in any way from exercising, any right under or arising from this Agreement by reason of such Party having at any time granted any extension of time for, or having shown any indulgence to, the other Party with reference to any payment or performance hereunder, or having failed to enforce, or delayed in the enforcement of, any right of action against the other Party

16.2 The failure of either Party to comply with any non-material provision of this Agreement shall not excuse the other Party from performing the latter's obligation hereunder fully and timeously.

17. MEDIA RELEASES

17.1 Each of the Parties undertakes in favour of the other that it will not make any releases or public announcement to the press or other media on any issue pertaining to this Agreement without first having obtained the prior written consent of the other Party.

17.2 Any Party that embarks on media releases or public announcements without obtaining permission from the other Party shall be deemed to have committed a breach in which case it shall be dealt with in terms of clause 23.

18. COSTS

18.1. The costs incurred by this project will be incurred by CHARGE as a privately funded company.

TR
ALW



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18.2 Each party shall incur its own costs during the collaboration and facilitation of this agreement.

19. INDEMNITY

The Parties agree to indemnify each other, its directors, employees, affiliates and agents from and against any direct or indirect special, punitive, or consequential event (including loss of profits, or injury to business reputation, or liability, or damages, or penalties), which may be imposed on or incurred in terms of this Memorandum of Understanding, or based upon or arising out of either Party's performance of or failure to perform the activities described herein.

20. TRANSFER OF FUNDS

The parties acknowledge and agree that this memorandum of agreement does not create any financial or funding obligations on either party and that such obligation shall arise only upon joint execution of a subsequent agreement or work plan (which shall include a budget) that specifically delineates the terms and nature of such obligations that references this Memorandum of Understanding comply with all legal obligations and statutes governing each party.

21. DISPUTE RESOLUTION

The Parties shall make all reasonable efforts to settle any dispute through consultation and mediation held by and between representatives of the Parties and resolve the matter.

22. AMENDMENTS

No amendments or consensual termination of this Agreement will be binding unless reduced to writing and signed by the Parties.

TR
ALW

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23. COUNTERPARTS

This Agreement may be executed in any number of counterparts and by different Parties hereto in separate counterparts, each of which when so executed shall be deemed to be an original and all of which when taken together shall constitute one and the same Agreement.

24. DATE OF IMPLEMENTATION

Notwithstanding the date of signature, this Memorandum of Understanding takes effect upon being signed by both parties.

25. DOMICILIUM CITANDI ET EXECUTANDI

Any notice or other document to be served under this agreement to a party may be served at its address as set out below:

Zero Carbon Charge (PTY) Ltd

Groenhoeck Farm

Vredendal

Western Cape

8160

Contact Person

Ms Larissa Venter

Head of Government Relations

082 591 7532/larissa@charge.co.za

Limpopo Economic Development Agency

Address: Enterprise Development House
Main Road
Lebowakgomo

TR
KAL
12

17. SIGNATORIES

This agreement is signed by **Mr Joubert Roux** on behalf of the **Zero Carbon Charge (PTY) LTD** and Mr Reuben Thakhani Makhuvha on behalf of the **Limpopo Development Agency** who warrant that they have the necessary authority to enter into this agreement.

DONE AND SIGNED in Concession on this 20th

day of May 2024.


Signature

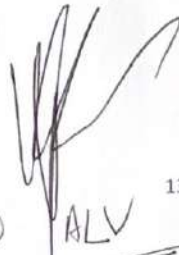
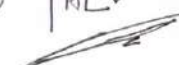
For **CHARGE** who hereby affirms that he is duly authorised to sign this agreement on its behalf.

Full names:

Mr Joubert Roux

Designation:

CEO

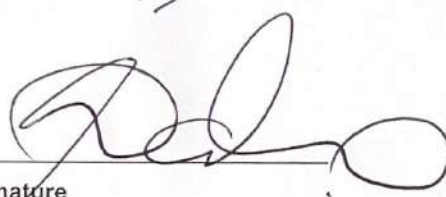
TR 
ALV 

As Witnesses:

1. Name: Juanita van der Merwe Signature: 

2. Name: _____ Signature: _____

THUS, DONE AND SIGNED in Centurion on this 7th
day of MAY 2024.

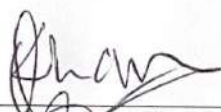

Signature

For LEDA who hereby affirms that he is duly authorised to sign this agreement on its behalf

Full names: THAKHANI REUBEN MAKHUBA

Designation: GROUP CHIEF EXECUTIVE OFFICER

As Witnesses:

1. Name: OWAIZ KHAN Signature: 

2. Name: Larissa Kinter Signature: 



14

Enquiries: Mr. H Louw | Telephone: 053 110 0289 | email: officeoftheceo@nceda.co.za | Ref: Support letter to Zero Charge initiative

Mr. Joubert Roux

Co-founder & Director: Zero Carbon Charge

Address:

Groenhoeck Farm
Vredendal
Western Cape
8160

Subject: Support of the Electric Vehicle (EV) Infrastructure Development in the Northern Cape through the Zero-Carbon Charge initiative.

Dear Mr. Roux,

I am writing to you today on behalf of the Northern Cape Economic Development Trade, Investment Promotion Agency Investment Promotion Agency, (NCEDA) to express our support to the Zero Carbon Charge on the development of a significant electric vehicle (EV) charging infrastructure network in the Northern Cape Province.

Aligning with Sustainable Growth

The global transition towards sustainable energy and transportation solutions presents exciting opportunities for regions rich in renewable energy resources. The Northern Cape is particularly fortunate, boasting an abundance of solar and wind potential, making it an ideal location for an extensive EV charging network. We at NCEDA recognize the immense potential of EVs to contribute to a cleaner and more sustainable future for South Africa. By supporting industry players like Zero Carbon Charge, the aim is to develop a robust EV charging infrastructure that will significantly enhance the potential EV experience in the Northern Cape.

Strengthening the Green Hydrogen Proposition

This initiative aligns perfectly with the vision outlined in the Northern Cape Green Hydrogen Strategy and Masterplan. A comprehensive EV network will further solidify the province's value proposition by providing carbon-neutral mobility solutions, not only contributing to decarbonization efforts but also creating a robust ecosystem for green hydrogen utilization.

NCEDA's Commitment to Support

NCEDA is fully committed to supporting the development of this initiative. We believe this project aligns with the commercialization lanes identified within the Green Hydrogen Strategy, specifically targeting the decarbonization of hard-to- abate sectors through the adoption of clean transportation solutions.

Thank you for your time and consideration. We look forward to partnering with you in advancing a sustainable future for the Northern Cape.

Sincerely,



Hendrik Louw
Acting Chief Executive Officer
Northern Cape Economic Development Agency (NCEDA)
10 April 2024



Traffic Impact Statement

Enquiries: Annet Krige
Cell: 084 610 0233
Email: annet@sturgeonsa.co.za

Our Ref: STUR0371
Your Ref:

29 March 2023

Zero Carbon Charge (Pty) Ltd
PO Box 671
VREDENDAL
8160

ATTENTION: Mr Joubert Roux

Dear Sir,

PROPOSED ELECTRICAL VEHICLE CHARGING STATIONS ACROSS SOUTH AFRICA: BASIC TRAFFIC IMPACT ASSESSMENT

Sturgeon Consulting was appointed to prepare a Basic Traffic Assessment for proposed Electrical Vehicle Charging Stations at various locations across South Africa. This letter should assess and determine the possible traffic impact that an individual proposed Electrical Vehicle Charging Station development will have on the existing road infrastructure.

1. BACKGROUND

Currently South Africa has less than 1 000 electric vehicles (EVs), but it is expected that this number will grow to approximately 130 000 EVs by 2027, less than 1.5% of registered vehicles, and that by 2032, 24% of new vehicle sales will be EVs. To allow for the successful transition from fossil fuel dependent vehicles to EVs it is critical that reliable infrastructure be available across South Africa.

Zero Carbon Charge is the first 100% renewable energy charging network for EVs in Africa. Their mission is to build a network of 130 green energy-powered ultra-fast charging stations across South Africa. A reliable and green network will enable the migration from internal combustion to zero carbon in the South African transport sector. By providing charging stations nationwide it will encourage motorists to purchase EVs and travel freely across the country without range limitations. Currently EVs have a range between 350km and 400km. The proposed ultra-fast charging stations will be located approximately 150km apart along the major national and provincial roads. To

ensure that no additional strain is placed on the Eskom grid, all charging stations will be driven by solar farms, less than 1ha in size. The energy generated by these solar farms will be stored in batteries.

2. LOCATION

Along the national highways and the regional highways of South Africa, 200 possible site locations have been identified for the development of EV Charging Stations. Potential sites have to be located close to major routes, be large enough to have 4 or 5 EVs charging simultaneously and have the potential to accommodate the renewable energy generation facilities required. Sites also have to provide EV users with convenient and safe charging locations.

The potential sites all belong to local entrepreneurs or local farmers and by collaborating on the project, employment opportunities are created while economic activity in rural areas are being stimulated.

3. PROPOSED DEVELOPMENTS

As previously mentioned, each of the proposed developments will consist of charging stations, a farmstall (newly built or existing) and solar panels. The renewable energy portions of the proposed developments will be located at the optimal location for the generation of electricity on the subject properties. The charging stations and the farmstalls will be located in close proximity to each other. The existing agricultural activities will continue on the properties alongside the proposed developments.

The renewable energy portion of each of the proposed developments will have a size of approximately 8350m² and will generate electricity that will be used for the charging of EVs. Electricity will be generated by solar panels (footprint of approximately 8350m²).

Each of the charging stations (approximately 52m²) will provide parking bays in accordance with the applicable requirement and will be fitted with a charging point for EVs and will be covered by a steel canopy. Additional parking bays for the farmstalls will be provided and visitors to the charging station will be encouraged to visit the facilities while their EVs are charging.

It should be noted that EVs are predominantly charged at home (approximately 70% of the charging required for EVs) which is in contrast to internal combustion engine (ICE) vehicles which can only be refueled at filling stations. Furthermore, it is anticipated most EVs will be used in built up areas with less than 50% of EVs in the rural areas. The number of EVs along rural roads will however increase during holiday periods when holiday goers visit / traverse these areas.

4. TRAFFIC INFORMATION

4.1. Provincial Road Network Information System (RNIS) and similar

Traffic count information is available from the Provincial Road Network Information System (RNIS) for counting stations located along provincial roads in the Western Cape. The information available includes the Average Annual Daily Traffic (AADT), historic growth rates and the number of vehicles (two-way) during the AM and PM peak hours along provincial roads. The traffic count information relates to a typical day and does not account for seasonal traffic variations. Similar information can also be obtained for the various other provinces, although not all provinces provide this level of detailed information.

4.2. SANRAL

The South African National Roads Agency Limited (SANRAL) has permanent and temporary counting station located at various locations across South Africa. The traffic count information can be requested from SANRAL and the traffic count data includes a summary of the Average Daily Traffic (ADT), Percentage Trucks and the Highest volume on the road for the years recorded. The traffic count information relates to the average daily traffic and does not account for seasonal traffic variations.

5. TRIP GENERATION

The *TMH17 South African Trip Data Manual (Committee Draft 2.2, August 2020)* published by the Committee of Transport Officials (COTO), does not provide specific guidelines on the trip generation rates for EV charging stations, farmstalls or solar facilities.

The following trip generation rates were however considered:

5.1. FILLING STATION

According to the *Department of Transport South African Trip Generation Rates (DOT SATGR), June 1995*, the following trip generation rates for Filling Stations are applicable:

- For Urban Areas: 4% during AM and PM Peak Hour and during 12- and 24-hour periods.
- For National and Provincial Freeways: 30% Light Vehicles and 40% Heavy Vehicles during 12- and 24-hour periods.
- 16% of trips attracted to filling stations are new trips, i.e., additional traffic on the road network.

Furthermore, the Revision of the Guidelines for Access to Filling Stations in the Greater Pretoria Area, JL Coetzee, F van Rensburg, H Schreurs, 2001, provides a graph based on 35 studies at filling

stations of varying location and with different volumes of pass by traffic to estimate the interception rate. Refer to **Figure 1**.

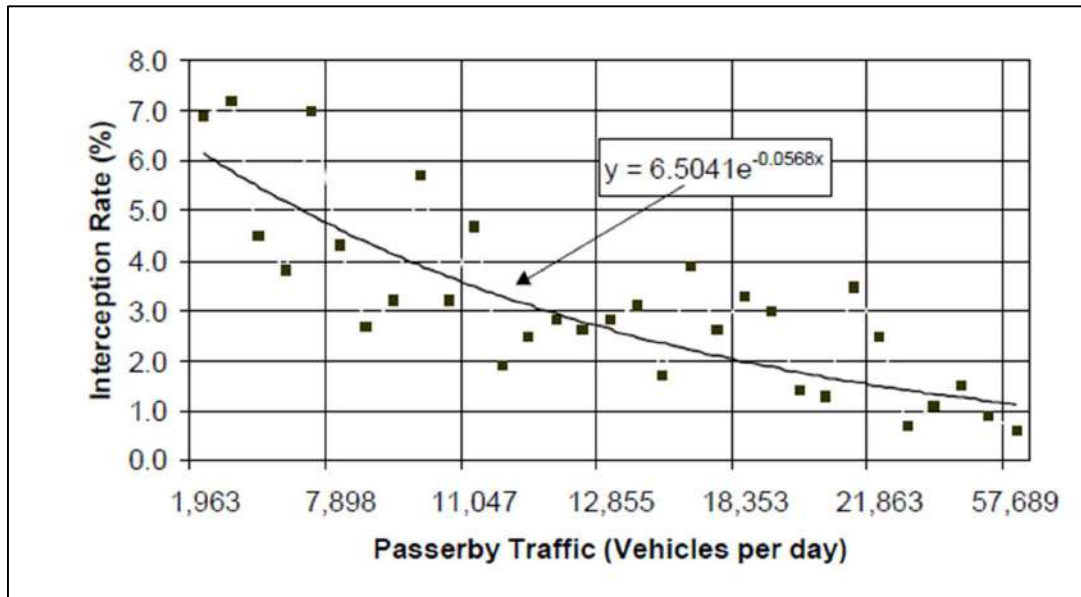


Figure 1 Interception Rates, JL Coetzee, F van Rensburg, H Schreurs, 2001

No information (locally or internationally) could however be sourced on the trip generation rates for EV charging stations.

It is however important to note that filling stations are generally constructed for the maximum capacity which is generally calculated in accordance with the DOT SATGR guidelines or alternatively the interception rates provided in **Figure 1**. Limited infrastructure development and constraints to energy supply will only accommodate 18-20 EVs to be serviced daily at each charging facility, whereafter the navigational software will indicate that the charging facility has reached its daily capacity. The number of vehicles that can be serviced daily is directly derived from the generating capacity associated with the solar infrastructure (1000kW daily) that will be provided at each charging station (18 cars x 55kW/car = 990kW daily). This number will however increase in the future and the charging stations will need to be expanded accordingly. This expansion will be addressed at a future stage with a new round of approvals.

Information obtained from Zero Carbon Charge indicated that there are currently 10 million registered vehicles on South African roads, **with less than 1000 being Electrical Vehicles. This accounts for approximately 0.01%.** The National Association for Automobile Manufactures in South Africa (NAAMSA) provided the following rollout of EVs over the next 5 years in relation to the number of new vehicles sold annually. The number of new vehicles sold per year, inclusive of Internal Combustion Engine vehicles (ICE), Battery-powered Electrical vehicles (BEV), Plug-in Hybrid Electric Vehicles (PHEV) and Hybrid vehicles, is indicated as the Total. It must be noted that this paper only references BEVs as PHEV and Hybrid vehicles will not use the charging facilities.

The batteries of PHEVs are too small to be of use for long distance travelling, when they will use their combustion engines and stop at petrol stations, and Hybrids, by definition, are never plugged in to a charger as they generate their own electricity from a combustion engine:

Table 1: NAAMSA PROJECTED ROLLOUT OF EVs

	2022	2023	2024	2025	2026	2027
ICE	407 066	403 573	399 338	380 060	378 611	371 506
BEV	4 285	8 870	13 770	23 754	34 419	50 891
PHEV	4 285	8 870	13 770	23 754	29 502	35 624
Hybrid	12 855	22 174	32 131	45 507	40 170	50 891
Total	428 491	443 487	459 009	473 075	482 702	508 912

Taking the above into consideration, the percentage of EVs on South African roads in relation to the total number of vehicles sold per year, the number of ICE vehicles on our roads and the limited generating capacity of each charging station, the charging stations will not incur a traffic impact at the proposed charging station in the foreseeable future. It is therefore anticipated that the trips generated by the farmstalls will be a sufficient measure to determine the trip generation of the proposed developments. Furthermore, the charging stations will not generate additional (new/primary) trips. It can therefore be assumed that most of the trips that will visit the charging station are already on the network and can be considered pass-by trips.

5.2. SOLAR FACILITY

Solar facilities generally generate trips during the Construction, Operational and Decommissioning phases. Experience with calculating the trips associated with each of these facilities for various large Solar-Facilities throughout South Africa, indicates that facilities of this magnitude (related to the charging stations) will generate minimal trips and will have an insignificant traffic impact.

5.3. FARMSTALLS

The vehicle trips that will be generated by the farmstalls can be based on the peak hour trip generation rates provided in the *Trip Generation Manual 9th Edition, 2012* published by the Institute of Transport Engineers (ITE) for Speciality Retail (ITE826). For the AM peak hour, a trip generation rate of 0.68 trips / 100m² GLA and a directional split of 48%:52% (in:out) and a trip generation rate of 2.71 trips / 100m² GLA and a directional split of 44%:58% (in:out) for the PM peak hour is proposed. For the Saturday peak hour, a trip generation rate of 4.97 trips / 100m² GLA and a directional split of 48%:52% (in:out) is proposed.

The recommended peak hour trip generation rates and directional split per 100m² GLA is shown in **Table 2**.

Table 2: Trip Generation Rates and Estimated Peak Hour Trips

Peak Hour	Extent	Trip Generation Rate	Directional Split		Trip Generation	
			In [%]	Out [%]	In	Out
Farmstall						
AM	100m² GLA	0.68	48	52	0	0
PM		2.71	44	58	1	2
SAT		4.97	50	50	3	3

6. TRAFFIC IMPACT

From Section 5, the following assumptions can be made in terms of traffic impact:

- EV Charging Station: 2 trips per peak hour¹ - INSIGNIFICANT (<50 peak hour trips)
- Farmstall: 0-6 trips per peak hour - INSIGNIFICANT (<50 peak hour trips)

7. EXISTING - AND PROPOSED ACCESSES

Accesses must follow the requirements set out in the *TMH26 South African Road Classification and Access Management Manual, October 2019* published by the Committee of Transport Officials (COTO), the *SANRAL Geometric Design Guidelines (G2 Manual)* and the regulations of the applicable provincial and local government in the vicinity of the sites.

The required Shoulder Sight Distance (SSD) for a Passenger Vehicle (P), a Single Unit Truck (SU) and a Single Unit Truck plus Trailer (SU + T) must be investigated at each of the proposed accesses. It is proposed that the sight triangle in both directions at any of the proposed accesses be kept clear of any high growing crops/grains to ensure acceptable sight distances. It is however assumed that the SSD requirements are met at the existing farm stall accesses, as these developments would have undergone the necessary approvals.

7.1. RIGHT - AND LEFT TURN WARRANTS

Key intersections and proposed access intersections of the proposed developments should be investigated to determine if right - or left turn lanes are warranted. SANRAL generally requires a separate right turn lane if the volume of right turning vehicles along their routes exceed 30 vehicles per day. The warrants for right - and left turn lanes are provided in, inter alia, the *Access Management Guidelines, 2020* published by the Western Cape Government's Transport and Public Works Department. The addition of a dedicated right - or left turn lanes will also be dependent on the growth of EV ownership and usage in South Africa as well as future possible expansions of the proposed developments where access is directly from a national road.

¹ This is derived by assuming that 10% of the daily trips will access the charging station during the peak hour. This is a general assumption used by Traffic Engineers based on research data.

8. PARKING REQUIREMENTS

Parking provision for the proposed developments should satisfy the requirements as suggested in the local authority's most recent zoning scheme. As previously mentioned, the charging stations will act as additional parking for the farmstalls since it is expected that visitors will make use of the farmstall while waiting for their EV to charge. Sufficient parking will be provided at each of the proposed developments 6 parking bays per 100m² GLA. The proposed developments will have an initial size of 100m².

9. NON-MOTORISED AND PUBLIC TRANSPORT

It is not anticipated that many additional public transport – or non-motorised transport trips will be generated by any of the proposed developments. However, additional public transport – or non-motorised transport facilities will be investigated for each of the subject properties.

10. CONCLUSIONS AND RECOMMENDATIONS

From the above, the following conclusions are made:

- South Africa has less than 1 000 electric vehicles (EVs), but it is expected that this number will grow to approximately 130 000 EVs by 2027.
- Zero Carbon Charge aims to build a network of 130 green energy-powered ultra-fast charging stations across South Africa.
- The location of the charging stations will be along national highways and the regional highways of South Africa.
- The proposed developments will consist of charging stations, a farmstall and solar panels.
- Each charging station will be limited by the generating capacity of the solar panels at the charging station and will only be able to service 18-20 EVs daily. This translates to approximately 2 peak hour trips which will visit the charging station.
- The charging stations will not generate additional (new/primary) trips. It can therefore be assumed that most of the trips that will visit the charging station are already on the network and can be considered pass-by trips.
- The construction, operational and decommissioning phases of the solar facilities will generate minimal trips and the traffic impact will be insignificant.
- Farmstalls has the potential to generate 0-6 trips per peak hour per 100m² GLA. These trips can also be assumed to be pass-by trips (traffic already on the road network), especially in rural areas.
- **In terms of traffic impact, it is concluded that the proposed developments will have an insignificant traffic impact.**
- Shoulder Sight Distance requirements should be met at accesses. It is however assumed that the SSD requirements are met at the existing farm stall accesses, as these developments would have undergone the necessary approvals.

- SANRAL generally requires a separate right turn lane if the volume of right turning vehicles along their routes exceed 30 vehicles per day.
- Parking for the farmstalls should be provided at 6 parking bays per 100m² GLA.
- It is not anticipated that many additional public transport – or non-motorised transport trips will be generated by any of the proposed developments.

From a traffic engineering perspective, the approval of the application for this development is supported.

Please do not hesitate to contact us should you have any queries.

Yours faithfully,



Annebet Krige Pr Eng

For: STURGEON Consulting



Heritage Impact Report



HERITAGE REPORT

COMPILED BY

Cedar Tower Services (Pty) Ltd t/a CTS Heritage



CTS HERITAGE

www.charge.co.za

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Proposed Network of Electric Vehicle Charging Stations with Associated Renewable Energy Facilities

Heritage Considerations

Background

Zero Carbon Charge (Pty) Ltd (ZeroCC) plans to roll out a network of car charging stations, powered by renewable energy facilities, along all the main routes across South Africa. Approximately 120 car charging stations with mainly solar facilities, at about 150km intervals, are envisaged at this stage.

A similar number of truck charging stations with larger renewable energy sites are envisaged. In some cases, the car and truck charging stations would be combined at the same site. The intention is to locate the car charging stations in tandem with existing farm stalls or guest houses along major national and provincial routes.

Project Description

The car charging sites would range from an initial 1ha to about 20ha to allow expansion of the solar facilities over time on a phased basis. Some of the sites have existing farm stalls or guest houses, while new farm stalls are envisaged in other cases. The various components of a car charging station and associated solar facility are listed below.

- Solar arrays (up to 3,5m height);
- Charging station control room in a standard 6m container (3m height).
- Natural gas on-site generator;
- Car charging point with canopy;
- New farm stall in some cases, approx. 100m²;
- 5 000 to 10 000 litre water storage tanks, typically behind the farmstall;
- Underground/overhead 33 kV powerlines (9m height);
- Security fencing (2m height)

EV Charging Stations

While the adoption of EVs in South Africa is still limited at present, this is set to change in the short to medium term, with a number of vehicle manufacturers ceasing production of internal combustion engines (ICE) completely by 2040. In order to facilitate the efficacy and uptake of EVs in South Africa, an EV charging network is required to be established which is similar in scale and nature to the ubiquitous petrol stations that are familiar features in the South African



landscape. Excluding the proposed PV facilities which will support the EV charging stations, the charging stations themselves are similar in size and scale to petrol stations, and are proposed to be located in similar positions along existing National and Regional routes.

The EV charging stations, like petrol stations at present, are likely to become expected and familiar features along the major road networks of South Africa. As with the construction of new petrol stations, the development, design and construction of each EV charging station will be guided by an impact assessment process to mitigate impacts to significant environmental, heritage and scenic resources.

Socio-Economic Benefits

In terms of the impacts to the landscape, due to the similarity in scale and nature to petrol stations, the primary difference from an impact perspective is the proposed PV facilities which are intended to provide the energy supply to the EV charging stations.

According to information provided by ZeroCC;

- South Africa is spending well in excess of R300 billion a year importing oil and fuel products for petrol and diesel vehicles of all kinds. As the use of internal combustion vehicles are phased out, there will be a significant decrease in Forex expenditure, resulting in the retention of that money within South Africa and enabling it to be reinvested in the economy.
- An electric car powered by the current South African grid would emit more CO₂e than a petrol car driven over the same distance whereas an EV charged with green-powered chargers emits zero CO₂e.
- High powered (ultra-fast) charging is the minimum viable standard in order to provide an experience roughly comparable with petrol/diesel. In SA, with a weak grid and loadshedding, on-site generation of power to supply the charging stations is required.

In utilising the energy provided by the on-site PV facilities to supply the EV charging stations, each site becomes a net energy producer in its own right. Furthermore, the socio-economic benefits associated with this net energy production remain on site and localised, with direct local benefits.

Site specific impacts to Heritage Resources

Each proposed development site is being assessed for impacts to archaeological, palaeontological, built environment and cultural landscape heritage resources through either a desktop heritage screening assessment or, if necessary, fieldwork and a comprehensive Heritage



Impact Assessment. These reports identify and map significant heritage resources relative to the proposed development areas and provide recommendations regarding impact mitigation strategies.

