PROPOSED DEVELOPMENT OF A NEW SOLID WASTE SITE IN LUCKHOFF, LETSEMENG LOCAL MUNICIPALITY

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT

DESTEA REF No: WML/EIA/01/2021 & EMS/15/21/06

NEAS REF. NO.: FSP/EIA/0000397/2021

CONSULTANTS

NSVT

ENVIRONMENTAL & SOCIAL SCIENTISTS

NOVEMBER 2021

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Environmental Impact Assessment Report is in terms of the Environmental Impact Assessment ("EIA") Regulations, 2014 (as amended), promulgated in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (as amended) ("NEMA") and National Environmental Management Waste Act, 2008 (Act No. 59 of 2008).

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PROJECT INFORMATION

REPORT TITLE: Environmental Impact Assessment Report

REPORT STATUS: Draft

PURPOSE OF REPORT: The purpose of this Environmental Impact Assessment Report is to present the proposed development and the need for the development; provide details of the Environmental Assessment Practitioner ("EAP") appointed to undertake the Waste Management License and Environmental Authorisation Application process; an overview of the public participation process; and to set out the environmental outcomes, impacts and residual risks of the proposed development. It provides information of the environmental hazards that the proposed solid waste site development may result in as well as to propose mitigation and management measures as to avoid or significantly reduce potential environmental impacts to the environment with input from the specialists on key issues.

PROJECT TITLE: Proposed Development of a New Solid Waste Site in Luckhoff, Letsemeng Local Municipality

DESTEA REFERENCE NUMBER: WML/01/2021 and EMS/15/21/06

APPLICANT: Letsemeng Local Municipality

ENVIRONMENTAL ASSESSMENT PRACTITIONERS: NSVT Consultants

REPORT COMPILATION RESPONSIBILITIES

REPORT COMPILED BY:

Lorato Tigedi Reg. EAP (EAPASA) *Pr. Sci. Nat.*
Environmental Assessment Practitioner

EXEUTIVE SUMMARY

Dipabala and NSVT JV were appointed for the development of a new landfill site facility in Luckhoff, Letsemeng local Municipality, Free State Province. Dipabala Consulting Engineers are responsible for providing professional engineering services for the proposed solid waste site, whereas NSVT, as independent Environmental Assessment Practitioners, are responsible for undertaking the Waste Management License and Environmental Authorisation application process in terms of NEM:WA (Act 59 of 2008) and National Environmental Management Act (Act 107 of 1998) for the proposed solid waste site facility, therefore a parallel application process will be followed. The application has been submitted to the competent authority, the Department of Economic, Small Business Development, Tourism and Environmental Affairs. The type of waste to be disposed of at the proposed SWS is general waste, which comprises of builders' rubble, garden, domestic, commercial, and general dry industrial waste.

For the development of the proposed solid waste site, five (5) alternative sites were identified, and they were evaluated based on land ownership, the current and future land use, site sensitivity/fatal flaws, input from an ecologist based on desktop review and social acceptance. During the site identification and selection, the municipality ward councilor and small emerging farmers were involved. From the evaluation, it was recommended that site 5 be slightly shifted north-easterly to increase the distance between the site and the watercourse and earth dam, which is the one referred to as site 6 and subjected to specialists' studies and technical investigation. Therefore, the proposed site identified for the development of the solid waste site is Alternative Site 6, which is located on the Remaining Extent of Portion 1 of Farm De Dorpsgronden van Luckhoff 577 within the jurisdiction of the municipality.

The Final Scoping Report that was submitted to the competent authority was reviewed and accepted. An assessment process was followed in terms of the tasks that were outlined in the Plan of Study without any deviations. Based on the outcome of the Scoping Process, when impact prediction was completed, specialists' studies were undertaken to assess key issues, *i.e.,* Heritage assessment, Ecological Assessment and Wetland Delineation, and Groundwater investigation. In addition to the environmental specialist studies, technical investigation was also undertaken by Dipabala. The elements that were considered in determining the layout for the proposed solid waste site included site area setting, site topography and drainage and the capital budget. Thereafter, the design layout for the proposed facility included a leachate containment and leachate collection system, evaporation pond, cut-off trenches/diversion berms as well as the lining of the site dedicated for landfilling with a Class B liner per the National Norms and Standards for Disposal of Waste Landfill. For the monitoring system, a borehole monitoring network will be established, and a Landfill Gas Sampling Point will be included if required. The facility does not include development of an incinerator. The site will be fenced off and access control is in place. The existing gravel road, which branches off Rabie Street will be upgraded to improve the road condition. The estimated construction cost is R6 032 87.05, and the envisaged construction period is 6 months, which will be overseen by Dipabala as they are responsible for the design.

The relevant environmental legislation was outlined including applicability or relevance to the proposed development to ensure that environmental compliance is not compromised for the proposed development. This also indicated commenting authorities that ought to be involved during the process as their inputs and comments are important, e.g., Department of Water and Sanitation. For a development to be planned, it is important to consider needs and desirability, and it is evident that Letsemeng Local Municipality's plans to develop a new landfill site is warranted as currently they are using a facility that a closure certificate has been issued, thus there is a need for a licensed disposal

facility for general waste. The proposed development is in line with the municipality's Integrated Development Framework, Spatial Development Framework and Local Economic Development Strategy. The preferred development footprint of the proposed SWS was planned in a way that the environmental impacts are avoided and where not possible, reduced significantly, and this was done by considering environmental constraints based on the input from specialists and technical aspects. During the site inspection, no sensitive areas were identified except for the preferential water pathway thus no changes on the layout were deemed necessary but will be subjected to review before submission to DESTEA for decision-making.

A comprehensive public participation process was undertaken as part of the scoping and EIA process. Methods that were used to inform identified I&APs regarding the proposed development include advertisement in The Free State Weekly, a local newspaper, on-site notice board, posters, and distribution of the background information document, which is phase 1 of the process, phase 2 was the reviewing of the Draft Scoping Report. No objections were received for Phase 1 and Phase 2 although concerns were raised regarding the access to the proposed site and fire hazard and only the latter was assessed as access will be via an existing dirt road, that branches off from Rabie Street, which is used by Eskom personnel to access their infrastructure. For Phase 3, the draft Environmental Impact Assessment Report will be submitted for 30 days review period and input and comments will be incorporated before submission to the competent authority for decision-making.

A site inspection was undertaken as part of the scoping process to determine the environmental baseline data as well as ground truthing. This assisted in determining the sensitivity of the receiving environment. The topography of the proposed site is gently sloping in a south-westerly direction with no steep slopes. It is characterized by alternating layers of mudstone and sandstone mostly Permian Adelaide Subgroup (Beaufort Group, Karoo Group). The area falls within the D33C Quartenary Catchment area and the nearest watercourses are located within 350m with a preferential water pathway traversing the proposed site. However, no groundwater users were identified. The vegetation is still largely in a natural state although it has/is subjected to anthropogenic activities, e.g., livestock grazing. Although it is evident that it's a natural habitat for various faunal species based on the tracks, droppings, and burrows. The Luckhoff/Relebohile area is located more than 1km west of the proposed site. There are no sensitive receptors except for a house structure nearby. Eskom infrastructure is in the vicinity and to access the proposed site, a same dirt track used to access their infrastructure is used. Like most towns in the Free State, agriculture is the main economic activity in the area. There are few social services, and the unemployment rate is high. The local community mostly depends on social grants and seasonal work. There was no evidence that the proposed site had any heritage, cultural, spiritual, or historical significance.

As indicated 5 sites were considered as candidate site but only Site 6 was subjected to the assessment process, landfilling is the selected method that will be used therefore no alternative treatment method of general waste was considered and an incinerator is not included in the development. A no-go alternative was deemed not feasible because the municipality currently is used a landfill site that was granted a closure certificate and currently it is in a poorly manage state resulting in land degradation and contamination of the air and water resources. The impacts that were identified were based on how the proposed development would impact the biophysical, social, and economic aspects. The assessment of the identified environmental impacts was based on the nature, extent, duration, intensity, irreplaceability, probability, and significance of the impact. The significance of these impacts could be reduced with the adoption of mitigation measures to a greater extent. The positive impact associated with the development is creation of job opportunities but only for the construction period. There is an opportunity for creation of "green" jobs during the operation but would require the municipality to provide the necessary support. Given the natural setting surrounding the proposed

site, it is evident that transformation will be limited to the development footprint. A sample was collected from the earth dam and analysed, the chemical results indicated that there was pollution thus it is clear that in terms of contamination of surface water there is no cumulative impacts, however, no analysis of the groundwater quality was done, therefore it is imperative that boreholes are established to determine the quality before operation phase. With the adoption of mitigation measures, the cumulative impacts as a result of the proposed development are low.