Cumulative Impacts in terms of heritage resources

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact. But it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

In terms of cumulative impacts to heritage resources, impacts to archaeological and palaeontological resources are sufficiently dealt with on a case by case basis, and are assessed at a site specific level per development site. The primary concern from a cumulative impact perspective would be to the cultural landscape. The cultural landscape is defined as the interaction between people and the places that they have occupied and impacted. In some places in South Africa, the cultural landscape can be more than 1 million years old where we find evidence of Early Stone Age archaeology (up to 2 million years old), Middle Stone Age archaeology (up to 200 000 years old), Later Stone Age archaeology (up to 20 000 years old), evidence of indigenous herder populations (up to 2000 years old) as well as evidence of colonial frontier settlement (up to 300 years old) and more recent agricultural layers.

Modern interventions into such landscapes, such as renewable energy development and associated infrastructure, constitute an additional layer onto the cultural landscape which must be acceptable or anticipated in certain contexts such as in REDZ areas, or within areas of low environmental sensitivity. The primary risk in terms of negative impact to the cultural landscape resulting from renewable energy development lies in the eradication of older layers that make up the cultural landscape. There are various ways that such impact can be mitigated. In most instances, these mitigation strategies align with visual impact mitigation strategies.



In terms of impacts to heritage resources, it is usually preferred that this kind of infrastructure development is concentrated in one location and is not sprawled across an otherwise agricultural, rural or wilderness landscape. The resulting challenge, in terms of renewable energy, is that this requires an extensive and substantial grid network to be developed through otherwise scenic contexts in order to transport the generated energy from its origin to where it is used.

This project addresses this issue through the establishment of the supporting PV arrays in the immediate proximity of the proposed EV charging stations. The present scale of the proposed PV arrays is small at 1ha, but is intended for expansion to 20ha through a phased approach. Even at 20ha, the proposed PV arrays are substantially smaller in scale than most of the approved solar facilities proposed throughout South Africa at present.

In implementing appropriate buffers along scenic routes, as well as other mitigation strategies such as planting and design on a case-by-case basis, the cumulative impact of the proposed EV charging stations and their supporting PV arrays can be kept at a minimum, and at an impact level largely equivalent to the cumulative impact of the development of additional petrol stations, with the benefits of on-site power generation and the use of green energy.

Visual Impacts

A cumulative visual impact statement was drafted for this project by Lawson and Oberholzer (2024). They conclude that there would be no cumulative visual impacts for the project, seen as a whole, as the charging stations and related solar facilities would be in the region of 150km apart. The only cumulative visual impacts would be where existing similar solar facilities or other energy infrastructure occur near the individual sites.

Some cumulative visual clutter could be experienced where infrastructure, such as service stations, existing powerlines and cell phone masts, are present in the surroundings. On the other hand, these facilities, together with the increase in the use of solar energy panels, are becoming more common as part of the landscape, and attract less visual attention over time.

A major benefit of the cellular design of the proposed solar facilities is that they not only provide localised energy in rural areas, but avoid the need for a plethora of linking powerlines to the main Eskom grid.

The Visual Statement concludes that In terms of the project as a whole, no fatal flaws were identified, and the project is considered acceptable from a visual perspective provided visual mitigations are implemented. General recommendations include the following to assist with the mitigation of the project:

- The footprint of the solar facilities should be kept as compact as possible to minimise the sprawl of buildings and related infrastructure.



- Degraded or disturbed sites should be used as far as possible, to minimise intrusion into scenic or pristine areas.
- Tree-planting, mounding, hedges or fencing with creepers should be used to reduce visibility of solar energy infrastructure.
- Lighting at night should generally be kept to a minimum, particularly in wilderness and rural areas, and light sources shielded from view with reflectors.
- Outdoor signage should be kept to a minimum, and where signage is required this should be discrete and located against a background to avoid silhouette effects. Billboard-type signs should not be permitted on major routes.

These recommendations are supported from a heritage perspective.

Conclusions

The proposed cumulative impact of the development of the proposed EV charging stations and their supporting PV arrays is therefore unlikely to result in unacceptable risk or loss, nor will the development result in a complete change to the sense of place of the area or result in an unacceptable increase in impact due to their position as one of many refuelling stations located along main transport routes through South Africa.

Cumulative impacts to heritage resources in general, and the cultural landscape in particular can be managed through the implementation of appropriate buffers along scenic routes, as well as other mitigation strategies such as planting and design on a case-by-case basis. In this way, the cumulative impact of the proposed EV charging stations and their supporting PV arrays can be kept at a minimum, and at an impact level largely equivalent to the cumulative impact of the development of additional petrol stations, with the benefits of on-site power generation and the use of green energy.

Jenna Lavin

CTS Heritage

February 2024



Agricultural Meta Land Use & Socio-Economic Impact Study



AGRI META LAND-USE AND SOCIO-ECONOMIC IMPACT REPORT

COMPILED BY

The Bureau for Food and Agricultural Policy (BFAP)



www.charge.co.za

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BFAP
DATA
DRIVEN
INSIGHT

Agri meta land-use and socio- economic impact overview

Zero Carbon Charge (Pty) Ltd.

March 2024



Introduction



Zero Carbon Charge (hereinafter referred to as *Charge*) commissioned this agricultural impact study. The company aims to build a national network of green energy powered ultra fast chargers, approximately 150km apart, covering all strategic highways and major routes in South Africa. The points below outline their estimated macro-economic impact metrics, according to Charge:

1. “The international car manufacturing business has irreversibly pivoted away from internal combustion engines, which they have to largely stop manufacturing by 2035 in most of the major auto markets in the world”.
2. Charge and NAAMSA project that a cumulative 353 836 electric vehicles (EV) and plug-in hybrids will be sold from 2023-2028, with more than 20% of total new sales being EV & PHEV vehicles by 2028. That is a significant increase in market share from less than 0.6% (of total new sales) in 2023. Charge is of the opinion that the set up of charging companies in SA will greatly accelerate the advent of electric cars.
3. There are in the order of 12 million registered vehicles in SA. Annual sales of passenger and light commercial vehicles exceed 400 000 per year. Passenger & light commercial as well as the road freight sector consume 15 billion litres of fuel a year, which is mostly imported (in crude or refined form). Charge projects that they will contribute to R187 billion savings in forex spent on crude oil and refined oil imports over 20 years.
4. Charge is targeting a specific sub-segment of the transport/travel market: focussed on all travel outside of urban areas. This follows the international model of ‘electric highways’ similar to Tesla, Fastned and similar companies. Charge aims to provide high powered (ultra-fast charging) EV charging that is 100% green in the “operational phase”, and completely grid independent.
 - Charge offers Zero CO₂ emissions with renewable energy powered chargers; opposed to 5.8 MT CO₂e per annum emissions when charged with Eskom grid power (**comparison on the operation of cars only, on a 25 000km per annum use assumption. Charge assumes 50% home charge (carbon emissions dependent on electricity source) and 50% zero carbon charge).

	Passenger & light commercial vehicles	Road freight
Total litres fuel consumed in 2022 (million litres)	8 082	6 956
Share of SA fuel sales	32%	27%

Source: Department of Energy, 2022

Methodology overview

Socio-economic impact

Underlying assumptions in the socio-economic impact estimation:

Number and area of sites:

- Car sites: 120* sites, starting at 0.6ha with a maximum of 19.7ha
- Truck sites: 100, starting at 12ha with a maximum of 186ha

**some 50 of the 120 sites could be initially developed to only cater for cars, and then expanded as the demand for EV charging in the road freight space expands. The expansion of car sites to cater for both cars and trucks are outside of the study scope and all calculations will be based on car-only developments.*

The impact is measured by quantifying:

- Employment impact of the construction and operational phase for 1 car and 1 truck site, which is then multiplied by the number of car and truck sites.
- Economic impact in terms of energy sales, convenience stores, rent returns to landowners and community upliftment program contributions is determined per site (per size, see range indicated above), which is then upscaled to the total number of sites, operational lifetime of phase 1, productivity and inflation % assumptions.

Agricultural impact

Underlying assumptions in the agricultural impact estimation:

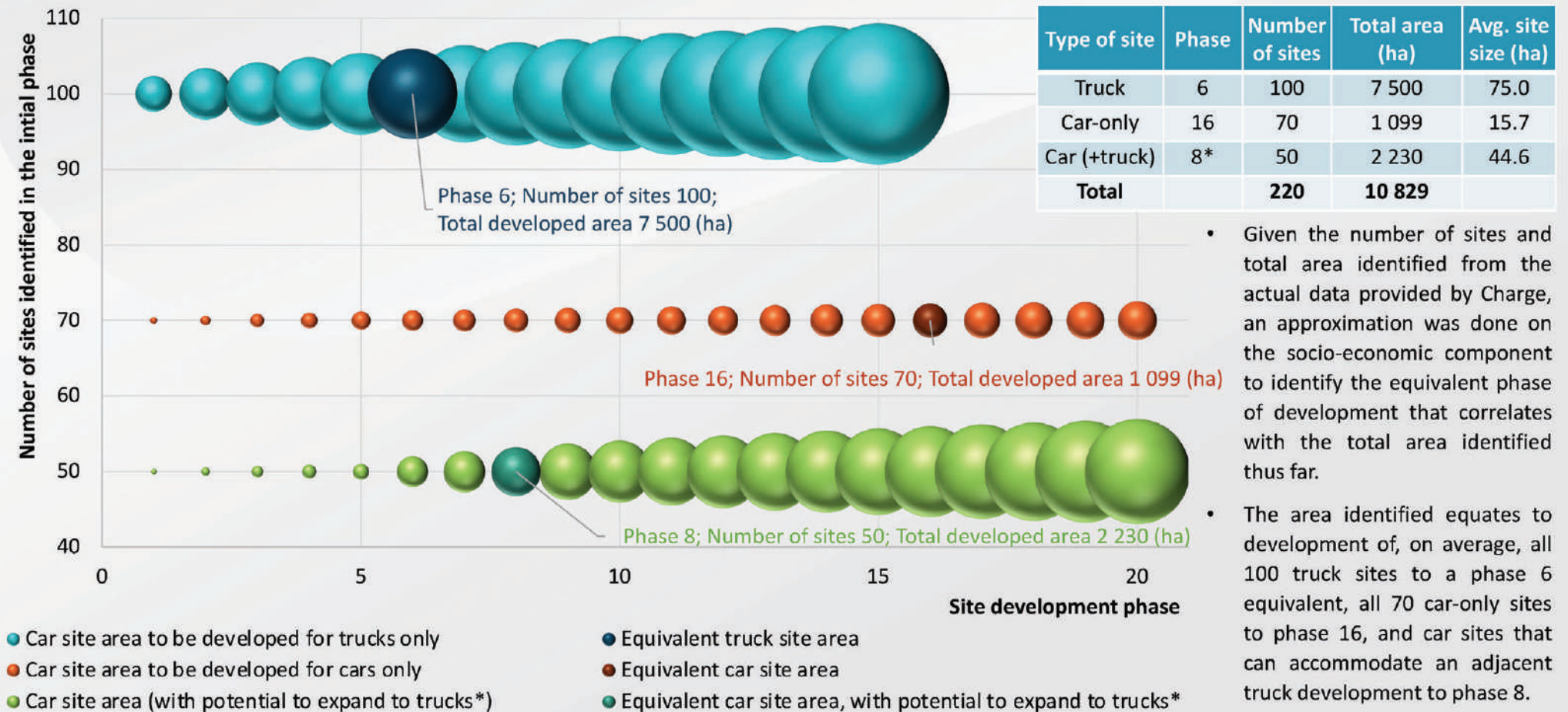
- Spatial outlines of the planned sites, as of October 2023, were used to determine the spatial footprint and agricultural impact of the site development.
- These locations and boundaries change continually as the company negotiates with individual land-owners. This is therefore a point-in-time analysis.
- The average site sizes assumed for the agricultural impact analysis are:
 - 70 car sites: 15.7ha
 - 50 car & truck sites: 44.6ha
 - 100 truck sites: 75ha

**note that actual planned site polygons were used and that they vary significantly in size;*

- The land-use analysis is further based on a range of spatial datasets (i.e. South African National Land Cover, Grazing Capacity, Land Capability, Protected areas, Crop Types etc.) from which the extent of the Charge site area will be characterized.
- Finally, the prevalent field crop, horticulture and / or livestock production and income that could potentially be generated on each charge site was summarised per local municipality to show the impact of this investment on total agricultural production in South Africa.

Methodology overview

Comparison of the land size per phase of development applicable to the **socio-economic study** with the actual area identified in the **agricultural study**



* for illustration purposes, BFAP assumes the addition of a phase 1 truck construction adjacent to an expansion to phase 6 on the car site construction

Executive Summary: Meta study on the socio-economic impact



Employment impact

Construction phase:

- Project based job creation (4-8 months) with a total of



5 800 job opportunities created for semi-skilled/unskilled workers



6 400 job opportunities created for skilled workers

Operational phase:

- Permanent, local job creation:



880 job opportunities for unskilled workers



1 540 job opportunities for semi-skilled workers



330 job opportunities for skilled workers

- Temporary, local job creation:



1 100 job opportunities for unskilled workers on a continuous basis

Total socio-economic impact of construction during *initial phase*:

- Area developed:** 1 272 hectares (12.72 million m²) – based on minimum starting area per car and truck site.
- Capital outlay:** R39.45bn, with 10-20% thereof on labour (downstream impact on South African economy)
- Significant downstream and indirect contributions to local economy

Contribution to socio-economic activity (per site)

	Truck 	Car 
Energy sales	R3.5m – R4m/ha/annum	R6m – R7m/ha/annum
Convenience revenue	R100 000 – R125 000/ha/annum	R250 000 – R330 000/ha/annum
Rent	R160 000 – R200 000/ha/annum	R250 000 – R350 000/ha/annum
Community upliftment	R30 000 – R40 000/ha/annum	R50 000 – R70 000/ha/annum

Executive Summary: Meta study on the socio-economic impact



Energy sales: Annual estimate, with an impact on shareholder return, convenience revenue, rent, and community upliftment



Convenience revenue: Limited to annual estimate, given that it is a function that will be outsourced



Rent: Annual estimate scaled over the initial project lifetime on a constant and inflation adjusted basis



Community upliftment: Annual estimate scaled over the initial project lifetime on a constant and inflation adjusted basis

Contribution to economic activity (per site)

	Truck	Car
Energy sales	R3.5m – R4m/ha/annum	R6m – R7m/ha/annum
Convenience revenue	R100 000 – R125 000/ha/annum	R250 000 – R330 000/ha/annum
Rent	R160 000 – R200 000/ha/annum	R250 000 – R350 000/ha/annum
Community upliftment	R30 000 – R40 000/ha/annum	R50 000 – R70 000/ha/annum

Scaled to total sites



Upscaling the economic impact (total impact in Year 1, on 100 truck sites @ 75% productivity)

	12ha (min)	186ha (max)
Rent	R184.78 million	R2 771.72 million
Community upliftment	R36.96 million	R554.34 million

Upscaling the economic impact (total impact in Year 1, on 120 car sites @ 75% productivity)

	0.6ha (min)	19.7ha (max)
Rent	R13.01 million	R633.81 million
Community upliftment	R2.60 million	R126.76 million



Scaled to lifetime with inflation

The annual productivity of the 120 car and 100 truck sites can be scaled over the lifetime of the initial phase (25 years) at an annual inflation of 5%. **If the area is expanded to the maximum potential return to all landowners in the initial phase in nominal terms (5% annual inflation assumed) @ 100% productivity** equates to:

- R176.38bn on 100 truck sites over 25 years.
- R40.33bn on 120 car sites over 25 years.

The **maximum potential contribution to Sumbandila in the initial phase in nominal terms (5% annual inflation assumed) @ 100% productivity** equates to:

- R35.28bn on 100 truck sites over 25 years.
- R8.07bn on 120 car sites over 25 years.

Executive Summary: Meta study on the impact on Agriculture



The planned 220 **Charge sites (Truck and Car sites)** have a total surface area of **10 823ha**, which is **0.01% of total agricultural land** in South Africa.

The 10 823ha used by Charge, consists of the following:



4 845ha (34.8%) consists of Grassland & Shrubland which can be used as **grazing for animal production**.



3 406 (31.5%) of this area can be **classified as cultivated fields**: fields, that are currently or have been previously cultivated for agricultural field crop production.

- Majority of these fields are currently under rainfed annual cultivation (87%).
- Followed by horticulture (0.04%), Subsistence farming (0.03%) and Pineapples (0.02%).



The remaining **2 572ha** consists of **natural forests, barren land, wetlands & water and built-up area**.



Agricultural land use is by far the biggest contribution in the total land use categorisation.

- The total charge site area falling under agricultural land use categories, represents less than 1% of the respective national totals. These categories include: field crops, irrigation, grazing (number of cattle), plantation forests, orchards and sugarcane.
- BFAP estimated that **1% or less** of the national production of respective field and horticultural crops would be impacted by the charge site land use change away from agriculture. Selected potential production statistics are highlighted below:
 - Maize: 11 100 tonnes (0.07% of total production. 5-year average annual variation in production was 7% from 2018 - 2022)**
 - Wheat: 1 740 tonnes (0.09% of total production. 6% 5-year average annual variation)**
 - Cabbage: 360 tonnes (0.22% of total production)**
 - Avocados: 730 tonnes (0.54% of total production)**
 - Beef: 49 tonnes (0.007% of total production)**

Executive Summary: Meta study on the impact on Agriculture



Crops on **currently cultivated fields** include: planted pastures and natural grazing, maize and soybeans in the summer production region and wheat, canola, lucerne and barley in the Western Cape (winter production region).



2 731ha (25%) of the total Charge site area (10 823ha) currently falls under **Protected Agricultural Areas (PAAs)** as defined by the DALRRD.



The total **potential income** that can be generated through agricultural activities on agricultural land within the Charge sites is summarised as follows:

- Field crops: average R12 520/ha per annum; total income of R40 534 110 per annum at current prices.
- Livestock: R477/ha per annum; total income of R1 543 892 per annum at current prices.
- Horticulture: R87 641/ha per annum; total income of R16 480 536 per annum at current prices.
- This equates to roughly **0.015% of total agricultural gross production value** (DALRRD, 2022).



Executive summary:

Socio-economic impact

Upper bound for **rent income (5% of energy sales)**

	Truck 	Car 
Rent	R160 000 – R200 000/ha/annum	R250 000 – R350 000/ha/annum

*variation based on number of vehicles charged per day

Total **job opportunity impact:**

- Providing a total of **13 300 temporary, and 2 750 permanent job opportunities.**
- Each household head, earning an income, has on average 3 dependents (varying slightly by province), that is, **39 900 dependents** for all temporary jobs and **8 250 dependents** for all permanent jobs (construction and operational phases).

Agricultural impact

Average **potential income from agricultural activities**

	Fieldcrops	Livestock	Horticulture
Average gross margins	R12 520/ha/annum	R477/ha/annum	R87 641 /ha/annum

*Gross Margin: income (price x volumes) less direct costs per “natural resource potential”, per site.

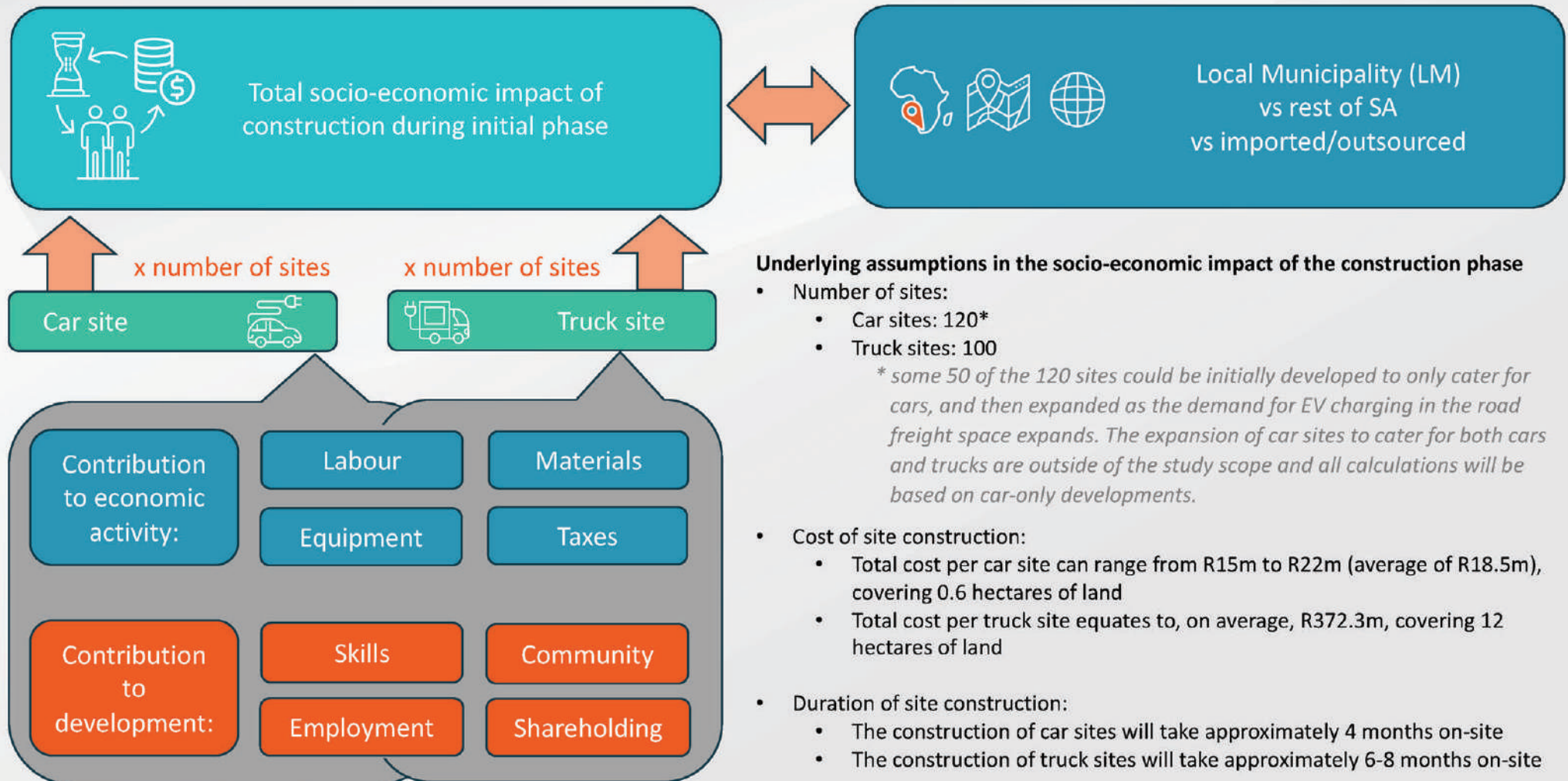
Total **food crop production estimates**, on Charge site area:

	Production estimate (’000 tonnes)	National Total (’000 tonnes)	%
Soybeans	19.34	1 676	1.154%
Avocados	0.73	135	0.539%
Pecans	0.06	23	0.249%
Cabbage	0.36	165	0.221%
Carrots	0.34	222	0.153%
Sunflower	1.10	841	0.131%
Wheat	1.74	1 979	0.088%
Sugarcane	15.11	18 484	0.082%
Maize	11.10	16 017	0.069%
Wine grapes	0.82	1 292	0.063%
Macadamias	0.02	59	0.040%
Table Grapes	0.05	353	0.014%
Beef	0.049	700	0.007%
Pineapples	4.52	117	0.04%
Potatoes	0.08	2 659	0.003%

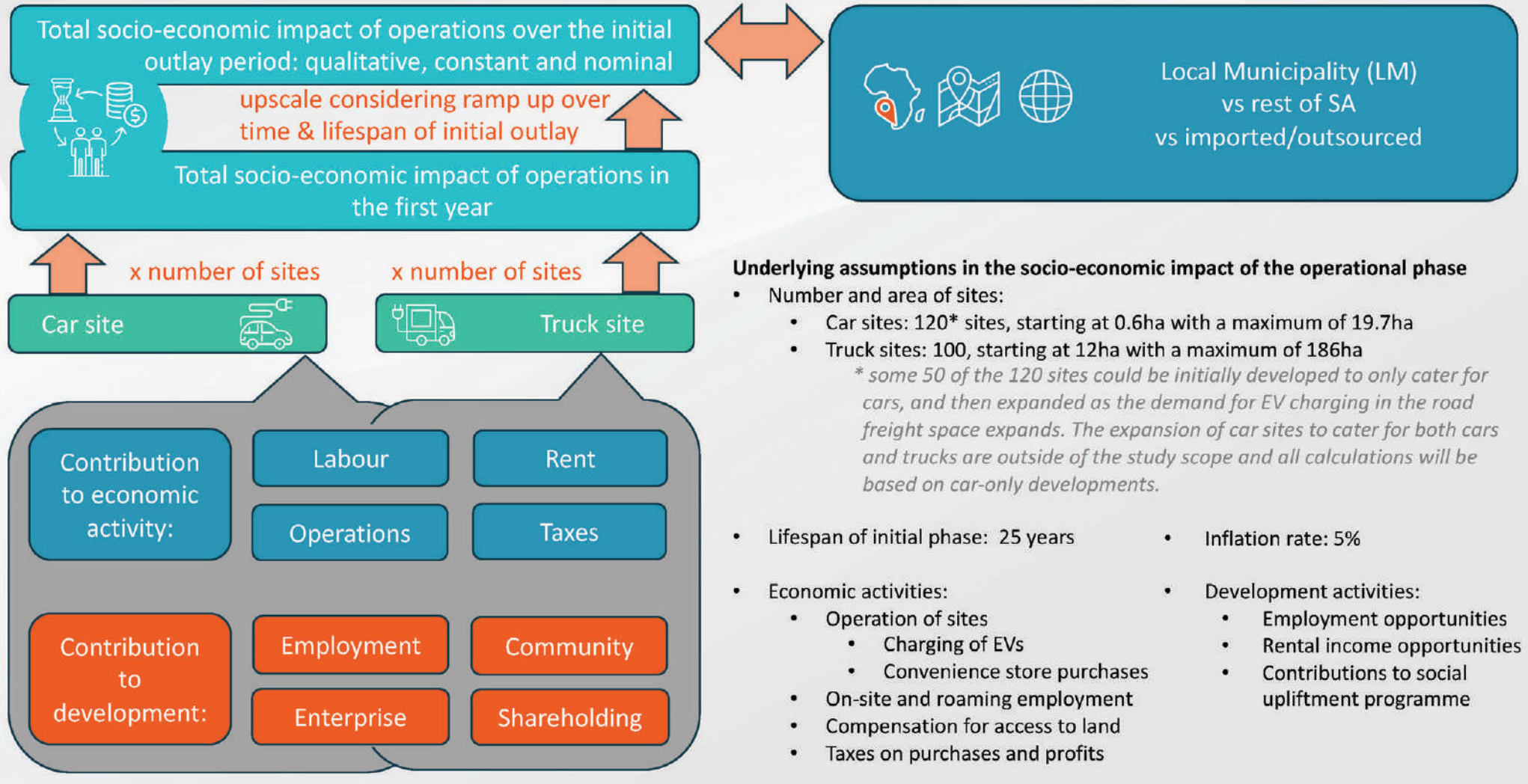
Meta study on socio-economic impact

- The construction and operation of the Charge sites across South Africa on major routes has the potential to make significant socio-economic contributions. At local municipality level, the rest of the country and internationally, the socio-economic contributions can typically be quantified and qualified in terms of the economic activity and socio-economic development.
- Contributions to economic activity measures the impact in terms of labour use, materials, equipment, rent, operations, and taxes. As the extent of these contributions can vary significantly in terms of its impact at local municipal level, domestically and internationally, it's best to demarcate by region when quantifying and qualifying the impact.
- In a similar fashion, the contributions of the construction and operations to the development of skills, enterprises and communities are important indicators for social upliftment, especially in rural and financially challenged municipalities. In addition, economic development that aligns with social targets in terms of employment, and shareholding opportunities elevates the impact of endeavors such as the one Charge is undertaking.
- The approach to quantify and qualify the socio-economic impact of Charge's construction and operation of zero carbon EV charging sites considers the impact for the construction phase and one year of the operational phase per type of site. To measure the total impact on landowners and community development, the impact of the total number of sites and over the typical lifetime of the initial construction is necessary.
- The methodology and impact, together with how it relates to the different provinces, are described in this section.