From the assessment of the specialists, no recommendations were received stating that the site was unsuitable and with the adoption of the outlined mitigation measures, the identified environmental impacts will be reduced to a greater extent. There are provincially protected species that were found on site and the Ecologist indicated that a Provincial Flora Permit must be obtained prior to commencement of the construction phase. A representative number of individuals/clusters of the identified provincially protected species to be adequately relocated to other suitable and similar areas as to where they were found from, and this must be done by a qualified and experienced Ecologist prior to vegetation clearance. Although, the proposed site had no other conservationally significant or important faunal species of locally distinct habitats, a single individual of the provincially protected antelope species *Raphicerus campsteris* (steenbok) was spotted traversing the area. The Heritage specialist indicated that the proposed site is a General Protection C for Archaeological Heritage. There is no evidence for the accumulation and preservation of intact fossil material within the Quartenary sediments and the likelihood of finding fossil vertebrate fauna within the geologically recent superficial deposits are considered very low to non-existent.

The Geohydrologist indicated that there is no major groundwater abstraction identified in the area and the aquifer is classified as a minor aquifer, with no important groundwater flow paths. Although there seemed to be no important groundwater usage in proximity of the site, it was recommended that upstream and downstream boreholes be drilled to establish the baseline groundwater quality as well as to be used for groundwater monitoring. The area to be used for waste disposal must be lined to ensure no leaching of pollutants into the subsurface. Due to the proximity of the watercourses, it is important that the mixing of clean and dirty water is avoided thus diversion berms or cut-off trenches must be used so that the watercourses are protected from contamination. The gravels found within the proposed site has low permeability, and the soils have low compressibility, low potential heave and low potential collapsibility. All materials were excavated using TLB excavation and as such the excavation can be classified as soft to intermediate as per SABS 1200 D-1988 (as amended 1990). Any excavation must be inspected by a competent person as per Health and Safety Regulations, i.e., a Geotechnical Engineer and/or Engineering Solutions.

The information provided in the Environmental Impact Assessment Report is deemed adequate to continue enable commenting authorities, identified, and registered Interested and Affected parties to provide their input. The significance of the anticipated impacts ranging between very high and medium can be reduced to low with the adoption of mitigation measures. The severity of the impact associated with operation will be lessened if the Environmental Impact Assessment Programme and outlined conditions are adhered to during the construction phase. It is crucial for the municipality to provide training for their personnel in waste management so that the outlined management measures are implemented, and the operation and maintenance manual is clearly understood to improve daily operations and general housekeeping. The recommendations from Specialists have been included in the conditions that should be considered by the competent authority. Therefore, the Environmental Assessment Practitioner is of the opinion that a Waste Management License and Environmental Authorisation be granted for the proposed development of a new solid waste site.

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ABBREVIATIONS

DESTEA	Department of Economic, Small Business Development, Tourism and Environmental Affairs
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioners
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMP	Environmental Management Plan
FSHRA	Free State Heritage Resources Authority
FSR	Final Scoping Report
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
LLM	Letsemeng Local Municipality
NEMA	National Environmental Management Act of 1998 as amended
NEM:WA	National Environmental Management Waste Act of 2008 (as amended)
SAHRA	South African Heritage Resources Agency
SDF	Spatial Development Framework
WML	Waste Management License