Framework for measuring impact of construction phase



Framework for measuring impact of operational phase



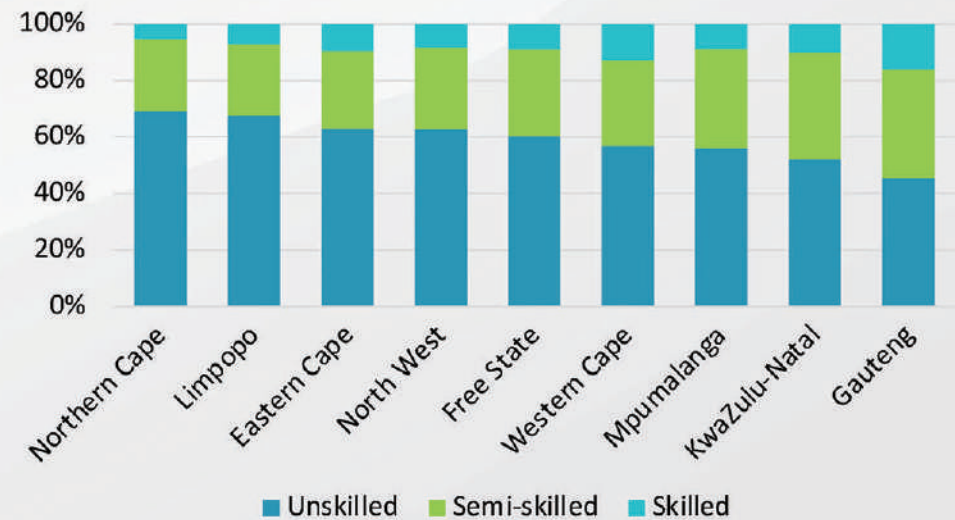
Contextualising impact of construction phase

Total socio-economic impact of construction during initial phase:

- Area developed: 1 272 hectares (12.72 million m²)
- Capital outlay: R39.45bn, with 10-20% thereof on labour (downstream impact on South African economy)
- **Employment: Project based job creation (4-8 months) with a total of 12 200 job opportunities created, of which 48% is earmarked for semi-skilled/unskilled workers in local municipalities**
- Significant downstream and indirect contributions to local economy



Level of skills of working age population

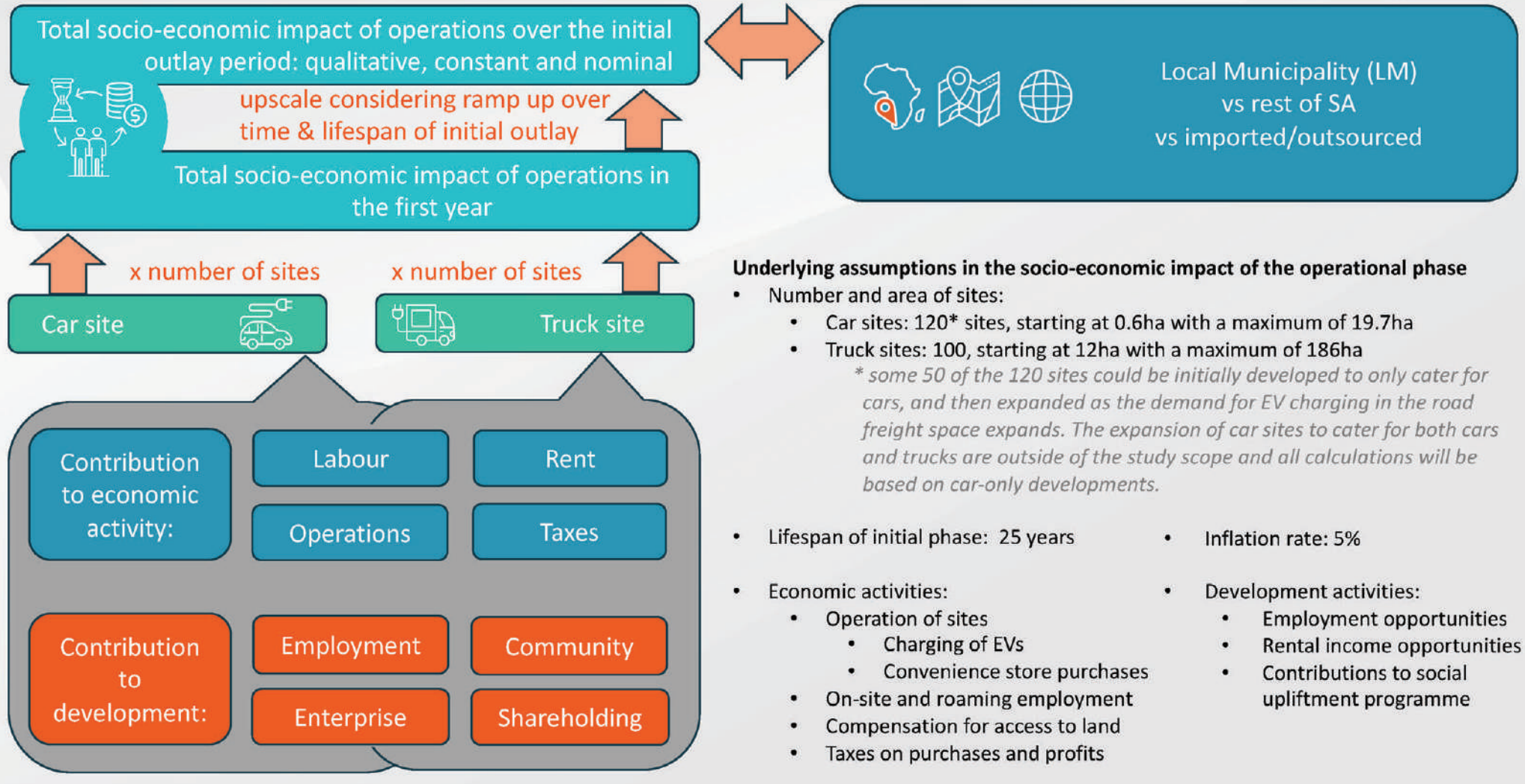


During the construction phase, a total of 6 400 skilled and 5 800 unskilled / semi-skilled jobs will be created (for a period of 4-8 months).

When these jobs are “allocated” to the sites by local municipality:

- 104% of total skilled labour in the Northern Cape could be employed by this project.
- Average 6% of skilled working age population in all other provinces could be employed through this project.
- An average 1% of unskilled / semi-skilled working age population could be employed temporarily by the construction of the charge sites.

Framework for measuring impact of operational phase



Measuring the economic impact of operational phase

Contribution to economic activity per site:

Labour



Unskilled & semi-skilled: 16



Skilled: 1.5

Category	Employment
Maintenance team (skilled, permanent)	5 people per 10 sites
Convenience team (skilled, semi-skilled, permanent)	1 manager and 7 general workers
Site cleaning team (unskilled, permanent)	1 general worker
Solar cleaning team (unskilled, temporary)	5 general workers, once a month
Security team (unskilled, permanent)	3 security personnel (3 x 8-hour shifts)

Per site matrix	Skilled	Semi-skilled	Unskilled
Permanent 	1.5	7	4
Temporary 	0	0	5

Contribution to economic activity:

Taxes



Profit from energy sales



Profit from sales at convenience store



Profit from leasing out land



Personal income



Levies and licenses

Significant and multi-faceted contribution to treasury, including, but not limited to:

- VAT
- Income and company tax
- Levies



Provincial taxes, e.g., licenses

Local taxes, e.g., municipal levies

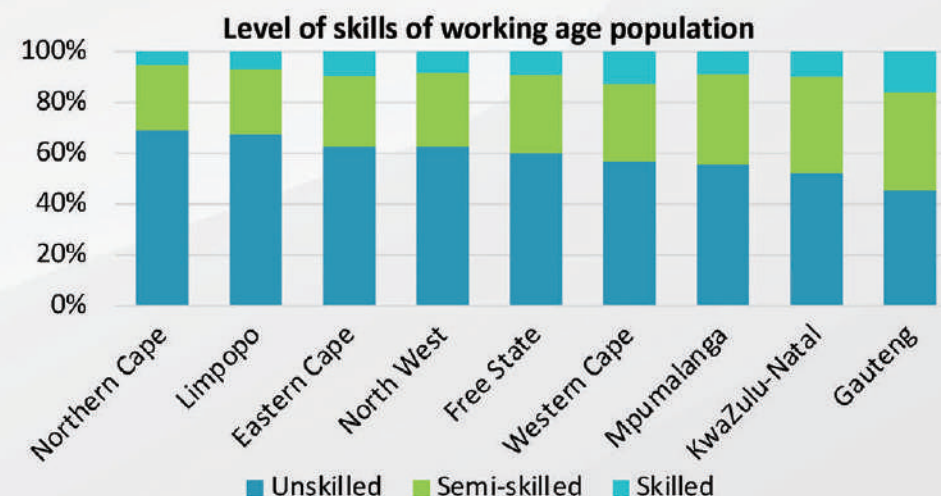
National taxes, e.g., VAT, income tax, company tax, energy levies

Additional tax measures that could come into play over time:

- Tax on energy sold (e.g., on petrol and diesel fuel currently)
- Incentives (tax rebates) to convert from conventional vehicles to EVs

Contextualising impact of operational phase

Total employment	Skilled	Semi-skilled	Unskilled
Permanent	330	1 540	880
Temporary	0	0	1 100



During the operational phase, the sites can contribute 330 skilled, 1 540 semi-skilled and 880 unskilled permanent jobs and 1 100 unskilled temporary jobs.

These jobs are “allocated” to the sites by local municipality and compared per province:

- Due to the Northern Cape’s relatively small working age population, the sites contribute up to 2.4% of jobs per skills categories.
- On the other hand, due to Gauteng’s large working age population, and small number of sites, the project contributes 0.1% of jobs per skills category.
- In the other provinces, an average of 0.19% of skilled, 0.27% of semi-skilled and 0.17% of unskilled working age population could have permanent (or temporary in the case of the unskilled) jobs during the operational phase of this project.

Measuring the economic impact of operational phase



Contribution to economic activity:

Operations



Gross revenue generated from energy sales

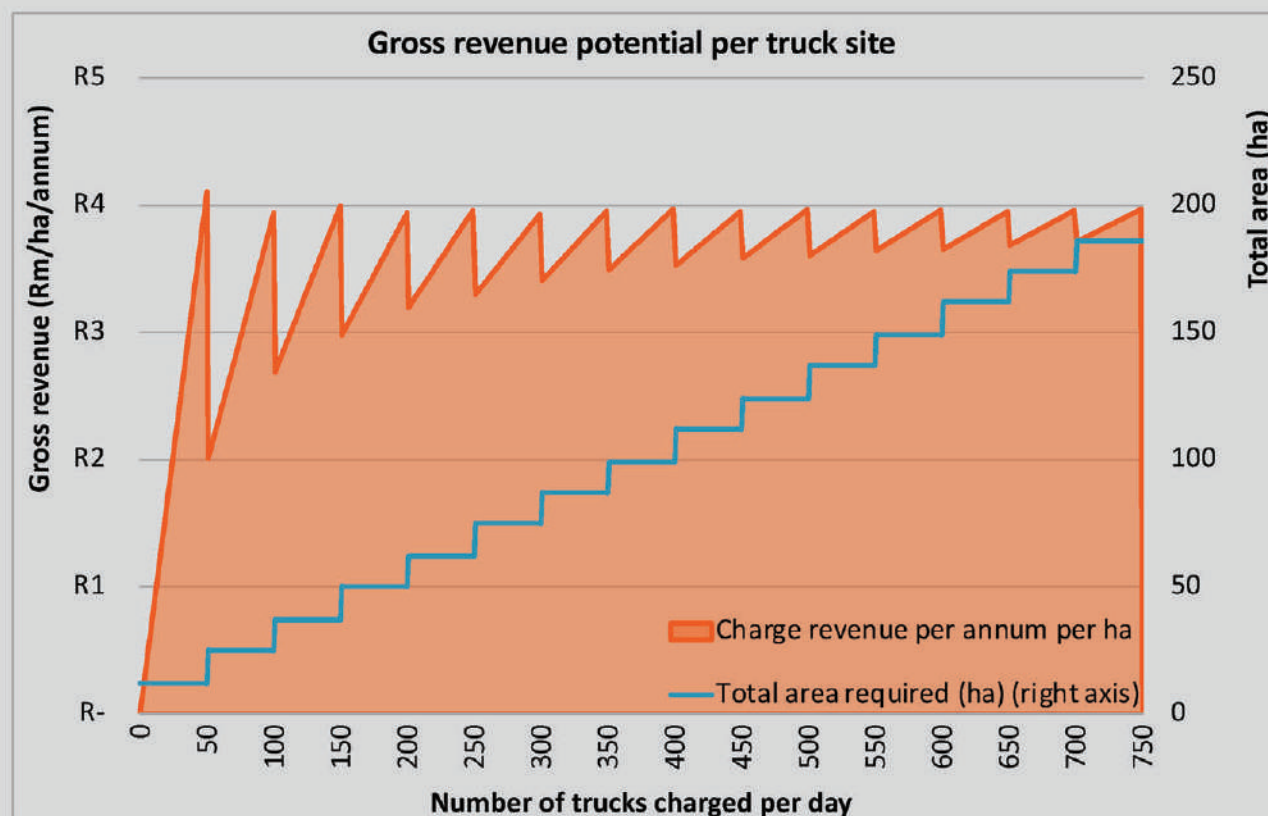


Assumptions	
kWh charge per truck	450
R/kWh charged	R6.00
Share of revenue	100%

Under these assumptions, the total upper bound for economic activity from energy sales is estimated at R3.5m-R4m per developed hectare per annum

Maximum potential per phase:

Phase	Total trucks to charge per day	PV (MWp)	Total (ha)	kWh sold per day
1	50	7	12	22 500
2	100	14	25	45 000
3	150	21	37	67 500
4	200	28	50	90 000
5	250	35	62	112 500
6	300	42	75	135 000
7	350	49	87	157 500
8	400	56	99	180 000
9	450	63	112	202 500
10	500	70	124	225 000
11	550	77	137	247 500
12	600	84	149	270 000
13	650	91	162	292 500
14	700	98	174	315 000
15	750	105	186	337 500



Measuring the economic impact of operational phase

Contribution to economic activity:

Operations



Gross revenue generated from energy sales

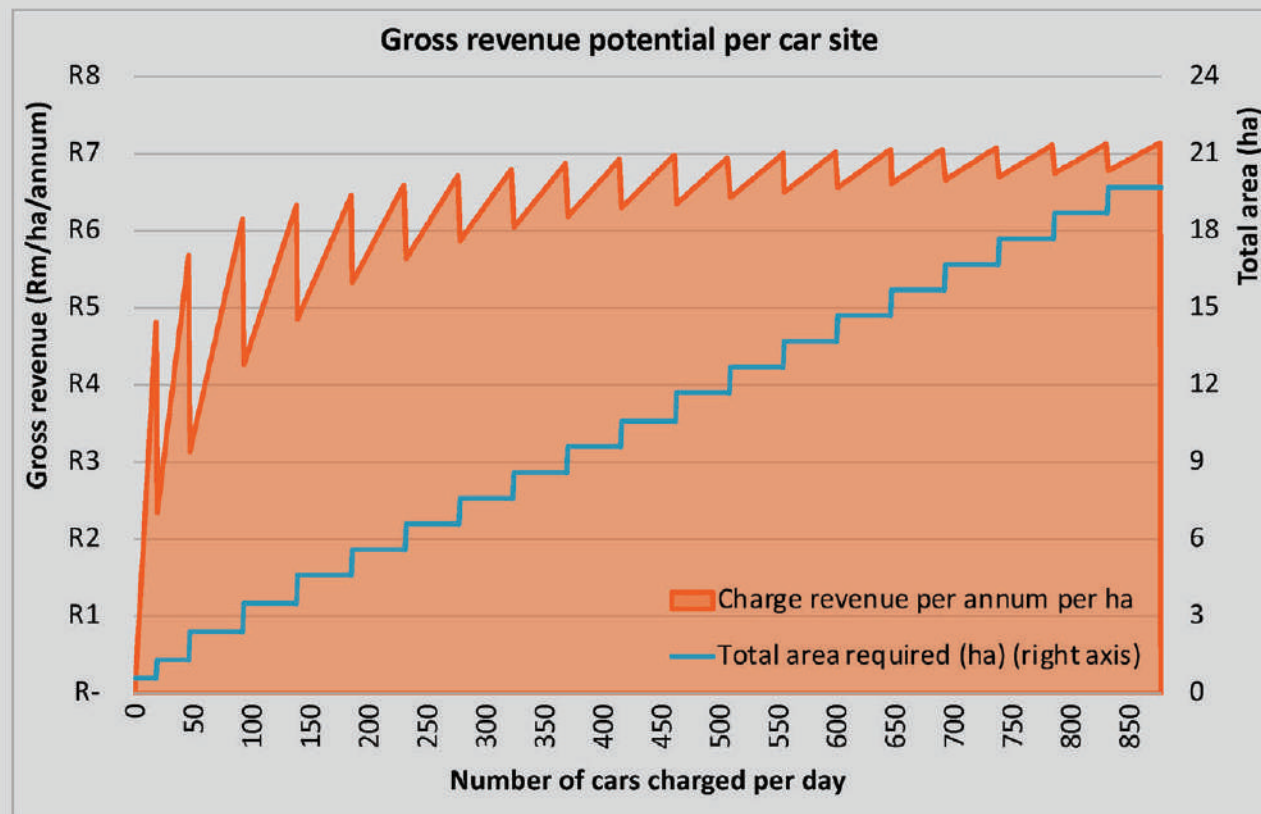


Assumptions	
kWh charge per car	55
R/kWh charged	R8.00
Share of revenue	100%

Under these assumptions, the total upper bound for economic activity from energy sales is estimated at R6m-R7m per developed hectare per annum

Maximum potential per phase:

Phase	Total cars to charge per day	PV (kWp)	Total (ha)	kWh sold per day
1	18	260	0.6	990
2	46	667	1.3	2 530
3	92	1 333	2.4	5 060
4	138	2 000	3.5	7 590
5	185	2 667	4.6	10 175
6	231	3 333	5.6	12 705
7	277	4 000	6.6	15 235
8	323	4 667	7.6	17 765
9	369	5 333	8.6	20 295
10	415	6 000	9.6	22 825
11	462	6 667	10.6	25 410
12	508	7 333	11.7	27 940
13	554	8 000	12.7	30 470
14	600	8 667	13.7	33 000
15	646	9 333	14.7	35 530
16	692	10 000	15.7	38 060
17	738	10 667	16.7	40 590
18	785	11 333	17.7	43 175
19	831	12 000	18.7	45 705
20	877	12 667	19.7	48 235



Measuring the economic impact of operational phase



Contribution to economic activity:

Operations

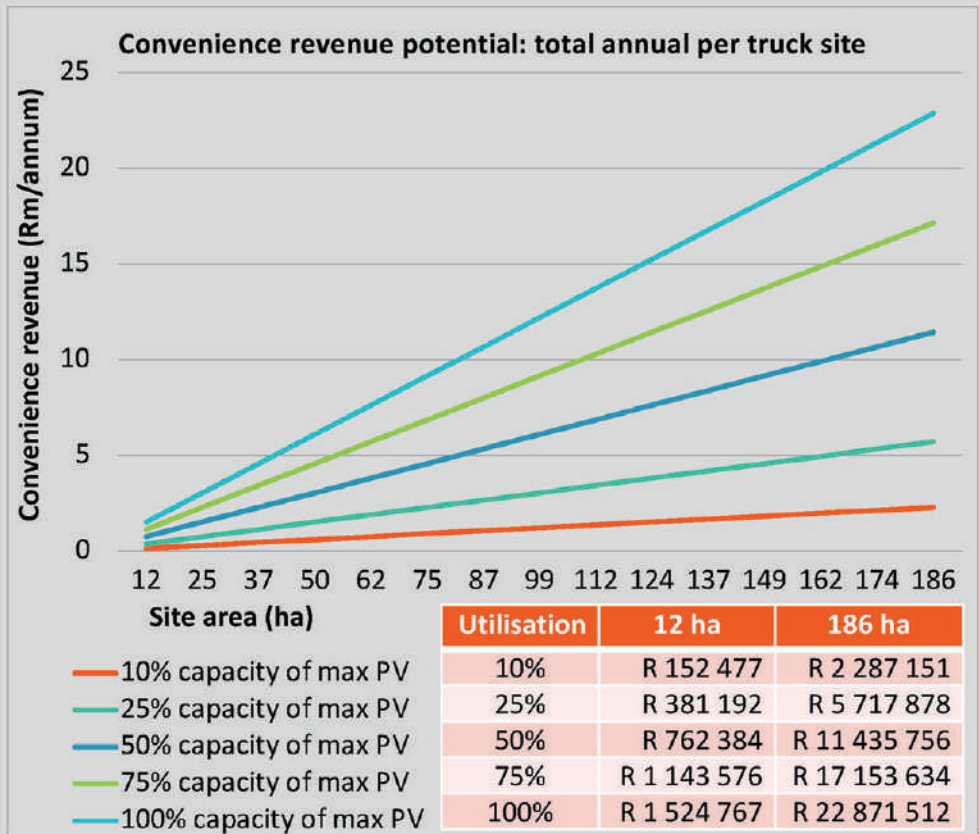
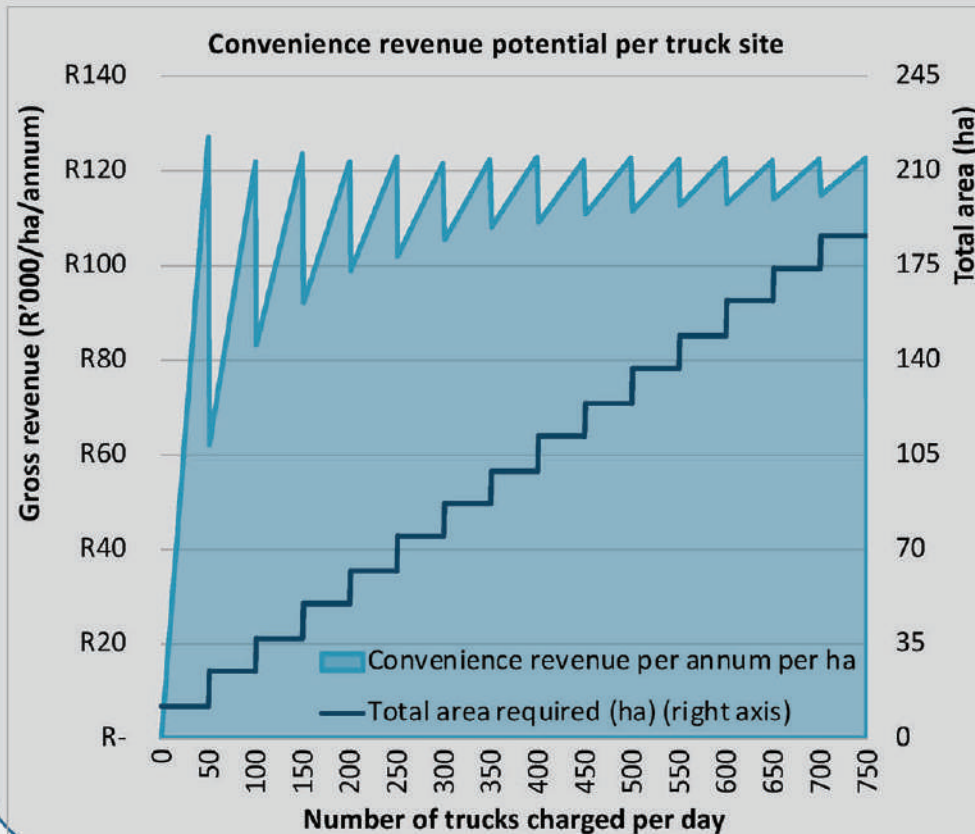


Gross convenience revenue linked to energy sales scale

Assumption: 50% of R0.37 convenience purchases/kWh

Based on convenience retail data from Nielsen (2017), inflation data from Stats SA (2024), retail fuel sales from DoE (2024), fuel station data from SAPIA (2024), EV fuel equivalents from Cardino (2024), and 50% vehicle occupancy compared to cars

Under these assumptions, the total upper bound for convenience retail is estimated at R100 000-R125 000 per developed hectare per annum



Measuring the economic impact of operational phase



Contribution to economic activity:

Rent



Gross rent payment to landowner from energy sales linked to scale

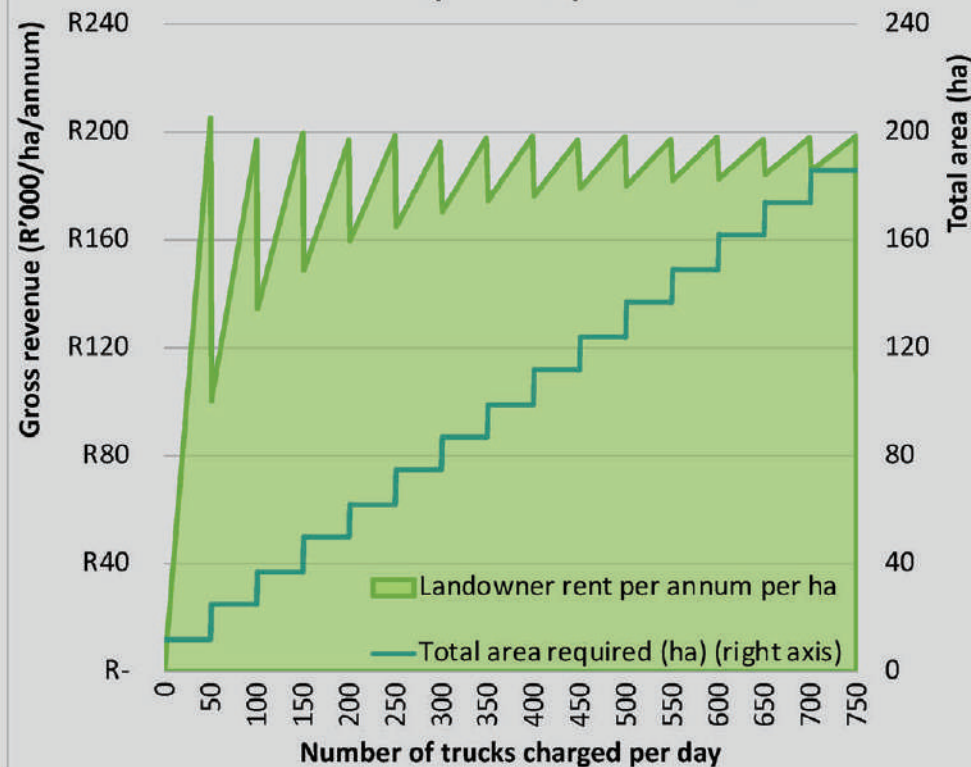


Assumptions

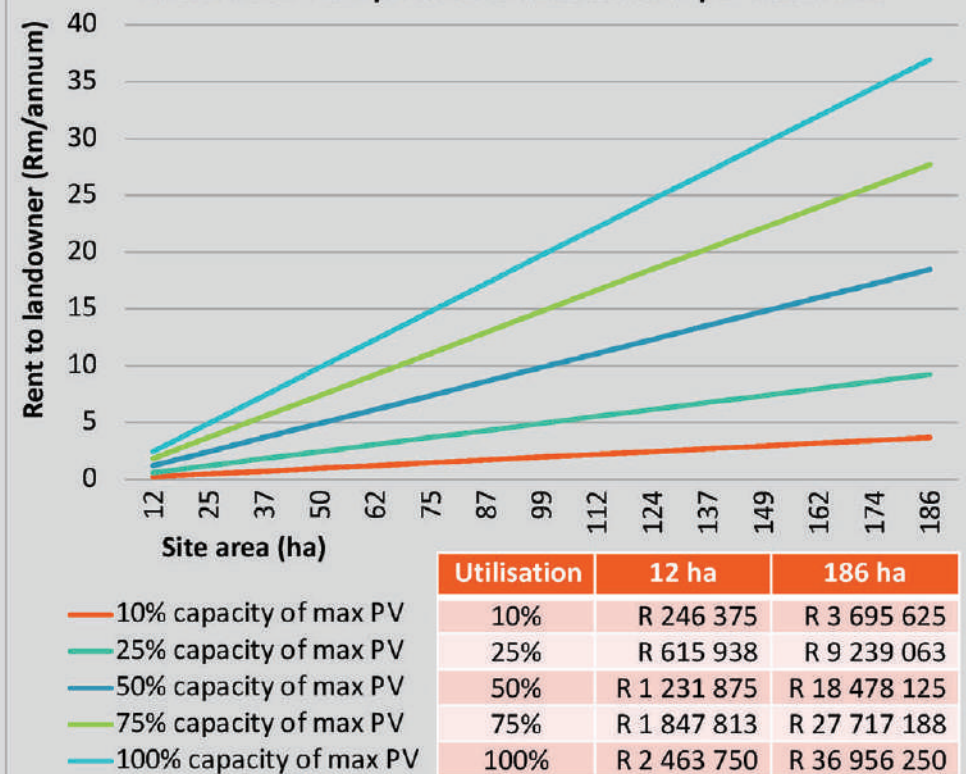
kWh charge per truck	450
R/kWh charged	R6.00
Share of revenue	5%

Under these assumptions, the total upper bound for rent payment (5% of energy sales) is estimated at R160 000-R200 000 per developed hectare per annum

Landowner rent potential per truck site



Landowner rent potential: total annual per truck site



Measuring the economic impact of operational phase

Contribution to economic activity:

Rent



Gross rent payment to landowner from energy sales linked to scale

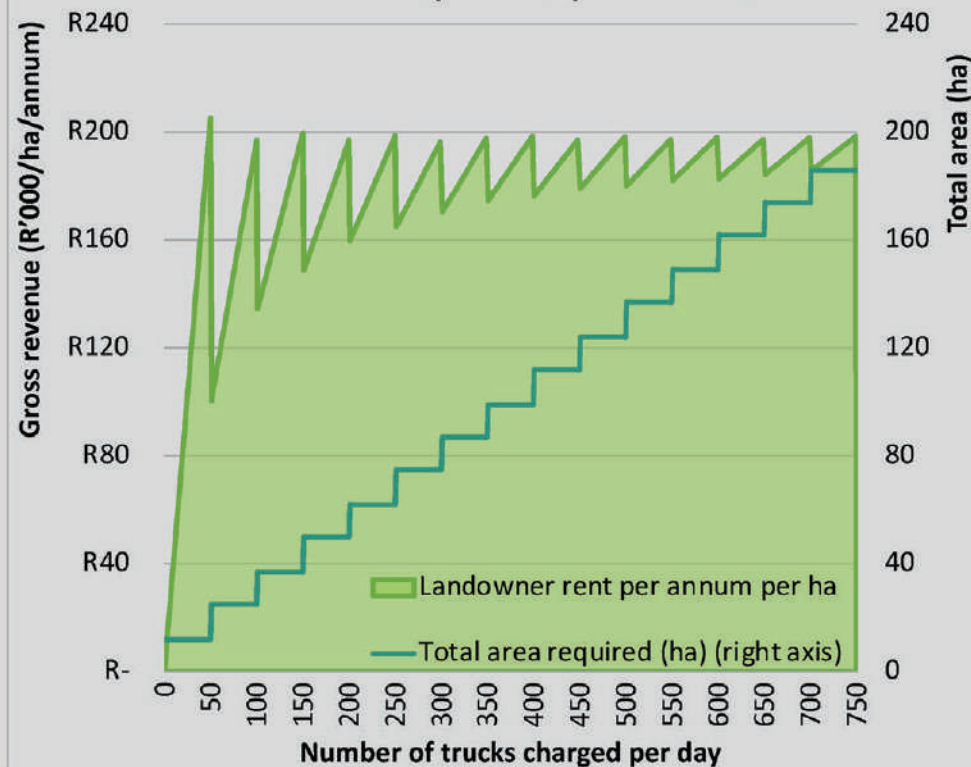


Assumptions

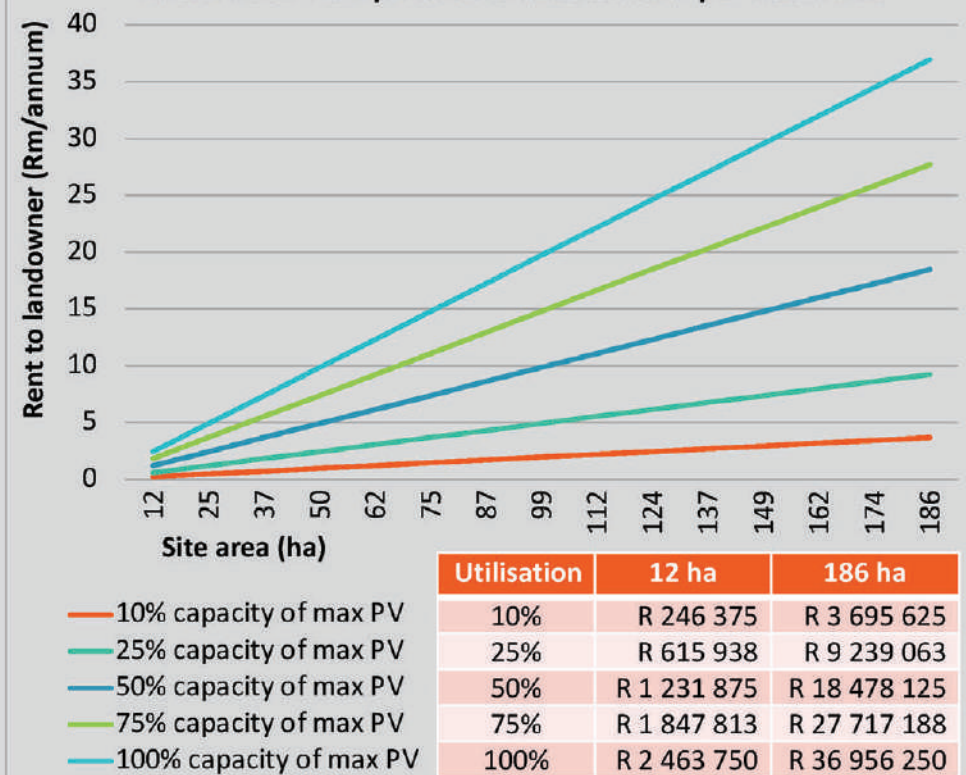
kWh charge per truck	450
R/kWh charged	R6.00
Share of revenue	5%

Under these assumptions, the total upper bound for rent payment (5% of energy sales) is estimated at R160 000-R200 000 per developed hectare per annum

Landowner rent potential per truck site



Landowner rent potential: total annual per truck site



Measuring the economic impact of operational phase

Contribution to economic activity:

Rent



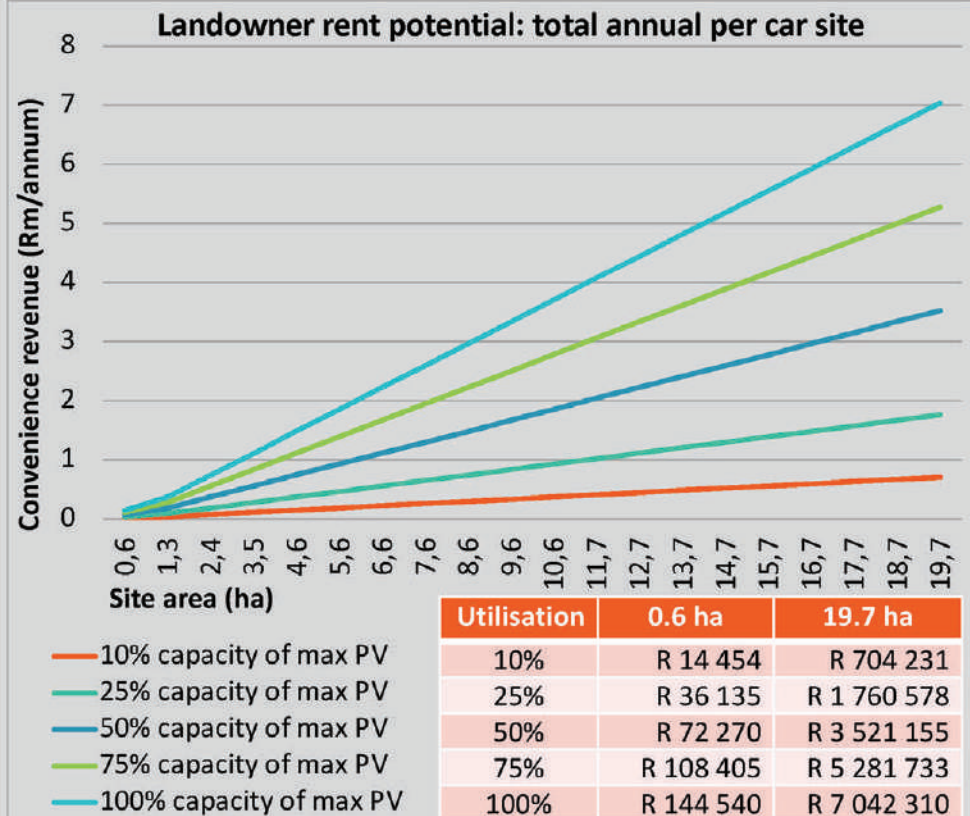
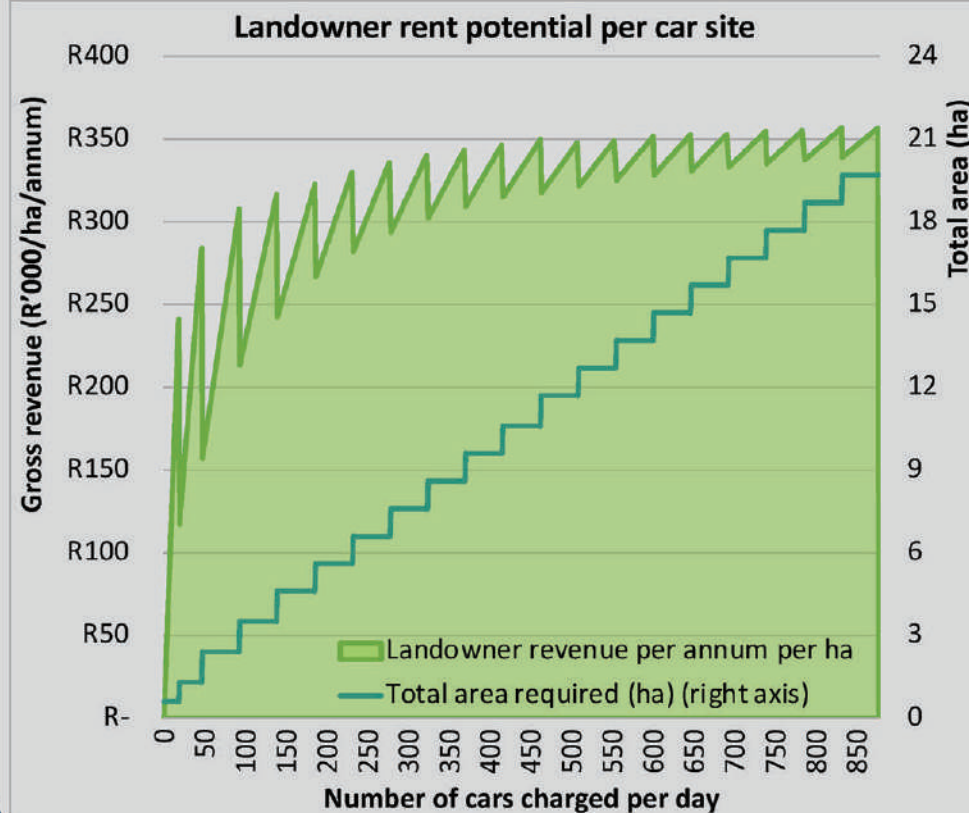
Gross rent payment to landowner from energy sales linked to scale



Assumptions

kWh charge per car	55
R/kWh charged	R8.00
Share of revenue	5%

Under these assumptions, the total upper bound for rent payment (5% of energy sales) is estimated at R250 000-R350 000 per developed hectare per annum



Measuring the social impact of operational phase



Contribution to development:

Employment



Unskilled & semi-skilled



Skilled

Contribution to development:

Shareholding



Creating long run opportunity to generate returns from investment (looking to raise about R2bn over time)

Contribution to development:

Enterprise



Large congregation of stakeholders to provide services to EV users that stimulate enterprise development locally and nationally

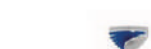
Activity	Site users	Direct engagement	Backed up by a network
	EV cars EV trucks	Employees & facilities - EV chargers - Convenience store	Consultants Contractors Service providers Industry partners



Impact	Developing communities & enterprises: - Contributing to upliftment and development of local communities (1% of energy sales) - Creating long-run employment opportunities (2100 jobs) - Compensation for land use (5% of energy sales) - Returns for capital invested Stimulate downstream economic activity
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Formal and informal/occasional collaborators include, but is not limited to:

CONSULTANTS | CONTRACTORS | SERVICE PROVIDERS & INDUSTRY PARTNERS



TAX & ACCOUNTING ADVISORS

FINANCIAL ADVISORS

ENGINEERS

TOWN PLANNERS

ENVIRONMENTAL ADVISORS

ARCHITECTS

QUANTITY SURVEYORS

VISUAL IMPACT SPECIALISTS

INTERIOR DESIGNER

FOOD SERVICE CONSULTANT

LANDSCAPE ARCHITECT

SOFTWARE SPECIALISTS

SAFETY & ACCESSIBILITY ASSESSOR

LEGAL ADVISORS

MEDIA COMMUNICATIONS SPECIALIST



Measuring the social impact of operational phase

Contribution to development :

Community



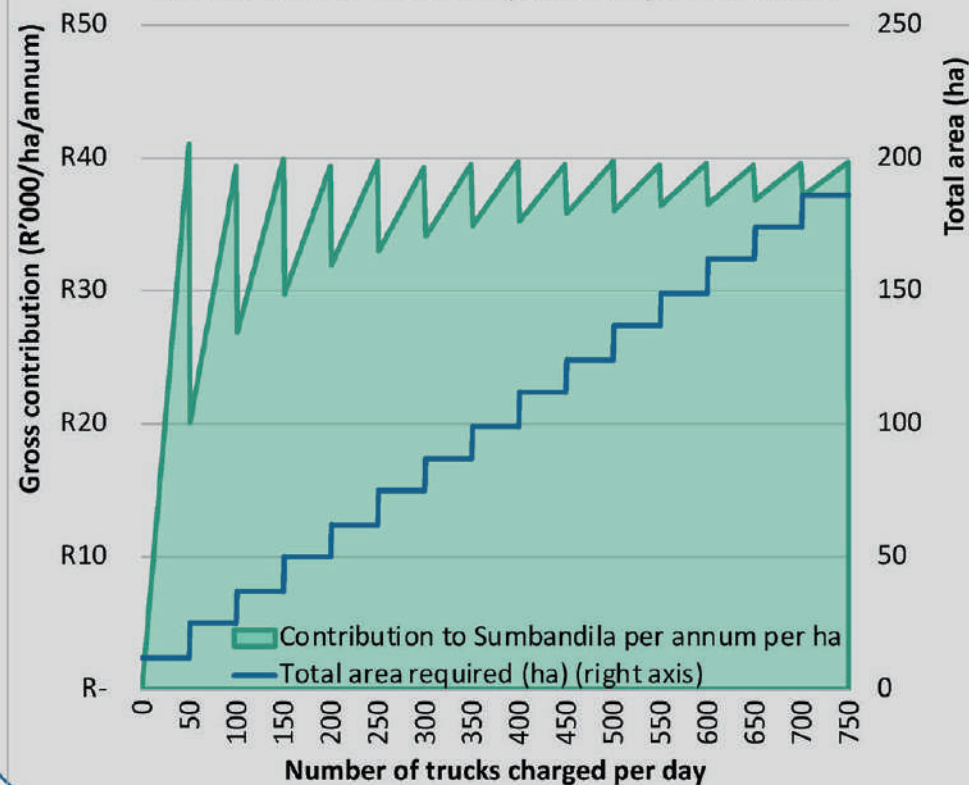
Gross contributions to Sumbandila Scholarship Trust from energy sales linked to scale



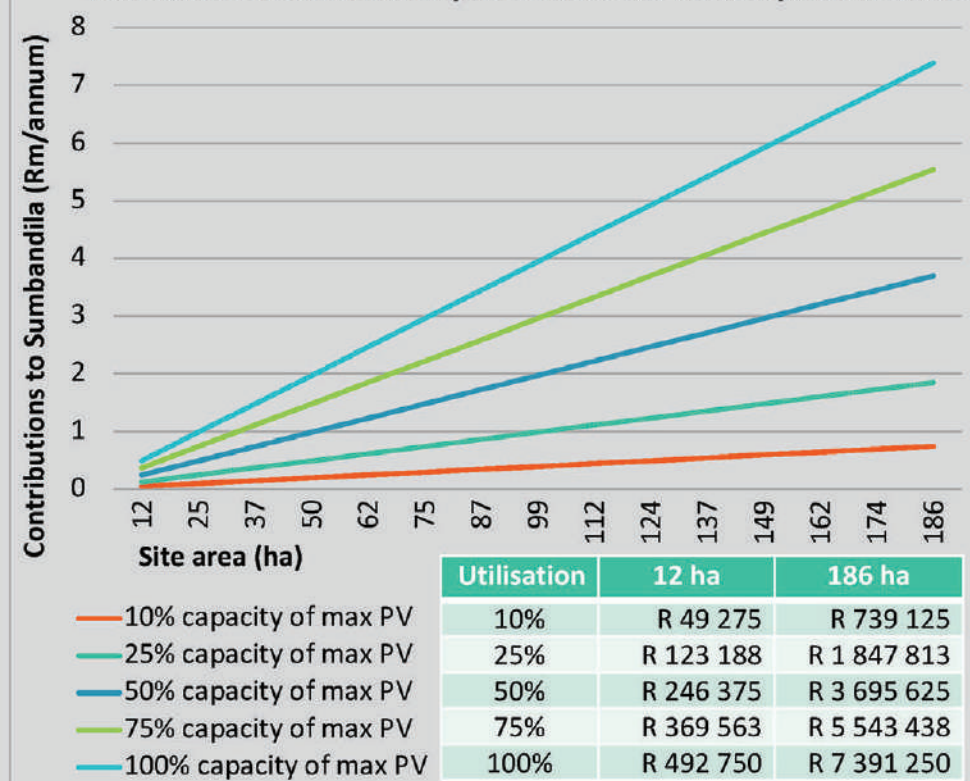
Assumptions	
kWh charge per truck	450
R/kWh charged	R6.00
Share or revenue	1%

Under these assumptions, the total upper bound for contributions (1% of energy sales) is estimated at R30 000-R40 000 per developed hectare per annum

Sumbandila contribution potential per truck site



Sumbandila contribution potential: total annual per truck site



Measuring the social impact of operational phase

Contribution to development:

Community

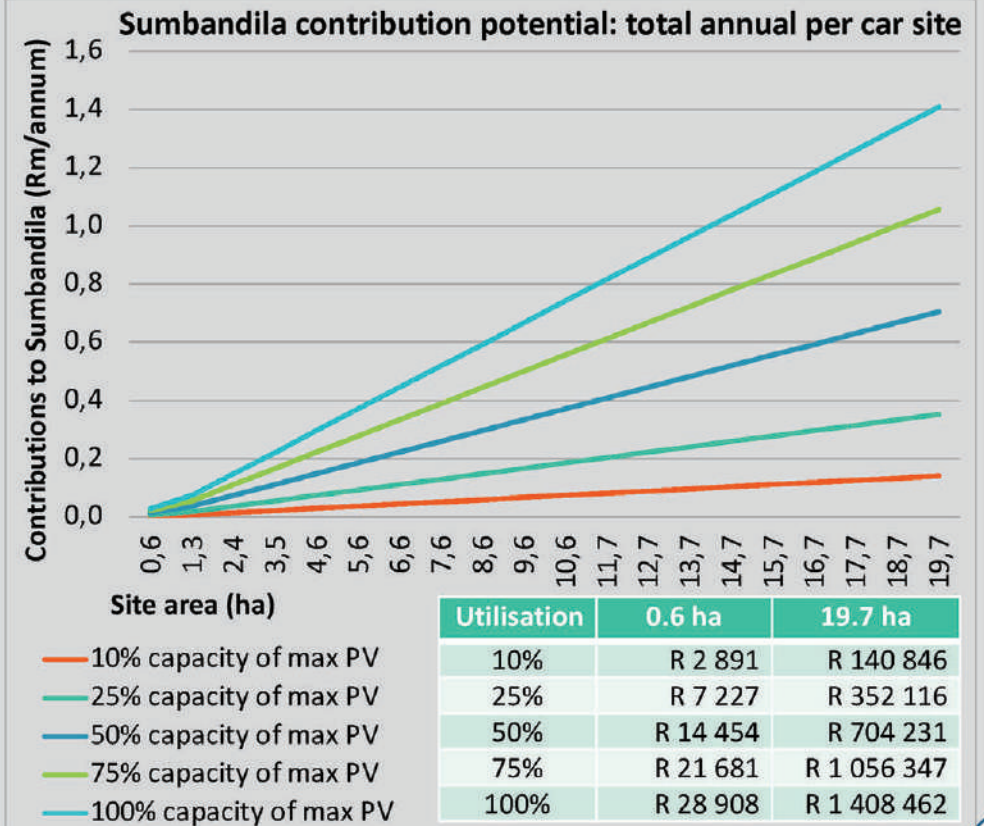
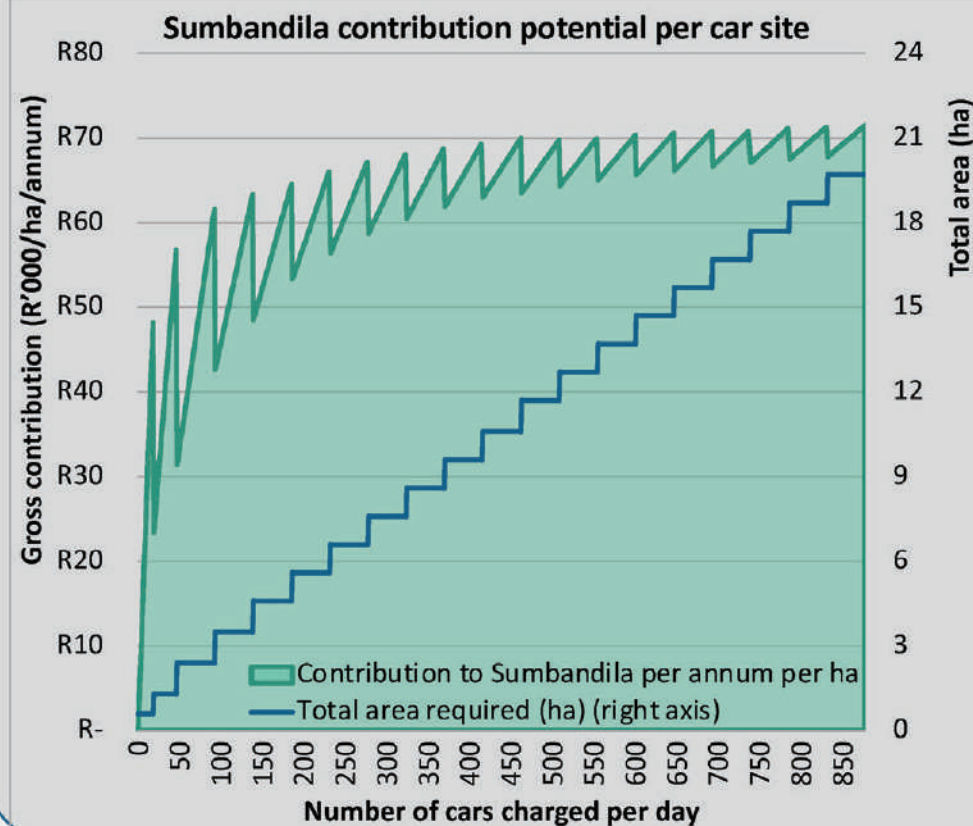


Gross contributions to Sumbandila Scholarship Trust from energy sales linked to scale



Assumptions	
kWh charge per car	55
R/kWh charged	R8.00
Share or revenue	1%

Under these assumptions, the total upper bound contribution (1% of energy sales) is estimated at R50 000-R70 000 per developed hectare per annum



Total job creation impact



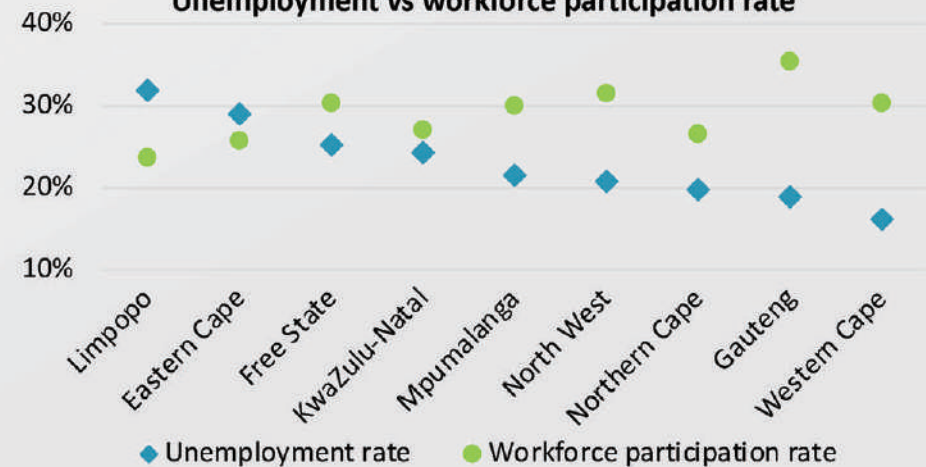
- Construction phase:
 - Project based job creation (4-8 months) with a total of
 - 5 800 job opportunities created for semi-skilled/unskilled workers
 - 6 400 job opportunities created for skilled workers
- Operational phase:
 - Permanent, local job creation:
 - 880 job opportunities for unskilled workers
 - 1 540 job opportunities for semi-skilled workers
 - 330 job opportunities for skilled workers
 - Temporary, local job creation:
 - 1 100 job opportunities for unskilled workers

- Each job created, will have significant downstream and indirect contributions to the local economy.
- Each household head, earning an income, has on average 3 dependents (varying slightly by province), that is, 39 900 dependents for all temporary jobs and 8 250 dependents for all permanent jobs (construction and operational phases).
- The unemployment rates presented per province (Source: Census 2011, which means that given the national unemployment trajectory, is likely significantly worse now), illustrates the need for additional job creation.

Average number of dependents



Unemployment vs workforce participation rate



Summary of demographics on sites

The demography, according to StatsSA published census and community survey data, in each Local Municipality (LM) where the Charge sites are planned to be placed are summarised per province.

This serves as a high-level description of the populations / demographics where these investments are planned. In summary:

- Gauteng is the most populous province where Charge stations are planned (>18 million people, 2011 Census).
- The Western Cape and Gauteng have 93% and 89% urban households respectively while the majority of households in the Northern Cape (61%), Mpumalanga (65%) and Limpopo (81%) provinces are in non-urban settings.
- The largest share of the working-age population resides in Gauteng (52%), KwaZulu-Natal (12%), Western Cape (9%) and Mpumalanga (7%).
- The unemployment rate is the highest in Limpopo (32%) and the Eastern Cape (29%), coinciding with the lowest workforce participation rates.
- Interestingly, the Northern Cape has one of the lowest unemployment rates (20%), but the highest proportion of unskilled working-age population: 69%.
- Gauteng (16%) and the Western Cape (13%) have the highest proportion of skilled working-age populations.
- The Western Cape (10%) and Gauteng (11%) provinces also have the highest proportion of top 10% earners in terms of provincial income distributions.
- Gauteng and KwaZulu-Natal house the highest number of “no income” and “bottom 50%” earners.

Upscaling the economic impact of operational phase

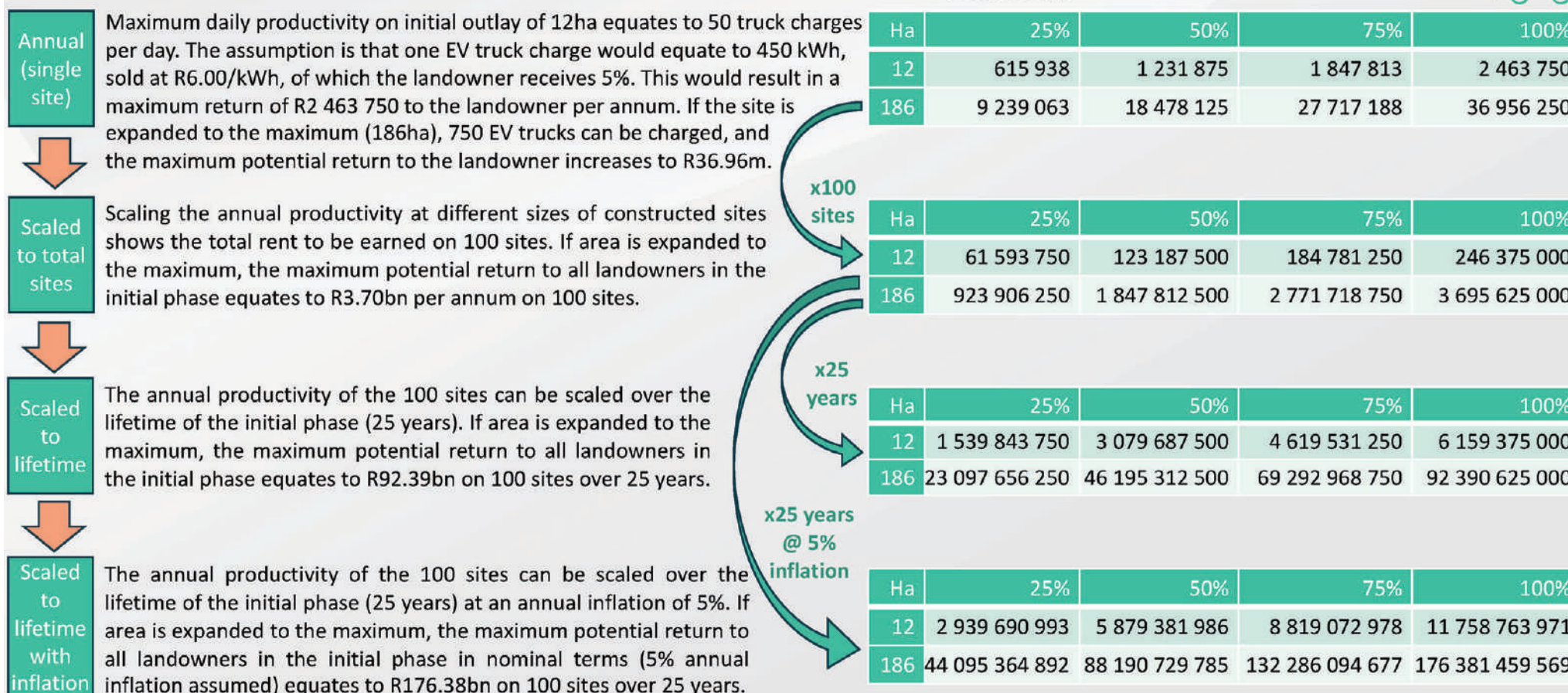


Contribution to economic activity:

Rent



Gross rent payment to landowner from energy sales linked to scale



Upscaling the economic impact of operational phase

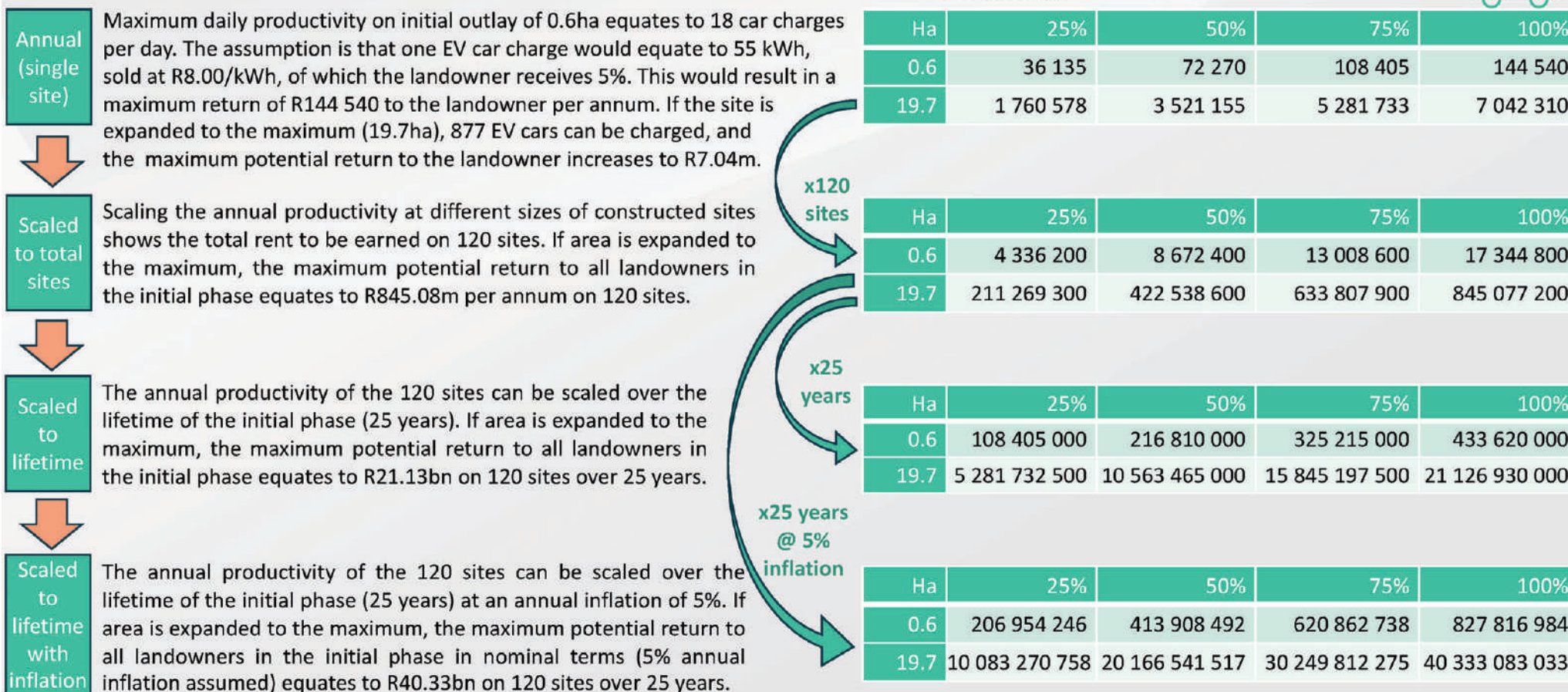


Contribution to economic activity:

Rent



Gross rent payment to landowner from energy sales linked to scale



Upscaling the economic impact of operational phase



Contribution to development:

Community



Gross contributions to Sumbandila Scholarship Trust from energy sales linked to scale



Productivity:

	Ha	Productivity:			
		25%	50%	75%	100%
Annual (single site)	12	123 188	246 375	369 563	492 750
	186	1 847 813	3 695 625	5 543 438	7 391 250
Scaled to total sites	Ha	25%	50%	75%	100%
	12	12 318 750	24 637 500	36 956 250	49 275 000
	186	184 781 250	369 562 500	554 343 750	739 125 000
Scaled to lifetime	Ha	25%	50%	75%	100%
	12	307 968 750	615 937 500	923 906 250	1 231 875 000
	186	4 619 531 250	9 239 062 500	13 858 593 750	18 478 125 000
Scaled to lifetime with inflation	Ha	25%	50%	75%	100%
	12	587 938 199	1 175 876 397	1 763 814 596	2 351 752 794
	186	8 819 072 978	17 638 145 957	26 457 218 935	35 276 291 914

x100 sites

x25 years

x25 years @ 5% inflation

Upscaling the economic impact of operational phase



Contribution to development:

Community



Gross contributions to Sumbandila Scholarship Trust from energy sales linked to scale

Annual
(single site)

Maximum daily productivity on initial outlay of 0.6ha equates to 18 car charges per day. The assumption is that one EV car charge would equate to 55 kWh, sold at R8.00/kWh, of which Sumbandila receives 1%. This would result in a maximum contribution of R28 908 to Sumbandila per annum. If the site is expanded to the maximum (19.7ha), 877 EV cars can be charged, and the maximum potential contribution to Sumbandila increases to R1.41m.

Scaled
to total
sites

Scaling the annual productivity at different sizes of constructed sites shows the total contribution to be made on 120 sites. If area is expanded to the maximum, the maximum potential contribution to Sumbandila in the initial phase equates to R169.02m per annum on 120 sites.

Scaled
to
lifetime

The annual productivity of the 120 sites can be scaled over the lifetime of the initial phase (25 years). If area is expanded to the maximum, the maximum potential contribution to Sumbandila in the initial phase equates to R4.23bn on 120 sites over 25 years.

Scaled
to
lifetime
with
inflation

The annual productivity of the 120 sites can be scaled over the lifetime of the initial phase (25 years) at an annual inflation of 5%. If area is expanded to the maximum, the maximum potential contribution to Sumbandila in the initial phase in nominal terms (5% annual inflation assumed) equates to R8.07bn on 120 sites over 25 years.

Productivity:

Ha	25%	50%	75%	100%
0.6	7 227	14 454	21 681	28 908
19.7	352 116	704 231	1 056 347	1 408 462

x120
sites

Ha	25%	50%	75%	100%
0.6	867 240	1 734 480	2 601 720	3 468 960
19.7	42 253 860	84 507 720	126 761 580	169 015 440

x25
years

Ha	25%	50%	75%	100%
0.6	21 681 000	43 362 000	65 043 000	86 724 000
19.7	1 056 346 500	2 112 693 000	3 169 039 500	4 225 386 000

x25 years
@ 5%
inflation

Ha	25%	50%	75%	100%
0.6	41 390 849	82 781 698	124 172 548	165 563 397
19.7	2 016 654 152	4 033 308 303	6 049 962 455	8 066 616 607

Meta study on the impact on Agriculture

Charge (the client) aim to establish a network of car and truck electric vehicle charging stations along South Africa's highways and main roads. The aim of this report is to provide the client with an independent analysis of how much agricultural land will be affected in each category of agricultural land-use, and what is the potential loss (or gain) in agricultural income and jobs in each of the Local Municipalities where sites will potentially be located.

The analysis is based on a range of spatial datasets (i.e. South African National Land Cover, Grazing Capacity, Land Capability, Protected areas, Crop Types etc.) from which the extent of the Charge site area will be characterized. Finally, the prevalent crop, horticulture and / or livestock income that could potentially be generated on each charge site was summarised per local municipality and a high-level demographic overview of the local municipalities is provided.

Spatial contextualisation

The actual locations identified by Charge, have a total surface area of 10 823ha. These locations and boundaries change continually as the company negotiates with individual land owners¹.

2 863ha (26%) of this area can be classified as field crop boundaries: fields, that are currently or have been previously cultivated for agricultural production. For 1 866ha (65%) of the field crop area (in Limpopo, Free State, Mpumalanga, North West and Western Cape only) the detail of crops produced on these fields is available.

Table 1: Current land use of the Charging sites

	Area (ha)	% contribution
Grassland & Shrubland	4 845	34.8%
Agricultural Land use	3 406	31.5%
Natural Forrest	1 822	16.8%
Barren land	593	5.5%
Wetlands	53	0.5%
Water	28	0.3%
Village	24	0.3%
Roads	23	0.2%
Mines	14	0.1%
Residential	8	0.1%
Offices & Industrial	6	0.0%
Eroded land	1	0.0%
Urban parks	0	0.0%
Total	10 823	

Source: South African National Landcover (2020)

¹The spatial analysis is based on the planned site boundaries, shared by Charge in October 2023. Where there were multiple boundaries per location, the 1ha / 20ha equivalent boundary was selected as the “initial site” for each location – for which this land use impact study was done.

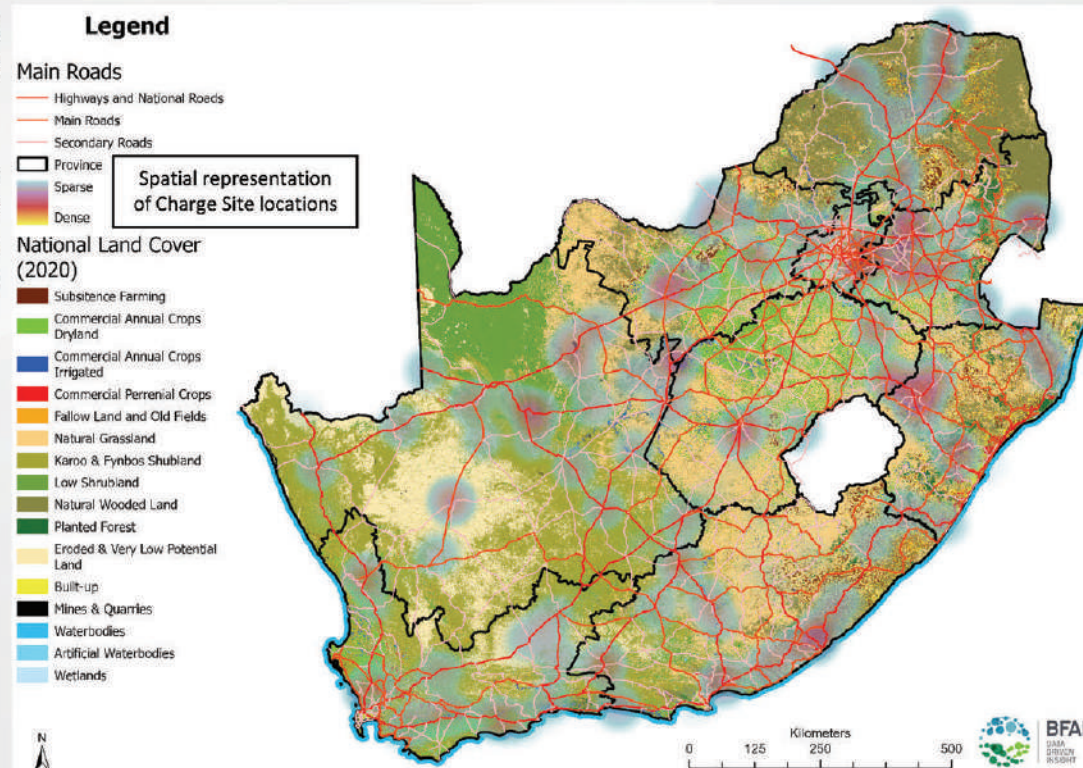


Figure 1: South African national land cover with Charge site density map and road infrastructure. (DEA, 2020 & BFAP, 2023)

Cultivated fields

Field crop boundaries (cultivated fields) make up only 2 861 hectares (23%) of the total site area. The majority of these field crop boundaries are classified as rainfed, annual cultivation fields, consisting of both cash crops and planted pastures (2 497ha, 87%) whereas horticulture, subsistence farming and pineapple fields contribute an additional 128ha, 96ha and 73ha each (10% in total).

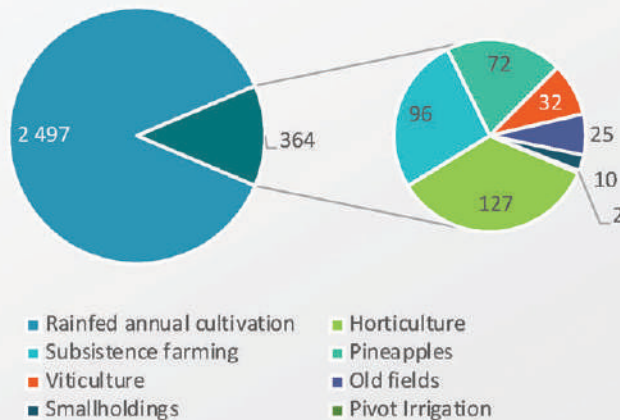


Figure 2: Field crop boundaries on Charge sites

Legend

Main Roads

- Highways and National Roads
- Main Roads
- Secondary Roads

Province

- Sparse
- Dense

Spatial representation of Charge Site locations

Field Crop Boundaries

- Food Gardens
- Horticulture
- Horticulture / Viticulture
- Non-pivot irrigated Annual Crop Cultivation / Planted Pastures
- Nursery
- Old Fields
- Pineapples
- Pivot Irrigation
- Rainfed Annual Crop Cultivation / Planted Pastures
- Rooibos
- Shadenet
- Small Holdings
- Subsistence Farming
- Tea Plantations
- Viticulture

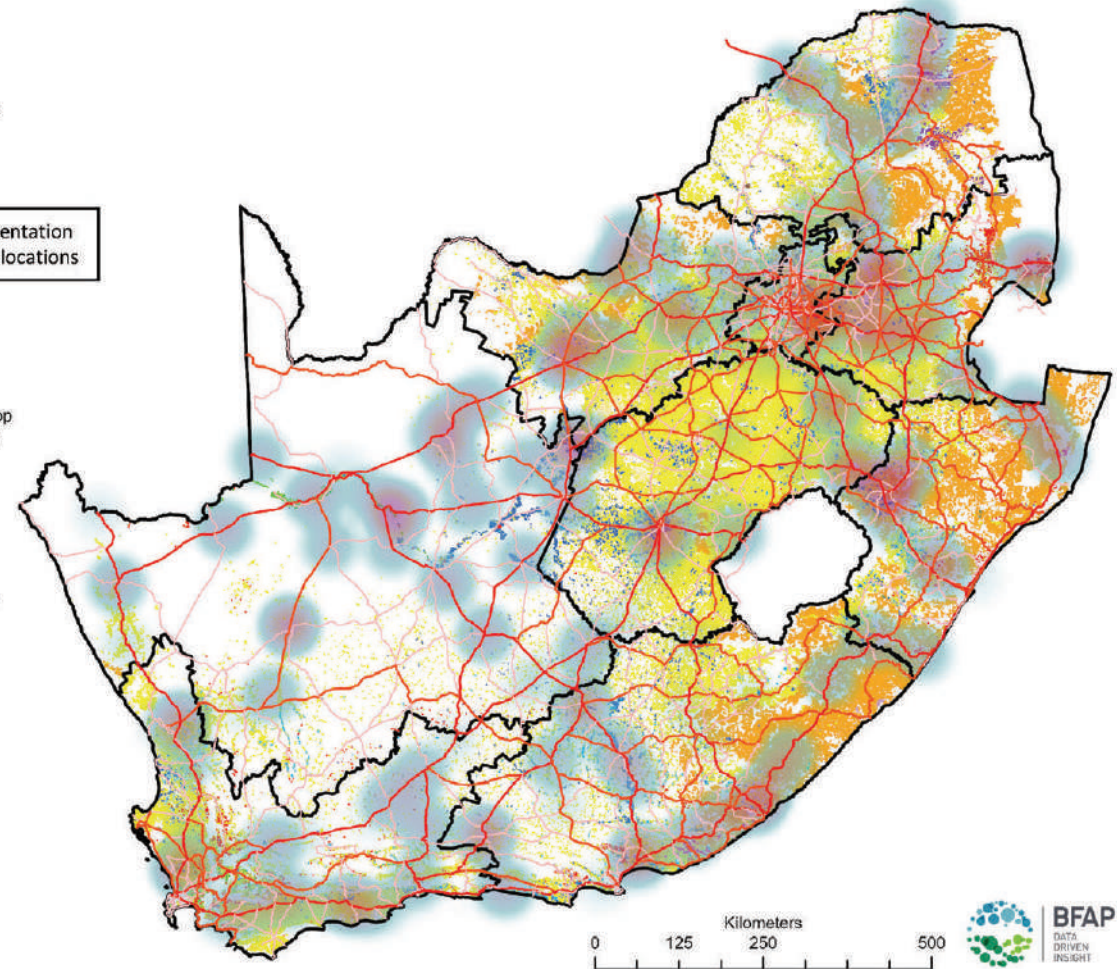


Figure 3: Field crop boundaries overlayed with Charge site densities (DALRRD, 2021 & BFAP, 2023)

Crop type information

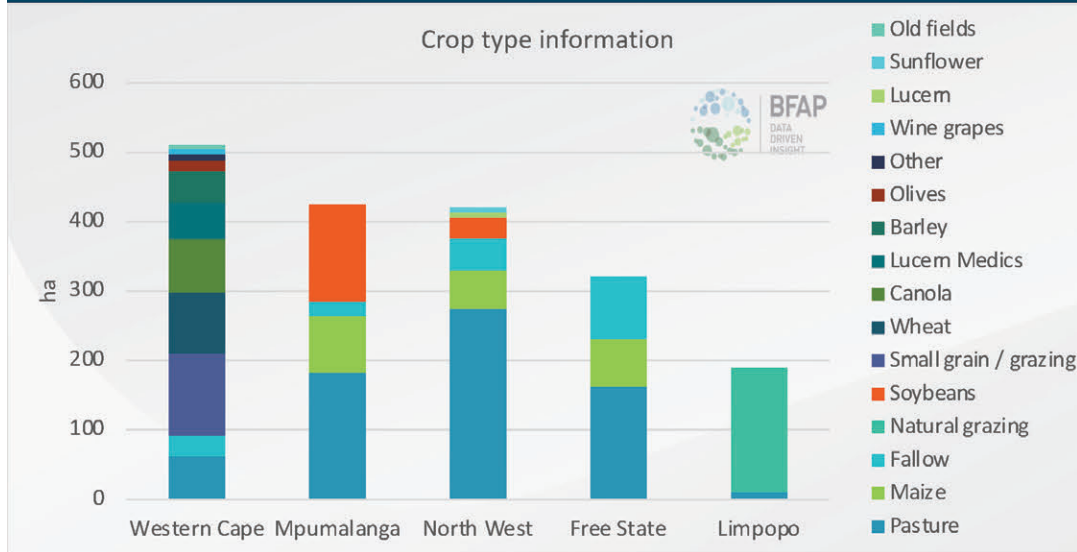


Figure 3: Crop type information on site areas (DALRRD, 2021 & WCDa, 2017; BFAP, 2023)

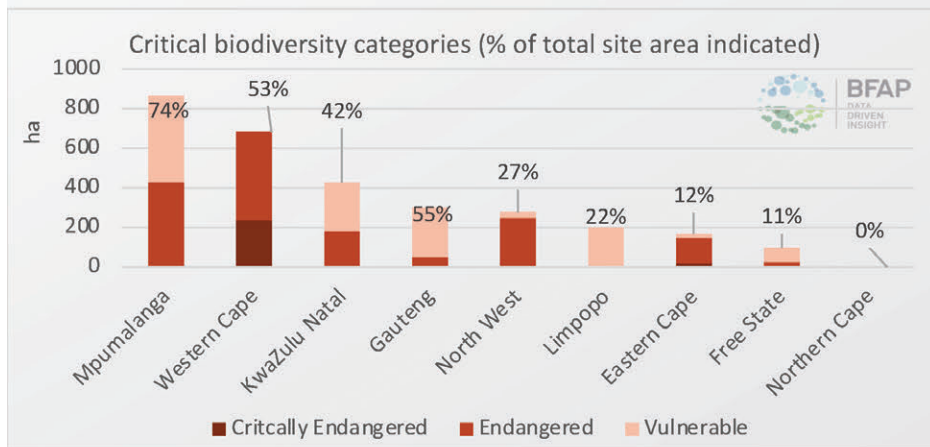


Figure 5: Critical biodiversity on site areas (SANBI 2022 & BFAP, 2023)

The 2021 crop type information (DALRRD) is available for the main summer crop producing provinces: North West, Free State and Mpumalanga. The Western Cape has conducted two flyover censuses, the latest published set from 2017 will be used. Finally, Limpopo has also conducted a flyover census in 2011, this is very outdated but some indication of the composition of the field crop boundaries in the province is an improvement on no data at all.

The available crop type information accounts for 1 866ha (65% of all cultivated fields on charge sites). The majority of cultivated fields in the 5 provinces where data is available are under a combination of pasture crops: natural grass and planted pastures (869ha, 47%) followed by maize production (204ha, 11%) and fallow fields (189ha, 10%). Together, these account for 68% of all cultivated fields in these provinces.

In the Western Cape, 327ha (64%) of cultivated fields are field crops (typically wheat, barley, canola), 25% of the cultivated fields are pastures and other fodder crops (130ha) and fallow fields & horticultural crops make up the rest of the cultivated fields.

The Critical Biodiversity Areas (CBA's) vegetation categorization by SANBI aims to support sustainable development through sustainable land use management. **These vegetation categorisations cover the total country's extent and therefore include areas where natural vegetation would have been classified as endangered, but where land use has already changed in the past.** Critical and Endangered biodiversity vegetation categories of land make up a significant portion of the Western Cape Charge site areas (53%), with less representation in other provinces. These classifications on natural vegetation will likely pose some limitations on land use change applications, mainly in the Western Cape.

Land capability, representing land use potential



The land capability dataset (see Figure 7) classifies South Africa's surface area into most to least suitable profiles for "natural or unimproved rain-fed (dryland)" production, based on soil (30% consideration), climate (40%) and terrain (30%) capabilities. A land capability class is an interpretive grouping of land units with similar potentials and continuing limitations or hazards. It is a more general term than land suitability and is more conservation oriented. The land capability classification does not take current crop cultivation, crop suitability nor unique agricultural land into consideration. It involves consideration of (i) the risks of land damage from erosion and other causes and (ii) the difficulties in land use owing to physical land characteristics, including climate.

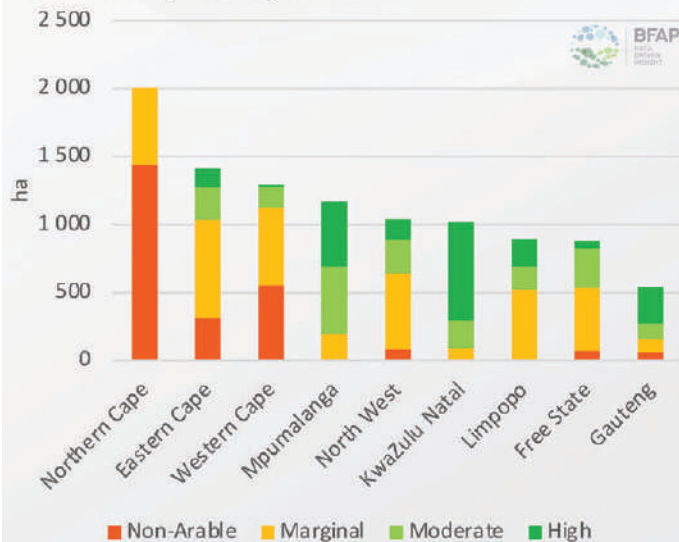


Figure 6: Land capability class per province for total site areas

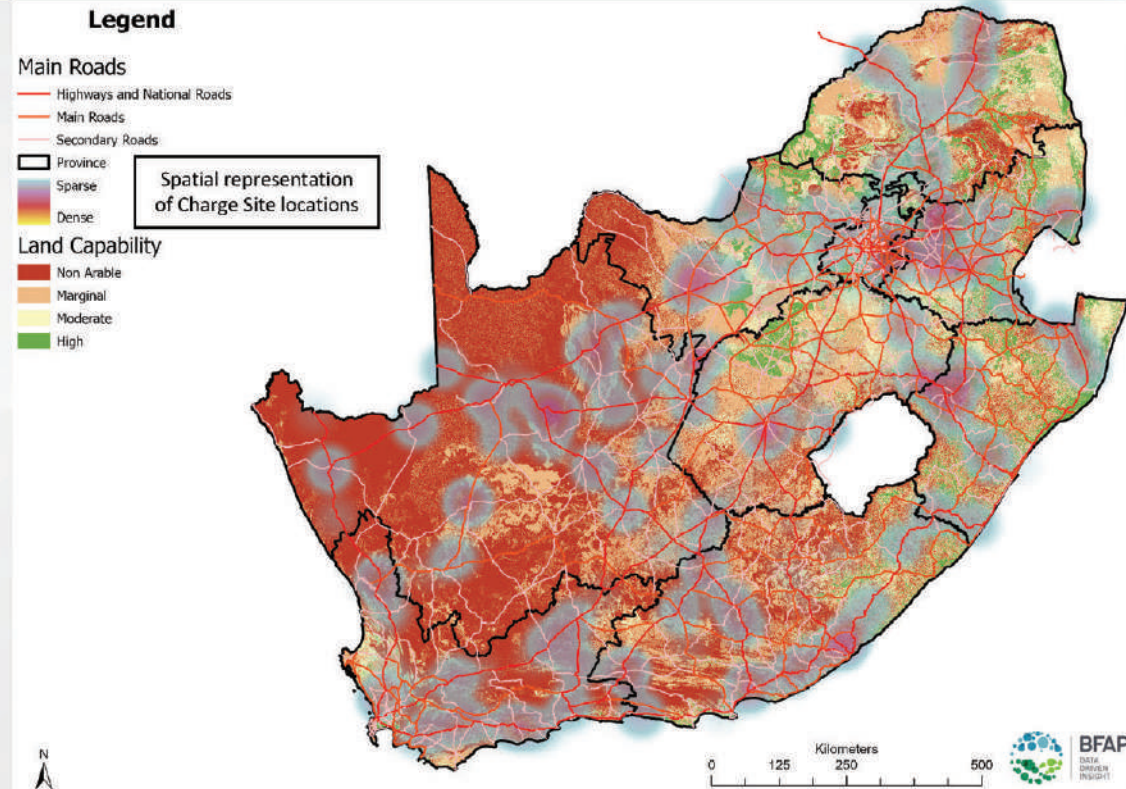


Figure 7: Land capability overlaid with Charge site location density map (DAFF, 2019 & BFAP, 2023)

Figure 6 shows that the Northern Cape Charge sites represent the largest area, but has only non-arable to marginal land capability class. Whereas Mpumalanga and KwaZulu Natal site areas comprise of mostly moderate to high land capability classes.

In summary, 25% of all the Charge site area falls in non-arable land capability, 37% is classified as marginal, 19% as moderate and 20% as high land capability class.

Protected Agricultural Areas, as developed by DALRRD

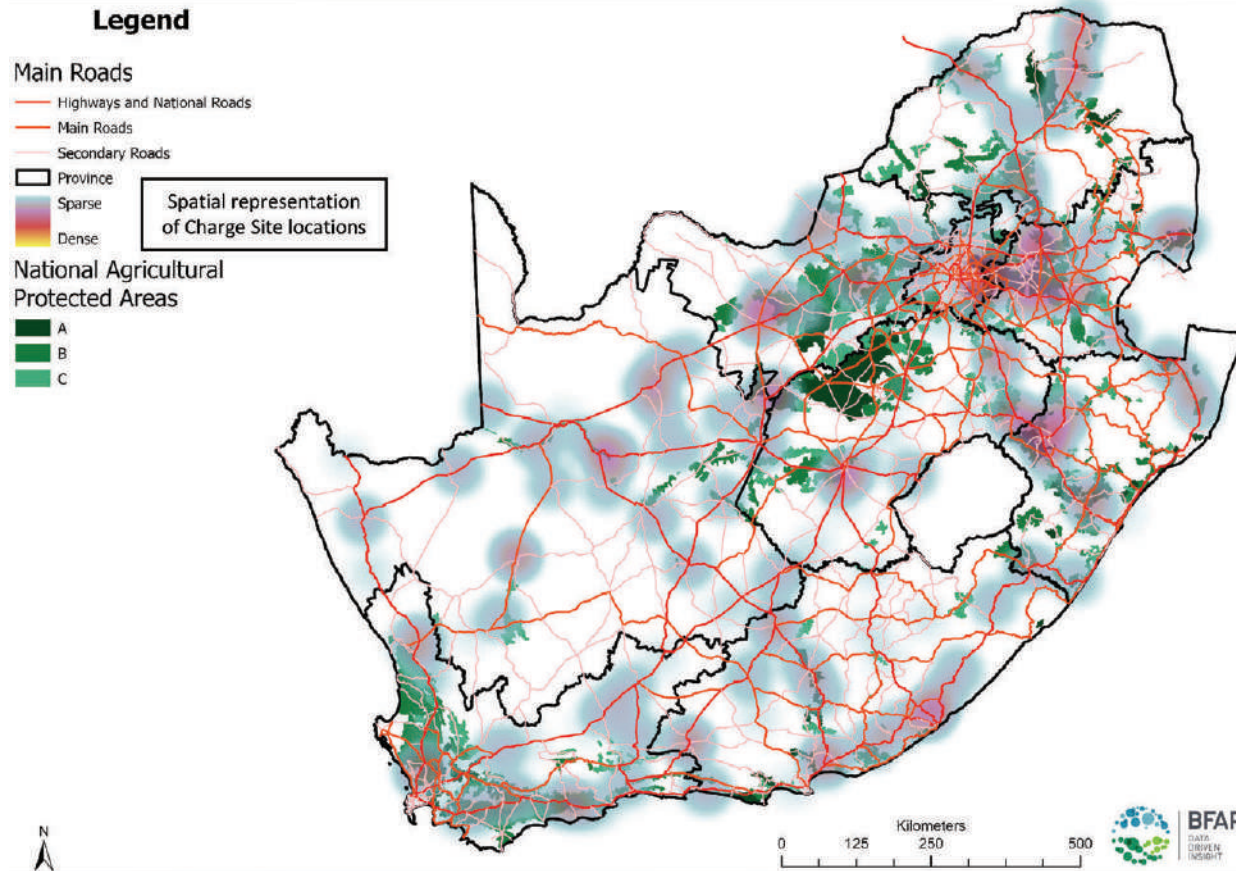


Figure 8: Protection of high-potential agricultural land (DALRRD, 2023 & BFAP, 2023)

A “Protected Agricultural Area (PAA)” is defined as a:

“cartographic delineated area of agricultural land, preserved for purposes of ensuring high value agricultural land is protected against non-agricultural land uses in order to promote the long-term agricultural production and food security”.

PAAs are therefore regarded as large, relatively homogeneous portions of high value agricultural land that have the potential to sustainably, in the long-term, contribute significantly to the production of food.

The aim of these areas is to:

- Be included and gazetted as PAAs as defined under PDALB, when it is enacted (process is underway);
- Be incorporated within current spatial planning mechanisms.

A total of 2 731ha (25%) of Charge site area currently falls under PAA categories A – C, which will be designated as national protected areas.

Figure 9 below lists the contribution per province.

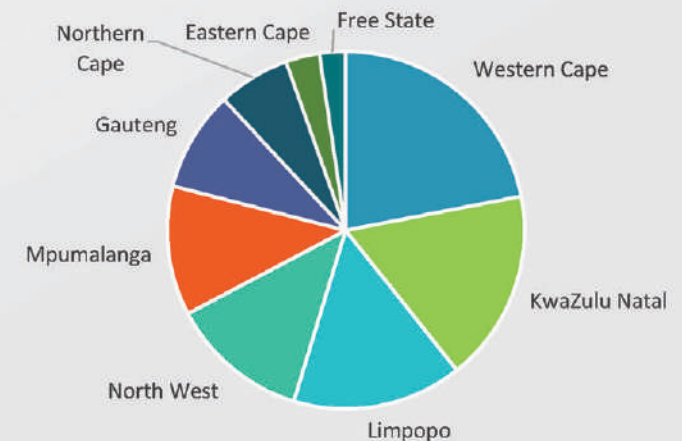


Figure 9: Total national Protected Agricultural Areas per Province (DALRRD, 2023 & BFAP, 2023)

Protected Agricultural Areas, as developed by DALRRD



Table 2 below details the top 3 landcover classes currently occurring on the National Protected Agricultural Areas (Landcover, 2020).

Most of these areas are currently under cropland production (1 216ha, 45% of all National Protected Agricultural Areas), followed by orchards (397ha, 15%), grassland (356ha, 13%) natural forests (309ha, 11%) and shrubland (295ha, 11%). The remaining area is made up of fallow land, plantations and some other landcover classes. These National Protected Agricultural Areas contribute 44% to the total charge site area in the Western Cape, up to 48% of the charge site area in Limpopo and 34% of the charge site area in both KwaZulu Natal and the North West provinces.

Table 2: Summaries on the current land use of national protected agricultural areas (DALRRD, 2023 & BFAP, 2023)

	Western Cape	KwaZulu Natal	Limpopo	North West	Mpumalanga	Gauteng	Northern Cape	Eastern Cape	Free State
Top 3 Landcover classes on National Ag. Protected areas.	Commercial cropland	Orchard	Natural Forrest	Commercial cropland	Commercial cropland	Commercial cropland	Shrubland	Grassland	Commercial cropland
	Shrubland	Grassland	Commercial cropland	Grassland	Orchard	Grassland	Grassland	Shrubland	Grassland
	Orchard	Fallow land	Fallow land	Fallow land	Grassland	Wetlands	Orchard		Fallow land
Sum of top 3 land cover classes	565	426	416	332	310	246	175	83	63
Total National Ag Protected Area	599	474	419	343	320	247	178	83	64
Total Charge Site Area	1 287	1 267	872	990	3 224	615	2 007	1 326	1 019
% of Charge site area, that is a national protected area	44%	34%	48%	34%	10%	40%	9%	6%	6%

Grazing capacity and livestock production



Figure 10 below shows South Africa's grazing capacity (in ha/Large Stock Unit (LSU)) overlaid with the Charge site density map while Figure 11 presents the contribution of various grazing capacity classes to the total charge site areas. The shrubland / Karoo vegetation in the Northern and Western Cape have the highest ha/LSU requirements.

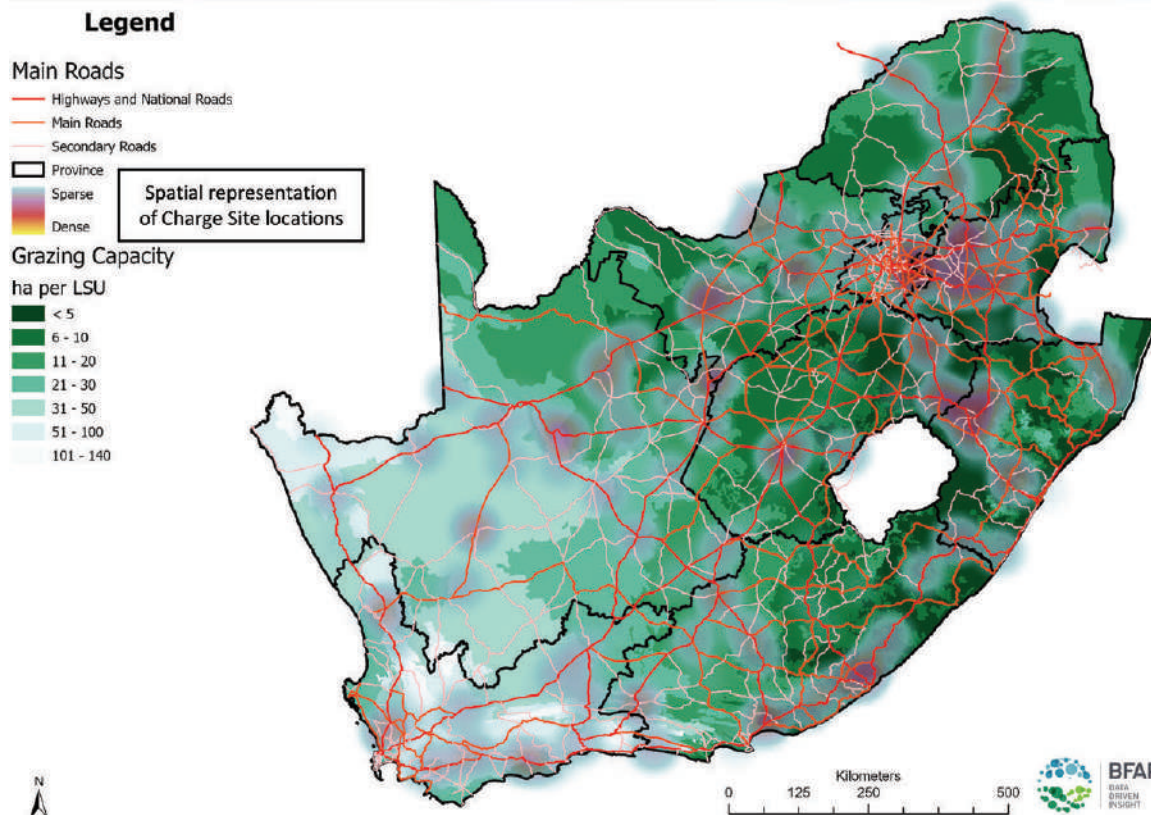


Figure 10: Grazing capacity overlaid with charge site density map (DAFF, 2019 & BFAP, 2023)

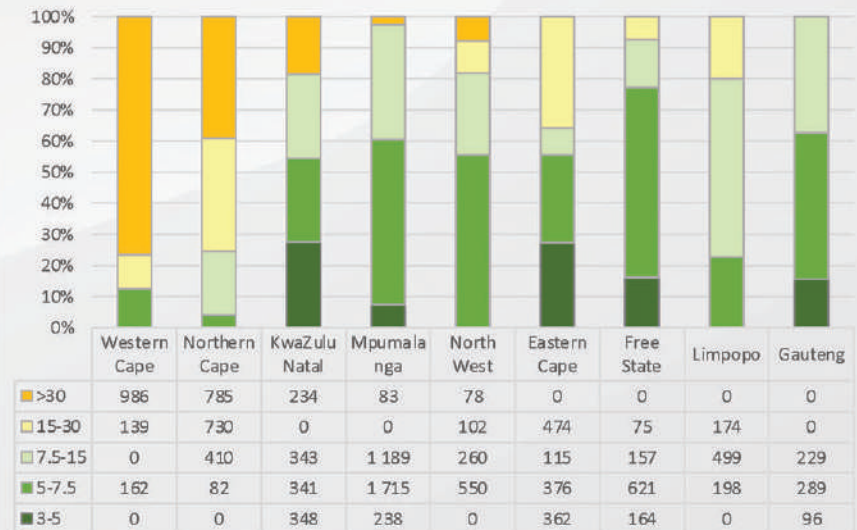


Figure 11: Grazing capacity on Charge sites, per province (DAFF, 2019 & BFAP, 2023)

A total of 1 209ha (mainly in KwaZulu Natal, Eastern Cape, Free State and Mpumalanga) represents land requiring only 3-5ha/LSU. This dataset is further used to develop potential income per hectare estimations.

Similarly to the protection of high-potential agricultural land methodology, the Department of Agriculture has defined high potential agricultural areas, specific to grazing, and has published the Western Cape set to date. The Charge site areas currently contain only category C and D grazing potential area (70ha and 390ha respectively); which are not currently classified as national protected areas.

Representativity within total Agriculture i.t.o. Area



41% (5 190ha) of the total Charge site area is classified as various agricultural activities by the land cover (see Table 2). In Table 2, the South African total field crop, irrigation, plantation forest, orchards, sugarcane and pineapple area is presented from various sources. Finally, the percentage presents the proportion of the total agricultural activity (in ha) that could potentially be affected by developing these Charge sites.

The total intended Charge site area is considered potential grazing land and the number of LSU's that can theoretically be supported on these sites is calculated at 1 219.

This number is then compared to the 12.8 million heads of cattle that are reported as the South African cattle herd by the Department of agriculture.

Similarly crop areas for other agricultural activities are compared: **The impact is estimated to be less than 0.1% for all categories of agricultural activity with the exception of plantation forests and orchards.** None of these macro-impact metrics are larger than 1%, and therefore unlikely to significantly affect agricultural production/activities and/or result in significant agricultural job losses.

Table 2: Total charging site area compared to South African totals

	Charge Site Area (ha) ⁶	South Africa Total (ha) (2020-2022 avg)	
Field crops	3 238	5 272 000 ¹	0.06%
Irrigation	19	1 390 000 ²	0.001%
Grazing	1 103 cattle ³	12 871 853 cattle ⁴	0.009%
Plantation Forest	200	117 917 ⁵	0.17%
Orchard	1 497	408 881 ⁶	0.37%
Sugarcane	237	252 700 ¹	0.09%
Total	5 190		

¹ BFAP Sector Model, 2020 – 2022 average

² WRC & DAFF 2018, BFAP 2021

³ Total large stock units (cattle) that can theoretically be supported by total Charge site area, based on Grazing Capacity (DAFF 2018)

⁴ South African cattle herd (DAFF 2018)

⁵ SACOL Annual Report (2022/2023)

⁶ South African National Land Cover 2020 (SANBI 2020)

Representativity within total Agriculture i.t.o. Production volumes

Table 3: Total charging site production estimates compared to South African totals

	Production estimate ('000 tonnes)	National Total ('000 tonnes)	%
Soybeans ¹	19.34	1 676 ⁴	1.154%
Avocados ²	0.73	135 ⁴	0.539%
Pecans ²	0.06	23 ⁵	0.249%
Cabbage ²	0.36	165 ⁴	0.221%
Carrots ²	0.34	222 ⁴	0.153%
Sunflower ¹	1.10	841 ⁴	0.131%
Wheat ¹	1.74	1 979 ⁴	0.088%
Sugarcane ²	15.11	18 484 ⁴	0.082%
Maize ¹	11.10	16 017 ⁴	0.069%
Wine grapes ²	0.82	1 292 ⁵	0.063%
Macadamias ²	0.02	59 ⁵	0.040%
Table Grapes ²	0.05	353 ⁵	0.014%
Beef ³	0.049	700 ⁴	0.007%
Pineapples ²	4.52	117 ⁴	0.04%
Potatoes ²	0.08	2 659 ⁴	0.003%

¹ It is assumed that all cultivated fields are planted to that particular crop and the yield according to crop suitability is achieved.

² Only the area currently under orchards in Local Municipalities where these crops are predominantly cultivated (CoCA, 2017).

³ Based on grazing capacity and BFAP Farm & Production Modelling assumptions.

For the potential production estimation of major field crops (soybeans, sunflower, wheat, maize) it is assumed that all cultivated fields are planted toward that particular crop (therefore representing an **upper limit of potential production impact**). Given this assumption and the consequent comparison with national statistics from the 2022 season, the largest potential share of production is 1.154% of the national soybean crop. Followed by 0.131% of the sunflower crop, 0.088% of the wheat crop and 0.069% of the national maize crop. **These potential crop production contributions are minute, if compared to the typical seasonal (climate-driven) variability in production (5-year average year-on-year production changes indicated): 12% for soybeans, 7% for maize, 6% for wheat and 0.4% for sunflower.**

All estimated potential orchard production impacts, with the exception of avocados and pineapples, were 0.25% or less of national production totals. For those two commodities, the impact remains less than or close to half a percentage.

For the grazing area impact, the grazing capacity in terms of large stock units (i.e. cattle) was used to estimate that **426 cattle (0.003% of the national cattle herd) could be potentially be sustained on the grazing area** falling in the charge sites and from these cattle, **an estimated 49 tonnes of meat could be produced annually (0.007% of the total beef production in South Africa).**

⁴ DALRRD, Abstract of Agricultural Statistics 2022.

⁵ BFAP and South African industry organisations' statistics, 2022.

Income estimation from agricultural activities on proposed Charge sites: Potential income substitution calculation

Illustration of potential gross margin (income) estimations

Area:
Landcover 2020
summary
per site

Cultivated
fields (ha)

Grazing area
(ha)

Orchard area
(ha)

Field crops

Quantifying attainable yield for the main field crops

Calculate the potential income per hectare per LM

Impose this potential income on field crop hectares of sites and choose the crop for which potential income is the highest

Livestock

Derive number of LSU's that can be supported per site using the national grazing capacity data.

Calculate estimated potential income per hectare.

Impose this potential income on grazing hectares of sites

Horticulture

Determine the dominant commodity grown per LM using the Agricultural Census 2017.

Calculate the potential income per hectare.

Impose this potential income on orchard hectares of sites.

Potential income estimation, from field crops, livestock and horticulture

1) The cultivated fields, grazing and orchard hectares were determined from the National South African Landcover 2020.

2) The BFAP farm level division compiled a set of representative farm level budgets for a selection of field crops and orchard crops as well as hectare/LSU based gross margin (income) estimates for livestock farming.

3) For fieldcrops, the GAEZ yield potential model (see next page) was used to extrapolate relevant gross margin (incomes) per crop to site locations.

4) The average potential income from each subsector (field crops, livestock, horticulture) and summarized per province and local municipality.

The **Gross Margin** is defined as income (price x volumes) less direct costs (e.g. seed, fertiliser, water for irrigating orchards etc.). But excluding overhead/ indirect costs (e.g. loan repayment, permanent labour etc.).

Maize & Soybean yield potential



FAO and IIASA (2023) in their Global Agro Ecological Zones (GAEZ) version 4, have published yield potential values based on various agronomic variables with the assumption that high-input regimes (commercial farming equivalent in South Africa) are used. The yield potential for maize, soybeans, sunflower and wheat was linked to each site area and the relevant gross margin (income) from farming activities was calculated.

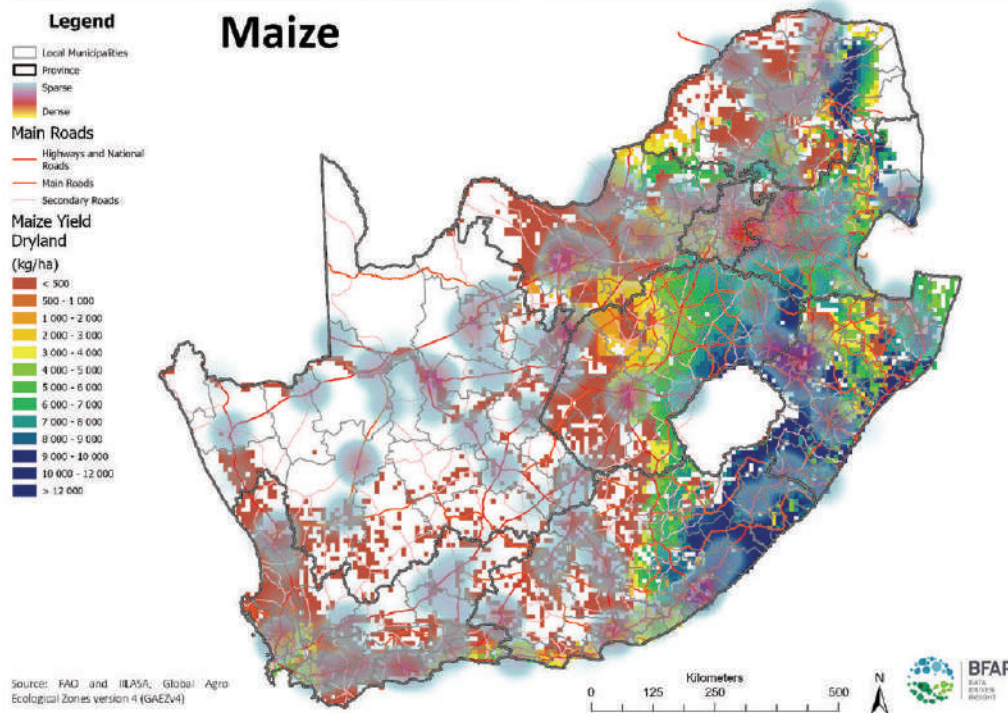


Figure : Maize potential dryland yield

Source: FAO & IIASA (2023)

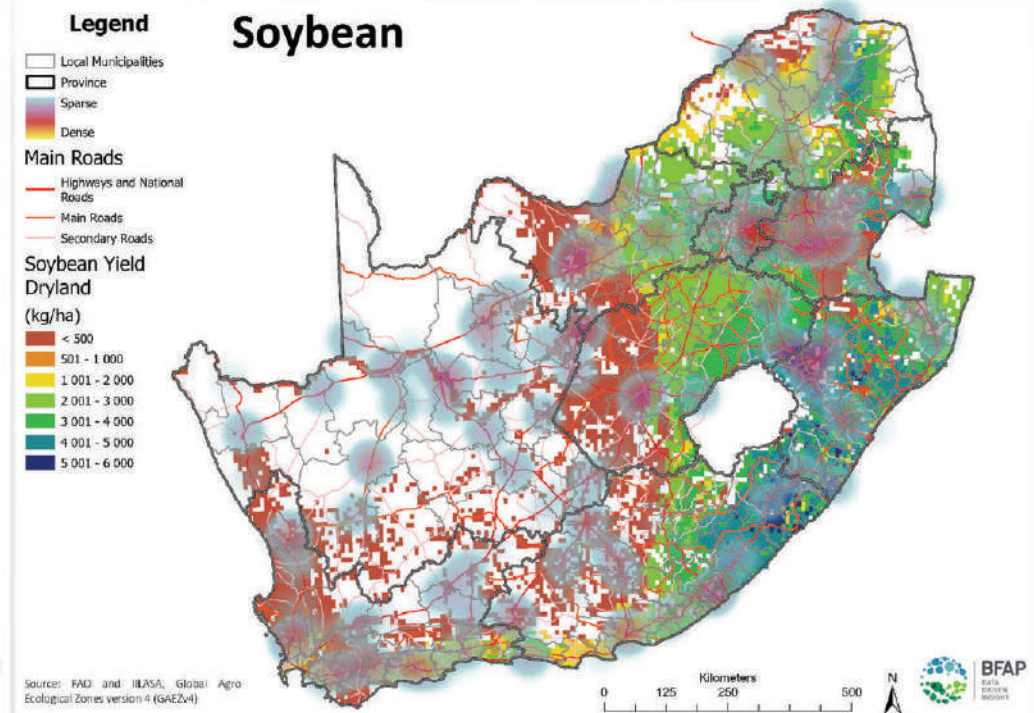


Figure : Soybean potential dryland yield

Source: FAO & IIASA (2023)

Potential income calculations - Summary

Table 3: Agricultural area per province

The cultivated fields, grazing and orchard hectares per site were determined from the National South African Landcover 2020 and are summarized in Table 3. This is the agricultural area, that could potentially generate an income from the agricultural sector perspective. This income per hectare is estimated in the next step



The BFAP farm level division compiled a set of representative farm level budgets (per natural resource productivity) for a selection of field crops and orchard crops as well as hectare/LSU based gross margin (income) estimates for livestock farming. These were in turn assigned to the site areas, based on natural resource potential proxies. The average income (gross margin) per hectare per subsector is summarised in Table 4.

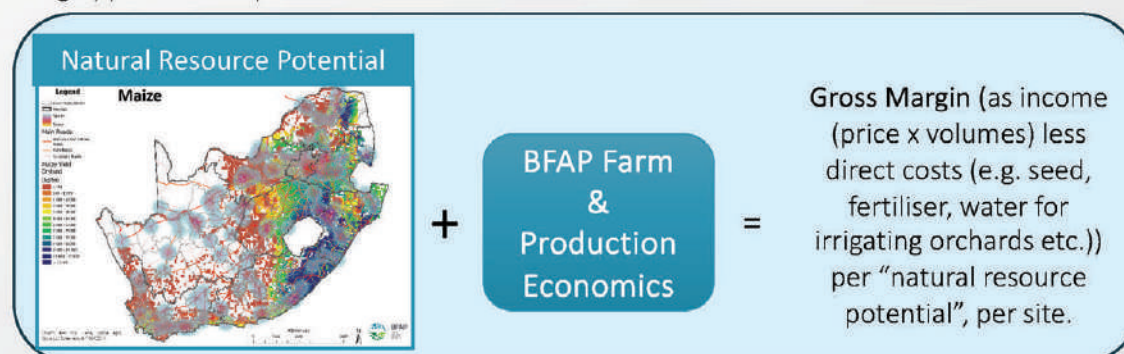


Table 4: Average potential gross margin per subsector

Landcover 2020 area estimate (ha)

Province	Total site area (ha)	Cultivated Fields	Grazing	Orchards
Northern Cape	2 008	218	1 288	2
Limpopo	872	241	92	0
North West	990	384	372	36
Mpumalanga	3 225	506	314	93
Eastern Cape	1 111	419	746	1
Western Cape	1 286	334	725	30
KwaZulu-Natal	1 114	575	411	6
Free State	1 018	302	680	0
Gauteng	614	259	217	0
	10 083	3 238	4 845	168

Average potential gross margin per ha (R/ha)

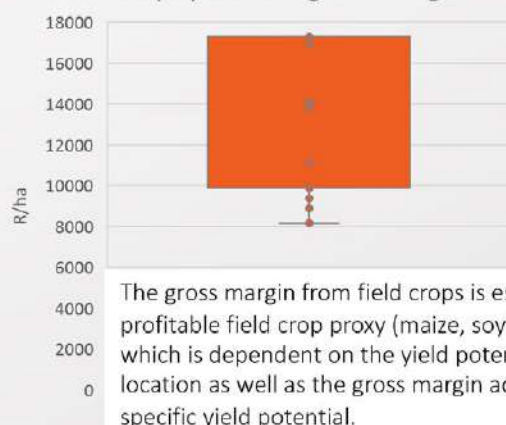
Province	Fieldcrops	Livestock	Horticulture
Northern Cape	R0	R162	R111 607
Limpopo	R13 175	R381	
North West	R9 767	R346	R101 344
Mpumalanga	R14 238	R478	R112 896
Eastern Cape	R11 222	R418	R62 997
Western Cape	R8 792	R86	R50 190
KwaZulu-Natal	R17 294	R444	R86 809
Free State	R14 396	R515	
Gauteng	R17 294	R532	
Province	R12 520	R477	R87 641

Potential income substitution calculations - Summary

Table 5: Potential income from agriculture summary

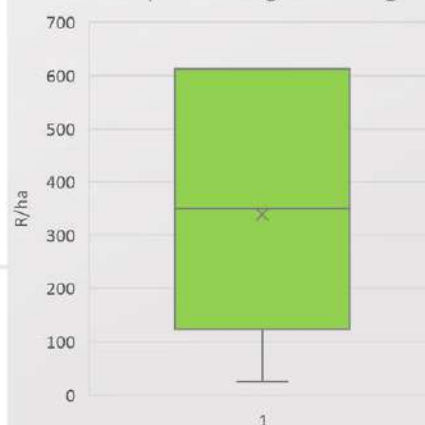
Province	Landcover 2020 area estimate (ha)				Average potential gross margin per ha (R/ha)			Total potential income per subsector (Rands)		
	Total site area (ha)	Cultivated Fields	Grazing	Orchards	Fieldcrops	Livestock	Horticulture	Fieldcrops	Livestock	Horticulture
Northern Cape	2 008	218	1 288	2	R0	R162	R111 607	R0	R207 994	R272 320
Limpopo	872	241	92	0	R13 175	R381		R3 174 194	R35 096	R0
North West	990	384	372	36	R9 767	R346	R101 344	R3 745 849	R128 588	R3 692 993
Mpumalanga	3 225	506	314	93	R14 238	R478	R112 896	R7 200 809	R149 718	R10 449 694
Eastern Cape	1 111	419	746	1	R11 222	R418	R62 997	R4 701 041	R312 013	R93 235
Western Cape	1 286	334	725	30	R8 792	R86	R50 190	R2 932 555	R62 137	R1 489 636
KwaZulu-Natal	1 114	575	411	6	R17 294	R444	R86 809	R9 951 113	R182 659	R482 658
Free State	1 018	302	680	0	R14 396	R515		R4 352 798	R350 173	R0
Gauteng	614	259	217	0	R17 294	R532		R4 475 752	R115 514	R0
	12 239	3 238	4 845	168	R12 520	R477	R87 641	R40 534 110	R1 543 892	R16 480 536

Fieldcrops potential gross margin



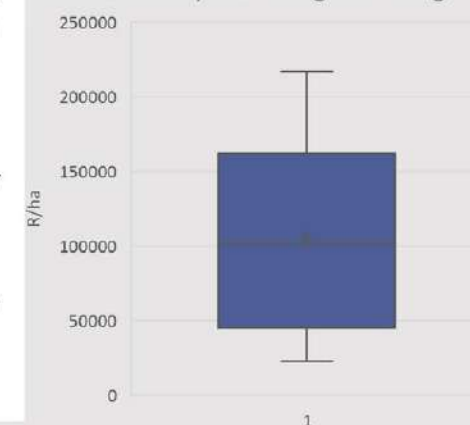
The gross margin from livestock is derived from the gross margin achievable, given levels of grazing capacity. These are then assigned to each site, given the locations' grazing capacity.

Livestock potential gross margin



The relevant horticultural crop is selected based on "orchard and sugarcane" activities located by the landcover data. Then representative gross margins are estimated for the relevant crop and assigned to the Charge sites. In this case, the variation comes primarily from the various horticultural crops that are selected per site.

Horticulture potential gross margin



In some cases, the initial charge site boundaries include significant areas / fields of higher value crops. Two examples are highlighted / demonstrated below. The impact on potential agricultural income would be significantly different if the site area was shifted a bit or when the detail of exactly which parts of the site boundary would undergo some form of land use change.

Sugarcane in KwaZulu-Natal

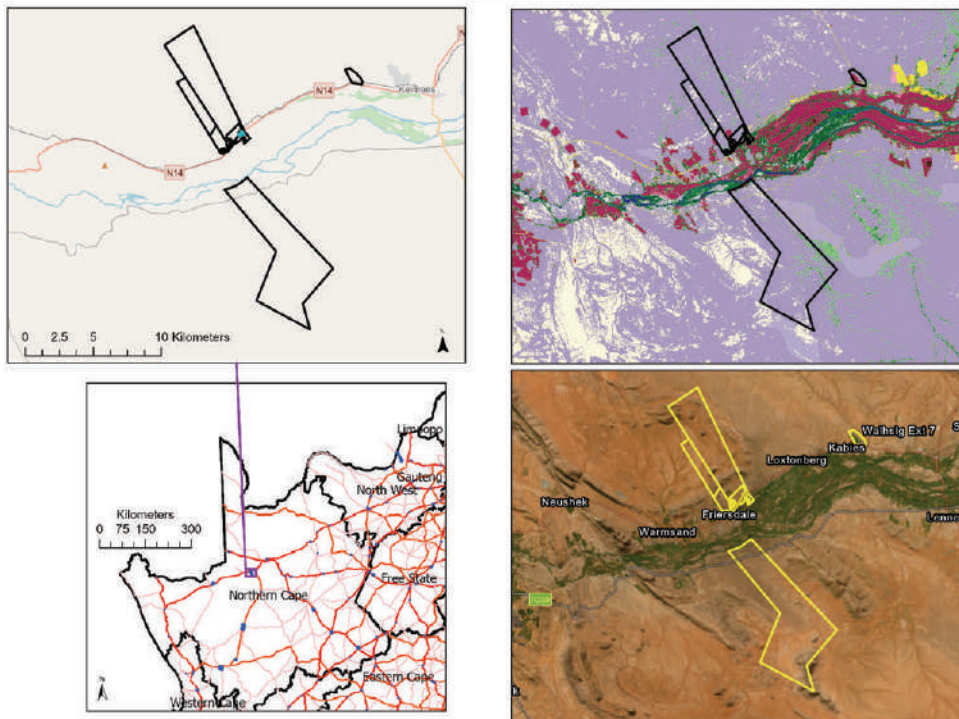


Figure 12: Table grape example in the Northern Cape
Source: Charge & BFAP (2023)

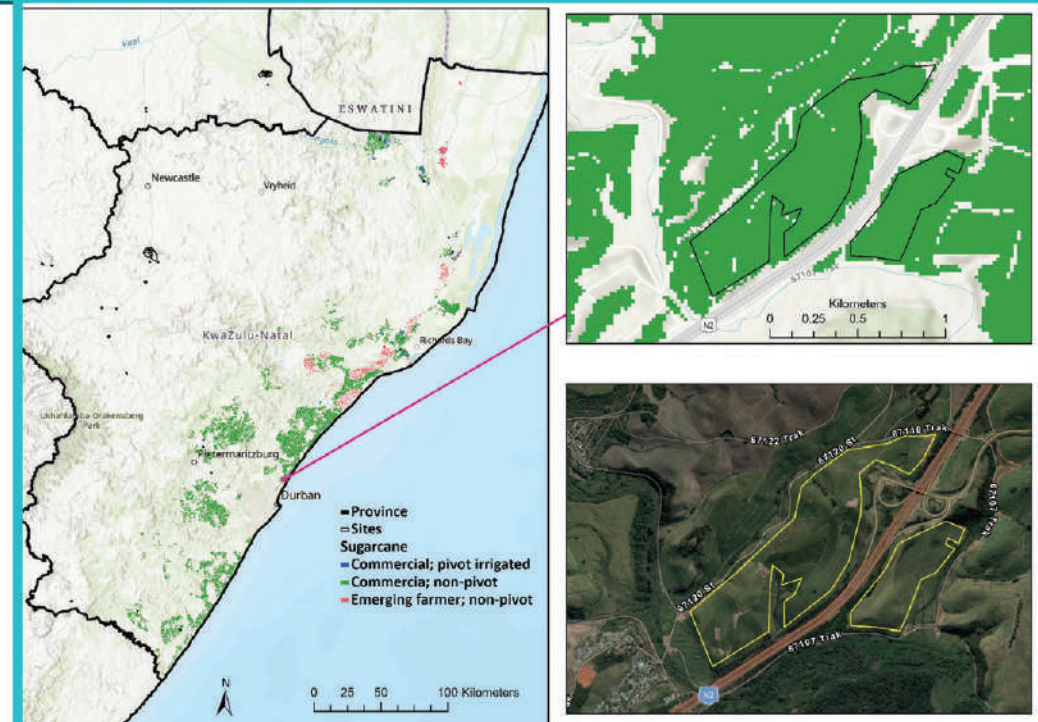


Figure 13: Sugarcane example in the KwaZulu-Natal
Source: Charge & BFAP (2023)

Thank You



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Visual Impact Report



VISUAL IMPACT REPORT

COMPILED BY

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Proposed Network of Electric Vehicle Charging Stations with Associated Renewable Energy Facilities

Strategic Visual Assessment

Executive Summary



Prepared for
Zero Carbon Charge (Pty) Ltd

Prepared by
Quinton Lawson and Bernard Oberholzer
Visual Specialists

November 2023
Updated January 2024

1. Background

Zero Carbon Charge (Pty) Ltd (ZeroCC) plan to roll out a network of car charging stations, powered by renewable energy facilities, along all the main routes across South Africa. Approximately 120 car charging stations with mainly solar facilities, at about 150km intervals, are envisaged at this stage.

A similar number of truck charging stations with larger renewable energy sites are envisaged. In some cases, the car and truck charging stations would be combined at the same site. The intention is to locate the car charging stations in tandem with existing farm stalls or guest houses along major national and provincial routes.

The Visual Specialist Study forms part of a Strategic Environmental Assessment (SEA), the intention of which is to provide early input into the potential visual sensitivity and mitigation of possible sites identified by ZeroCC. The high-level desktop screening study is intended to assess the cumulative project as a whole, and is not a visual impact assessment (VIA) of individual sites.

The term 'visual' includes a range of aesthetic, scenic and amenity values, which contribute to an area's overall 'sense of place' for both natural and cultural landscapes. Scenic resources in particular, often viewed from the main arterial routes, play an important role in the tourism economy of each region.

2. Project Description

The car charging sites would range from an initial 1ha to about 20ha to allow expansion of the solar facilities over time on a phased basis. In other words the solar farms would be modular in that the entire solar facility for each site would not necessarily be built at the same time. Some of the sites have existing farmstalls or guest houses, while new farmstalls are envisaged in other cases.

The purpose of the solar facilities, which make use of a cellular approach, is to provide energy at a local scale for the car charging stations and nearby users. The intention is not to feed into the national grid, which currently lacks capacity, and therefore no additional connecting powerlines would be required.

The mitigating effect of doing cellular generation of energy for green mobility at the local scale is aimed at negating the need to build new electrical grid infrastructure in the form of powerlines and substations to supply the additional demand.

The Developers estimate that this localised cellular network of solar facilities would avoid the need for some 18 000 km of new electrical grid infrastructure often entailing large pylons, and that this would significantly outweigh the potential visual influence of the relatively small solar facilities envisaged. They indicate the comparison of these two approaches in the images below.



The localised cellular approach using solar panels



The electrical grid approach at the national scale

The various components of a car charging station and associated solar facility are listed below, together with a typical footprint in Figure 1.

- Solar arrays (up to 3,5m height);
- Charging station control room in a standard 6m container (3m height).
- Natural gas on-site generator;
- Car charging point with canopy;
- New farmstall in some cases, approx. 100m²;
- 5 000 to 10 000 litre water storage tanks, typically behind the farmstall;
- Underground/overhead 33 kV powerlines (9m height);
- Security fencing (2m height).



Figure 1: 3-D view of a typical 1 hectare car charging station and solar facility, which includes a farmstall.

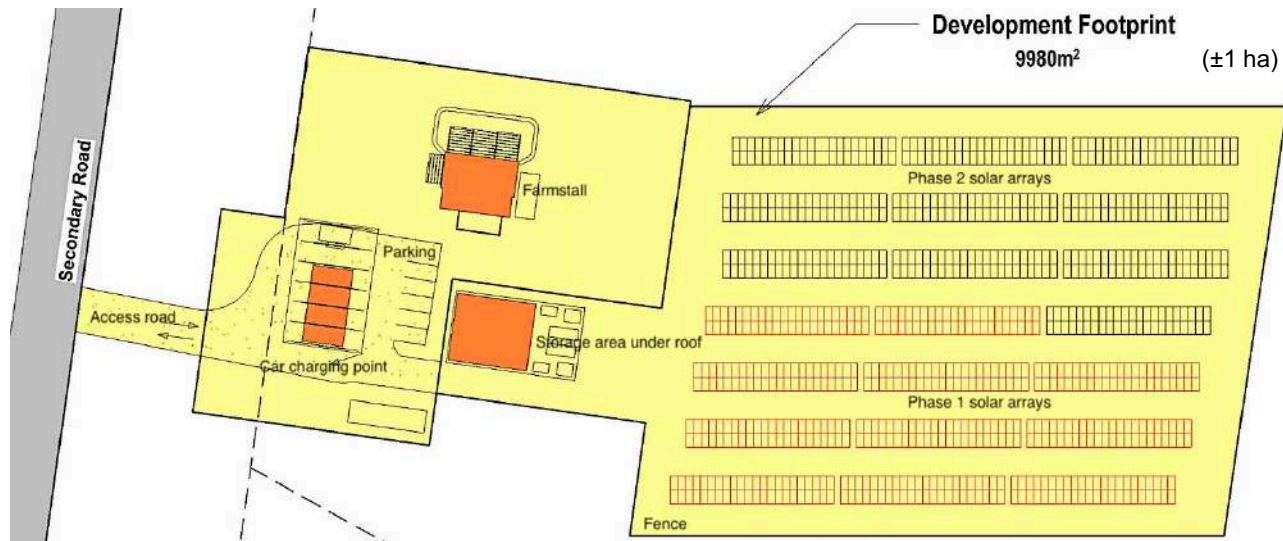


Figure 2: Typical site development plan for a 1 hectare car charging station and solar facility.



Figure 3: View of a typical solar facility adjacent to an arterial route near De Aar.

3. Study Methodology

The strategic visual assessment included the following:

Site Description and Possible Mitigation:

A description and possible visual mitigation measures to avoid or minimise potential visual impacts are provided for each site in a series of tables, accompanied by Google Earth ground views. A preliminary visual sensitivity rating before mitigation is provided. (See **Addendum A**).

Visual Sensitivity Mapping:

Mapping of scenic topographic features, protected areas and potentially sensitive receptors (see Table 1) for each site. General information sources for the mapping are given in Table 2. The maps indicate potential visual sensitivity on a gradient from very high to high, medium and low visual sensitivity based on criteria in Table 3. (See **Addendum B**).

Table 1: Scenic Features and Sensitive Receptors

Topographic features	Landforms such as mountains, koppies, cliffs and rock outcrops contribute to the scenic value of the area, providing visual interest or contrast.
Water features	Water features, including rivers, lakes and large dams provide scenic and amenity value, particularly in arid landscapes.
Cultural landscapes	Cultural landscapes, such as rural landscapes, historical buildings or settlements, battle sites, cemeteries etc. have cultural value, increasing visual sensitivity.
Protected Areas	Protected areas, such as national parks, nature reserves and other conservation areas tend to increase visual sensitivity.
Human settlements	Human settlements, such as farmsteads, villages or towns, and particularly residential areas, tend to be sensitive to visual intrusions such as power lines and other infrastructure.
Scenic and arterial routes	National roads, provincial roads, scenic routes and mountain passes or poorts tend to be visually sensitive, especially for the tourism economy.

Table 2: Information Sources

Data / Information	Source	Date	Type	Description
Project Data	Zero Carbon Charge (PTY) LTD	2023	Vector Digital Spatial Data	Project Layouts by proponent
South African Protected Areas Database	Department of Forestry, Fisheries and the Environment (DFFE) https://egis.environment.gov.za/gis_data_downloads	2023 Q2	Vector Digital Spatial Data	Spatial delineation of Protected Areas in South Africa, updated quarterly
1:50 000 Topographic Series GIS Data	Chief Directorate National Geo-spatial Information (CDNGI) http://www.cdngiportal.co.za/cdngiportal/	2023	Vector Digital Spatial Data	Spatial Data 1:50 000 Topographic Series including elevational data (20m contours)
1:50 000 Topographic Series Maps	Chief Directorate National Geo-spatial Information (CDNGI) http://apollo.cdngiportal.co.za/erdas-iws/ogc/wms/CDNGI_PORTAL_BACKDROP	2023	Georeferenced Raster Mosaic	CDNGI_50K_Current_Mosaic
1:250 000 Topo-cadastral Series Maps	Chief Directorate National Geo-spatial Information (CDNGI) http://apollo.cdngiportal.co.za/erdas-iws/ogc/wms/CDNGI_PORTAL_BACKDROP	2023	Georeferenced Raster Mosaic	CDNGI_250K_Current_Mosaic
Spatial Cadastral Data	Cape Farm Mapper 3 https://gis.elsenburg.com/apps/cfm/	2023	Vector Digital Spatial Data	Spatial Cadastral Data of Farm Boundaries
South African Heritage Resources Agency	National Heritage Sites Inventory Database	2017	Vector (Point) Digital Spatial Data	National Heritage Sites, Graded
Open Street Map (OSM) Spatial Data	www.openstreetmap.org www.geofabrik.de	2023	Vector Digital Spatial Data	South Africa Road and Waterway Data
SA Road and Terrain Data	Google Maps (maps.google.com)	2023	Online Data	South Africa Road and Terrain Data
SA Satellite Imagery	Google Earth Pro	2023	Online Data	South Africa Satellite Imagery

The buffers recommended in Tables 3a and 3b below are based on the National Wind and Solar SEA prepared with the CSIR for the DFFE (2014), as well as on a number of other visual impact studies for solar energy facilities by the authors. The buffers have, however, been adapted to the smaller solar facilities proposed by ZeroCC.

The visual buffers indicated in the mapping are intended for the solar arrays, substations and battery storage systems (if required), and not for the car charging stations or farmstalls, which tend to be visually insignificant, and would therefore not normally require visual buffers. The buffers are nominal at this stage and need to be adapted to actual site conditions.

The separate tables for each route attached as **Addendum A** need to be read in conjunction with the maps in **Addendum B**. The tables provide a brief description of each site, together with Google Earth street views, as well as possible visual mitigation measures to reduce visual sensitivity, and therefore potential visual impact significance for each site.

The visual buffers indicated on the maps are intended to be nominal and would not apply, or would be reduced, where a proposed site is in a view shadow (i.e. not visible to receptors), or is screened by existing buildings, road embankments or vegetation.

Visual impact significance can be reduced by means of avoidance, visual mitigation or offsets. Avoidance can include relocating or changing the boundaries of the proposed site, or by reducing the footprint of the proposed solar facilities. Mitigation usually involves screen planting or mounding to reduce visual exposure of the solar facilities. Offsets could include landscape reclamation of disturbed or derelict sites.

The context of each site, such as surrounding land uses or disturbed areas, need to be taken into consideration on an individual site basis in order to determine their actual visual impact significance.

Table 3a: Visual Sensitivity Mapping Criteria (Sites smaller than 10ha)

Scenic Resources	Very high sensitivity	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Scenic topographic features (koppies, outcrops etc).	Feature	Within 150m	-	-
Perennial drainage courses, wetlands, water bodies	Within 30m ¹	Within 60m ¹	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Sites of heritage or cultural value (historical buildings, battle sites, cemeteries etc)	within 100m ²	within 200m ²	-	-
Protected Landscapes / Sensitive Receptors				
Nature reserves, game farms, tourist accommodation	within 250m	within 500m	within 1 km	-
Farmsteads outside the site	within 100m	within 200m	within 300m	-
Settlements (towns, villages)	within 100m	within 200m	within 300m	-
Scenic routes	within 250m	within 500m	within 1 km	-
National Roads (non-scenic)	within 100m	within 200m	within 400m	-
Provincial / arterial routes (non-scenic)	within 60m	within 120m	within 200m	-
Main district roads (non-scenic)	within 30m	within 60m	within 100m	-
Passenger rail lines	within 100m	within 250m	within 400m	-

Notes:

¹ To be determined by Freshwater Specialist

² To be determined by Heritage Specialist

Table 3b: Visual Sensitivity Mapping Criteria (Sites larger than 10ha)

Scenic Resources	Very high sensitivity	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Scenic topographic features (koppies, outcrops etc).	Feature	Within 150m	-	-
Perennial drainage courses, wetlands, water bodies	Within 30m ¹	Within 60m ¹	-	-
Steep slopes	Slopes > 1:4	Slopes > 1:10	-	-
Sites of heritage or cultural value (historical buildings, battle sites, cemeteries etc)	within 100m ²	within 200m ²	-	-
Protected Landscapes / Sensitive Receptors				
Nature reserves, game farms, tourist accommodation	within 250m	within 500m	within 1 km	-
Farmsteads outside the site	within 200m	within 400m	within 600m	-
Settlements (towns, villages)	within 200m	within 400m	within 600m	-
Scenic routes	within 250m	within 500m	within 1 km	-
National Roads (non-scenic)	within 100m	within 200m	within 400m	-
Provincial / arterial routes (non-scenic)	within 60m	within 120m	within 200m	-
Main district roads (non-scenic)	within 30m	within 60m	within 100m	-
Passenger rail lines	within 100m	within 250m	within 400m	-

Notes:

¹ To be determined by Freshwater Specialist

² To be determined by Heritage Specialist

The visual sensitivity categories indicated in Table 4 below have been colour-coded to reflect the colours used in the visual sensitivity mapping. The categories indicate levels of visual sensitivity before mitigation, which could reduce after mitigation measures have been applied, as shown in Table 5 for each of the charging sites.

Table 4: Visual Sensitivity Categories

Very high	Areas of high visual sensitivity, or sensitive visual receptors, which require avoidance measures or stringent mitigation.
High	Areas of high visual sensitivity, or sensitive visual receptors, which could be mitigated with visual buffers and/or screening.
Medium	Areas of moderate visual sensitivity, or sensitive visual receptors, which could be mitigated with visual buffers and/or screening.
Low	Areas of low visual sensitivity with few visual constraints, requiring only minimal mitigation.

Table 5: Summary of Strategic Visual Assessment

N1 Route

Site No.	Route	Visual characteristics	Visual sensitivity before mitigation	Visual Sensitivity after mitigation
C-N001-01 Karoo Padstal	N1 Western Cape	Existing Karoo padstal and accommodation. Visually exposed site.	Medium-low	Low
C-N001-02 The Barn	N1 Free State	Existing guesthouse. Heritage site. Partly screened by trees.	Medium-low	Low
C-N001-03 Leeuberg	N1 Free State	Existing guesthouse. Visually exposed site	Medium	Medium-low
C-N001-04 De Rust	N1 Gauteng	Small site (2ha). Close to farmsteads. Visually screened by trees.	Low	Low
C-N001-05 Whistling Bridge	N1 Western Cape	Existing farmstall. Historic blockhouse heritage site. Partly degraded site.	High	Medium
C-N001-06 Winburg	N1 Free State	N1 intersection. Site partly screened by gum trees.	Medium-low	Low
C-N001-07 Prince Albert Rd	N1 Western Cape	Existing truck stop. Close to existing settlement. Visually exposed ridge.	Medium	Medium-low
C-N001-08 Berry Farm	N1 Free State	N1 intersection. Adjacent to truck stop. Visually exposed site.	Medium	Low
C-N001-09 Musina	N1 Limpopo	Adjacent to airstrip. Cabins nearby on N1. Dense bushveld vegetation.	Low	Low
C-N001-10 Kuilsfontein	N1 Free State	Existing farmstall and guest house. Visually exposed site.	Medium	Medium-low
C-N001-11 Grass Valley	N1 Limpopo	N1 intersection/toll plaza. Dense bushveld vegetation.	Medium	Low
C-N001-12 Bela Bela	N1 Limpopo	N1 intersection. Existing farmsteads. Dense bushveld vegetation.	Medium-low	Low
C-N001-13 Worcester	N1 Western Cape	Truck yard nearby. Visually exposed site.	Medium	Low
C-N001-14	N1	N1-R354 intersection. Matjiesfontein heritage site nearby. Visually exposed site	Medium-high	Medium

Site No.	Route	Visual characteristics	Visual sensitivity before mitigation	Visual Sensitivity after mitigation
Matjiesfontein	Western Cape			
C-N001-15 Orange R. Lodge	N1 Northern Cape	Existing lodge nearby. Visually exposed site.	Medium	Medium-low
C-N001-16 Murray Hill Road	N1 Gauteng	Surrounded by smallholdings/farmsteads. Visually exposed site	High	Medium

N2 Route

C-N002-01 Dassiesfontein	N2 Western Cape	Existing farmstall and restaurant. Partly screened by existing trees.	Medium-low	Low
C-N002-02 Stilbaai Junction	N2 Western Cape	Adjacent Schoongelegen farmstead. Visually exposed site.	Medium-high	Medium-low
C-N002-03 Hokaai Padstal	N2 Western Cape	Existing farmstall. Partly screened by existing trees.	Low	Low
C-N002-04 Shabby Fufu	N2 Western Cape	Existing farmstall. Partly screened by existing trees. Surrounding smallholdings.	High	Medium
C-N002-05 Klein-Brakrivier	N2 Western Cape	N2-R102 intersection. Small site (6ha). Close to residential settlement.	Medium-high	Medium
C-N002-06 Wolf Sanctuary	N2 Eastern Cape	Small site (1ha) between N2 and R102. Farmsteads and guest houses nearby.	Medium-high	Medium
C-N002-07 St Albans	N2 Eastern Cape	N2 intersection. Adjacent smallholdings. partly screened by alien vegetation.	Medium-low	Low
C-N002-09 Piet Retief	N2 Mpumalanga	Adjacent to a truck stop. Settlements and lodges nearby. Partly screened by trees.	Medium-high	Medium-low
C-N002-11 Hluhluwe	N2 Kwazulu-Natal	Nearby farmsteads and lodges. Visual screening by forest trees.	Low	Low
C-N002-12 Harding	N2 Kwazulu-Natal	N2 intersection. Adjacent guesthouse. Visually screened by exotic trees.	Low	Low
C-N002-13 Kokstad NC	N2 Kwazulu-Natal	Lodge nearby. Visually exposed and sloping site.	Medium	Medium-low

C-N002-14 Kokstad SB	N2 Kwazulu-Natal	Adjacent farmstead. Visually exposed site. Partly screened by gum trees.	Medium	Low
C-N002-15 Swellendam	N2 Western Cape	Kluitjieskraal farmstead / health spa nearby. Visually exposed site.	Medium-high	Medium-low
C-N002-16 George Elvis Brew	N2 Western Cape	N2-R404 intersection. Adjacent to airport. Visually exposed, partly screened by trees.	Medium	Low
C-N002-17 Coombs	N2 Eastern Cape	Heritage sites nearby. Existing low trees provide visual screening.	Low	Low

N3 Route

C-N003-01 Kopleegte	N3 KwaZulu-Natal	N3 intersection. Small site (1ha). Visually exposed grassland site.	Low	Low
C-N003-02 Sasol Kohler	N3 Free State	N3 intersection. Small site (1ha). Visually exposed grassland site.	Low	Low
C-N003-03 R34 Erfhoek	N3 Free State	Area disturbed by diggings. Visually exposed grassland site.	Medium-low	Low
C-N003-05 Harrismith	N3 Free State	Platberg Private Nature Reserve. Guest house / farmsteads nearby. Visually exposed cropland site.	Medium	Low

N4 Route

C-N004-01 Orchid Farmstall	N4 Mpumalanga	Existing farmstall and orchards. Partly screened by road embankment and trees.	Medium-low	Low
C-N004-02 Marikana	N4 North West	Bapong Royal Palace and Magaliesberg PNE to the south. Site partly screened by trees.	Medium	Low
C-N004-03 Vaalbank	N4 Gauteng	Surrounded by farmsteads. Visually exposed site.	Medium-high	Medium-low
C-N004-04 Stonechat	N4 Mpumalanga	Existing farmstall. Country Lodge to the south. Site partly screened road embankment and existing trees.	Medium-low	Low
C-N004-05 Strathmore Malel	N4 Mpumalanga	Kruger National Park to the north. Farmsteads nearby. Site partly screened by trees.	Medium-high	Medium-low

N5 Route

C-N005-01 Liddell Bethlehem	N5 Free State	Farmsteads nearby. Visually exposed cropland site.	Medium-high	Medium
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N6 Route

C-N006-01 Komani Q'town	N6 Eastern Cape	Farmsteads to north-west of the site. Partly screened by existing vegetation.	Medium	Low
C-N006-02 Wagon Wheel	N6 Eastern Cape	Existing farmstall. Farmsteads to east of the site. Visual screening by existing forest trees.	Medium	Low
C-N006-03 Aliwal North	N6 Eastern Cape	Irrigated cropland from Orange River. Visually exposed site.	Medium	Low
C-N006-04 Reddersburg	N6 Free State	Residential area and farmstead nearby. Visually exposed site.	High	Medium
C-N006-05 Sterkstroom	N2 Eastern Cape	N6-R344 intersection. Visually exposed site on rising ground.	Medium	Medium-low

N7 Route

C-N007-04 A. Vanrynsdorp	N7 Western Cape	Featureless, visually exposed site. Roadside picnic site.	Medium	Low
C-N007-05 Z. Vanrynsdorp	N7 Western Cape	Semi-arid expansive Knersvlakte. Featureless, visually exposed site.	Medium	Low
C-N007-06 R362 Groenhoek	N7 Western Cape	Irrigated land along Olifants River. Numerous surrounding farmsteads. Visually exposed site.	High	Medium
C-N007-07 Piketberg	N7 Western Cape	Piketberg intersection. Existing Eskom powerline. Cement factory to the south. Residential area 300m to the north.	Medium-high	Medium
C-N007-08 Atlantis Junction	N7 Western Cape	Kalbaskraal Nature Reserve 250m to northeast. Smallholdings to the southwest. Visually exposed site	Medium	Low
C-N007-09 S. Kamiesberg	N5 Northern Cape	Intersection with road to Hondeklipbaai. Semi-arid visually exposed site.	Medium	Low
C-N007-12 Tierkloof Afdraai	N7 Western Cape	Olifants River to the east of N7. Semi-arid visually exposed sloping site.	Medium	Low
C-N007-13 Vioolsdrif	N7 Northern Cape	Farmsteads / irrigated land on northern boundary. Arid, visually exposed ridge. Some screening with existing trees.	High	Medium

C-N007-14 Springbok	N7 Northern Cape	Existing tourist accommodation. Semi-arid visually exposed site.	Medium	Low
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N8 and N9 Routes

C-N008-01 Knapgedaan	N8 Free State	Small site (6ha). Smallholdings to the east. Guest accommodation in the area. Visually exposed grassland site.	Medium	Low
C-N008-02 Three Fountains	N8 Free State	Site slopes to the south. Visually exposed grassland site.	Medium	Low
C-N008-03 Campbell	N8 Northern Cape	Adjacent to Campbell settlement and mission station heritage site. Visually exposed site, screened by isolated trees.	High	Medium-high
C-N008-04 Felidae Centre	N8 Free State	Large pan to the south. Visually exposed grassland site.	Medium	Low
C-N009-01 Jagpoort Padstal	N9 Eastern Cape	Existing farmstall. Mountain Zebra-Camdeboo PNE. Visually exposed grassland with prominent slopes.	Medium	Medium-low
C-N009-09 Aberdeen	N9 Eastern Cape	Existing farmstall. Small sites (2ha and 10ha). Adjacent to residential area. Visually exposed grassland site.	High	Medium

N10 Route

C-N010-01 Britstown	N10 Northern Cape	Intersection of N10 and N12. Visually exposed grassland site.	Medium	Low
C-N010-02 Hanover	N10 Northern Cape	Visually exposed grassland site. Screened from the town (Hanover) by low koppies.	Medium	Low
C-N010-03 Kalbas Padstal	N10 Northern Cape	Existing farmstall. Small site (1ha). Irrigated land along Orange River to the east. Visually exposed grassland site.	Low	Low
C-N010-05 Redlands Prieska	N10 Northern Cape	Redlands railway siding to the northwest. Visually exposed scrubland site.	Medium-low	Low
C-N010-06 Sherborne	N10 Eastern Cape	Existing guest house and settlement. Old rail line to the east. Visually exposed grassland site.	Medium	Low
C-N0010-07 Daggaboer	N10 Eastern Cape	Existing farmstall. Site mainly screened by existing trees and farmstall.	Low	Low

N11 Route

C-N011-01 Fort Mistake	N11 KwaZulu-Natal	Nearby farmsteads along the Nkunzi River. Scenic mountain area. Visually exposed sloping grassland site.	Medium-high	Medium
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C-N011-02 Ermelo Aucamp	N11 Mpumalanga	Existing N11 truck stop at intersection. Open cast mines nearby. Visually exposed site partly transformed.	Low	Low
C-N011-03 Biekie Padstal	N11 Limpopo	Existing farmstall. Site screened by existing bushveld trees.	Low	Low
C-N011-04 Loskop Padstal	N11 Limpopo	On the boundary of Loskop Dam Nature Reserve. Visually exposed site, partly transformed.	Medium-high	Medium-low
C-N011-05 Volksrust	N11 Mpumalanga	Open grassland sloping site. Partly screened by road embankment and gum trees.	Medium	Low
C-N0011-06 Elandslaagte	N11 KwaZulu-Natal	Low rocky ridge with aloes. Partly screened by low ridge and existing trees. Visually exposed grassland on eastern part.	Medium	Low

N12 Route

C-N012-01 Wolmaransstad	N12 Northern Cape	Adjacent to two farmsteads to the south. Visually exposed grassland, partly screened by trees.	Medium	Low
C-N012-02 R374 Windsorten	N12 North-West	South of Christiana. Nearby farmstead. Visually exposed grassland, mainly screened by trees.	Medium-low	Low
C-N012-03 Potchefstroom	N12 North-West	Combination of smallholdings and semi-industrial. Site partly screened by buildings and trees.	Medium-low	Low
C-N012-04 Potchefstroom GW	N12 North-West	Site straddles district road. Nearby farmsteads. Visually exposed grassland with scattered trees.	Medium	Low
C-N0012-05 Christiana	N12 North-West	Remote location. Visually exposed grassland with scattered trees.	Medium	Low

N14 Route

C-N014-01 Biekiesvlei	N14 North-West	Existing Biekiesvlei Guesthouse. Small settlement of Biesiesvlei smallholdings. Site mainly screened by houses and trees.	Medium-low	Low
C-N014-02 Ventersdorp	N14 North-West	Large site (31ha) east of Coligny. Existing farmstead to the west. Visually exposed cultivated site.	Medium	Medium-low
C-N014-04 Buithof	N14 North-West	Existing Buithof guesthouse east of Lichtenburg on R52. Farmsteads nearby. Visually exposed cultivated site.	Medium	Medium-low
C-N014-05 Olifantshoek	N14 Northern Cape	'The Ranch' chalets existing. Farmsteads nearby. Site partly screened by low vegetation.	Medium-low	Low

C-N0014-06 Pauwkop	N14 North-West	South of Delareyville. Visually exposed cultivated maize field. Partly screened by low vegetation. Powerline in foreground.	Medium	Low
C-N014-07 R505 Ga Maloka	N14 North-West	West of Coligny on N14 and R505. Rural settlement. Next to church. Visually exposed site partly screened by trees.	Medium	Medium-low
C-N014-08 Akkerboom	N14 Northern Cape	Existing Akkerboom farmstall east of Kakamas on the Orange River. Visually exposed grassland, partly screened by low thorn trees.	Medium	Low
C-N0014-09 Upington	N14 Northern Cape	Track adjacent to the site. Visually exposed grassland and scrub.	Medium	Low
C-N014-10 Pofadder	N14 Northern Cape	Smaller site (8ha). Visually exposed sparse grassland and scrub.	Medium	Low
C-N0014-11 Vryburg	N14 North-West	Existing guesthouse. Numerous homesteads nearby. Visually exposed grassland, partly screened by trees.	Medium-high	Medium-low

N17 and N18 Routes

C-N017-01 Ermelo Beukes	N17 Mpumalanga	Site straddles N17. Existing rail line on boundary. Private nature reserve nearby. Visually exposed grassland partly screened by gum trees.	Medium-high	Medium-low
C-N018-01 Mahikeng	N18 North-West	Disanang rural settlement west of Mahikeng. Visually exposed grassland partly screened by thorn trees.	Low	Low
C-N018-02 Stella	N18 North-West	Soutpan salt works nearby. Visually exposed cultivated site, partly screened by trees.	Medium	Low

Provincial 'R' Routes

C-R027-01 Brandvlei	R27 Northern Cape	Remote and semi-arid, low scrub vegetation, partly disturbed.	Medium-low	Low
C-R027-02 Calvinia	R27 Northern Cape	Semi-arid with low scrub vegetation. Remote, visually exposed wilderness landscape.	Medium	Medium-low
C-R033-02 Albert Falls	R33 KwaZulu-Natal	North of Pietermaritzburg near Albert Falls Dam. Partly visually exposed field, and partly screened by woodland thicket.	Medium	Medium-low
C-R046-01 Fynbos Padstal	R46 Western Cape	Scenic mountain area. North of Wolseley. Existing farmstall and guesthouse. Visually exposed Renosterveld. Partly screened by farmstall and pine trees.	Medium	medium-low
C-R046-02 Nuweplaas	R46 Western Cape	West of Riebeek-Kasteel. Existing farmstall on district road. Visually exposed cropland.	Medium	Medium-low

C-R056-01 Elliot (Khowa)	R56 Eastern Cape	Steep slope on western portion. Cultivated, contoured cropland on eastern portion. Visually exposed site.	Medium	Medium-low
C-R060-01 La Berg Stud	R60 Western Cape	West of Swellendam. Lower portion visually exposed cropland. Upper portion partly screened by gums.	Medium	Medium-low
C-R075-01 Jansenville	R75 Eastern Cape	Farm covered with aloes, scrub and trees. Visually exposed site, partly screened by low trees.	Medium	Medium-low
C-R716-01 Denysville	R716 Free State	Existing equestrian centre. Powerlines along route. Farmsteads in the area. Visually exposed, treeless grassland.	Medium	Medium-low

4. Cumulative Visual Impacts

There would be no cumulative visual impacts for the project, seen as a whole, as the charging stations and related solar facilities would be in the region of 150km apart. The only cumulative visual impacts would be where existing similar solar facilities or other energy infrastructure occur near the individual sites.

Some cumulative visual clutter could be experienced where infrastructure, such as service stations, existing powerlines and cell phone masts, are present in the surroundings. On the other hand, these facilities, together with the increase in the use of solar energy panels, are becoming more common as part of the landscape, and attract less visual attention over time.

A major benefit of the cellular design of the proposed solar facilities is that they not only provide localised energy in rural areas, but avoid the need for a plethora of linking powerlines to the main Eskom grid.

5. Regulatory Process

The current SEA is for the project as a whole, and if authorisation is forthcoming, then the approval of individual sites should generally be streamlined by individual municipalities.

The Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (Oberholzer, 2005), could be used by municipalities in the assessment of individual sites. Section 8.6 of the Guideline indicates the level of visual assessment required depending on the expected visual impact. For example, where little or no visual impact is expected, only a Level 1 brief comment by a suitably experienced specialist would be required. The levels of visual sensitivity indicated in Table 5 above could be used as a guide.

6. Summary of Findings and Recommendations

The Summary Table 5, provided above, indicates the potential visual sensitivity for each site both before and after mitigation. Preliminary findings indicate that a few of the sites on the various routes have 'low' visual sensitivity, requiring little or no mitigation, most have 'medium' visual sensitivity and can be fairly easily mitigated, while a few have 'high' visual sensitivity, mainly because they are adjacent to residential or heritage areas, and would need more stringent mitigation measures. (See also more detailed descriptions and Google Earth street views of the proposed sites in **Addendum A**.)

In terms of the project as a whole, no fatal flaws were identified, and the project is considered acceptable from a visual perspective provided visual mitigations are implemented.

General recommendations include the following to assist with the mitigation of the project:

- The footprint of the solar facilities should be kept as compact as possible to minimise the sprawl of buildings and related infrastructure.
- Degraded or disturbed sites should be used as far as possible, to minimise intrusion into scenic or pristine areas.
- Tree-planting, mounding, hedges or fencing with creepers should be used to reduce visibility of solar energy infrastructure.
- Lighting at night should generally be kept to a minimum, particularly in wilderness and rural areas, and light sources shielded from view with reflectors.
- Outdoor signage should be kept to a minimum, and where signage is required this should be discrete and located against a background to avoid silhouette effects. Billboard-type signs should not be permitted on major routes.

7. References

Oberholzer, B. 2005. Guideline for Involving Visual and Aesthetic Specialists in EIA processes: Edition 1. CSIR Report no. ENV-S-C 2005 053 F. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.

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Expertise

Quinton Lawson has a Bachelor of Architecture Degree (Natal) and has more than 20 years of experience in visual assessments, specializing in 3D modelling and visual simulations. He has previously lectured on visual simulation techniques in the Master of Landscape Architecture Programme at UCT.

Bernard Oberholzer has a Bachelor of Architecture (UCT) and Master of Landscape Architecture (U. of Pennsylvania), and has more than 25 years of experience in visual assessments. He has presented papers on Visual and Aesthetic Assessment Techniques, and is the author of Guideline for Involving Visual and Aesthetic Specialists in EIA Processes, prepared for the Dept. of Environmental Affairs and Development Planning, Provincial Government of the Western Cape.

The authors have both been involved in visual assessments for a wide range of residential, industrial and renewable energy projects. They prepared the 'Landscape/Visual Assessment' chapter in the report for the *National Wind and Solar PV Strategic Environmental Assessment (SEA)*, as well as the *National Electricity Grid Infrastructure SEA* in association with the CSIR, for the Department of Environmental Affairs in 2014-2015.

Declaration

The authors declare that they are independent practitioners with expertise and wide experience in visual impact assessments, that the assessment has been carried out in an objective manner and complies with the relevant EIA regulations, and that all material information in their possession, which may influence a decision by the competent authority and the objectivity of the assessment, has been disclosed.

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Separate Documents:

Addendum A: Description of Individual Sites, Mitigation Measures and Visual Sensitivity.

Addendum B: Visual Features and Visual Sensitivity Mapping for Individual Sites.