1. INTRODUCTION

Dipabala NSVT Joint Venture was appointed by Letsemeng Local Municipality ("LLM") for the development of a new solid waste site ("SWS") situated on the Remaining Extent of Portion 1 Farm De Dorpsgronden van Luckhoff 577, in Luckhoff within the jurisdiction of LLM in the Free State Province. Dipabala Solutions ("Dipabala") is responsible for the professional engineering and NSVT Consultants ("NSVT") as independent Environmental Assessment Practitioner ("EAP") is responsible for managing the application for the Scoping & Environmental Impact Assessment ("EIA") process for the waste management license ("WML") as well as for an Environmental Authorisation ("EA"). The competent authority for these applications is the Department of Economic, Small Business Development, Tourism and Environmental Affairs ("DESTEA"), which has advised that a parallel application process must be followed for the WML and EA. NSVT has completed the Final Scoping Report ("FSR") component of the EIA process in terms of the National Environmental Management Act (Act 107 of 1998) ("NEMA") (as amended) and National Waste Management Act (Act 59 of 2008) ("NEM:WA"). The FSR was accepted on the 01 September 2021 and thereafter a draft Environmental Impact Assessment Report ("EIAR") was compiled and will be subjected to 30 days review period. After obtaining input from the specialists, commenting authorities, and Interested and Affected Parties ("I&APs"), the final environmental reports will be submitted to DESTEA for review and decision making.

The specialist studies, which have been conducted to assess identified key environmental issues and determine whether the development of the new solid waste site on the proposed site will be environmentally acceptable are as follows:

- Heritage (Archaeological and Palaeontological) Impact Assessment;
- Ecological Impact Assessment and Wetland Delineation; and
- Geohydrological Investigation.

The above-mentioned specialist studies have provided mitigation and recommendations for the proposed SWS, which will be contained in the Environmental Management Programme ("EMPr") to ensure that they are adhered to during the different phases of the activity.

In addition to the studies mentioned below, technical investigations, *i.e.*, Geotechnical Investigation, compilation of Technical Report and design drawings for the proposed SWS were also undertaken by Dipabala.

2. PROJECT DETAILS

2.1. DETAILS OF THE APPLICANT, CONSULTING ENGINEERS & EAP

2.1.1 DETAILS OF APPLICANT

The details of the applicant are shown in *Table 1* below**.**

Table 1: Details of the Applicant

PROJECT APPLICANT	Letsemeng Local Municipality		
CONTACT PERSON	Tshemedi Lucas Mkhwane		
~~RESPONSIBILITY/~~ POSITION	Municipal Manager		
POSTAL ADDRESS	Private Bag X3, Koffiefontein 9986		
PHYSICAL ADDRESS	7 Groot Trek Street Koffiefontein 9986		
TELEPHONE	053 205 9200	**Fax**	053 205 0144
EMAIL	mm@letsemeng.gov.za		

2.1.2 DETAILS OF THE CONSULTING ENGINEERS

The details of the applicant are shown in *Table 2* below**.**

Table 2: Details of the Consulting Engineers

PROJECT ENGINEERS	Dipabala Solutions		
CONTACT PERSON	Tokelo Motheane		
RESPONSIBILITY~~/POSITION~~	Engineer		
PHYSICAL ADDRESS	No. 60 Raymond Mhlaba Street Noordhoek Bloemfontein 9301		
TELEPHONE	051 011 4272	**Fax**	
E-MAIL	Tokelo.motheane@dipabala.com tkmotheane@gmail.com	**Cell**	071 163 2116

2.1.3 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

The details of the EAP are shown in *Table 3* below and the CV is attached hereto as **Appendix 2.1.3.**

Table 3: Details of the Environmental Assessment Practitioner

CONSULTING FIRM	NSVT Consultants		
EAP	Lorato Tigedi		
POSTAL ADDRESS	P. O. Box 42452, Heuwelsig, 9332		
PHYSICAL ADDRESS	1 Fourth Street, Arboretum, Bloemfontein, 9301		
TELEPHONE	061 500 8461	**FACSIMILE**	086 239 9133
E-MAIL	lorato@nsvt.co.za	**CELL**	082 784 8259
QUALIFICATIONS	B. Sc. Hons. (Wildlife) B. Sc. (Natural Science)	**EXPERTISE/ EXPERIENCE**	18 years working in the environmental management field as an EAP. She has completed Scoping and EIA applications, BA applications, drafting of EMPr document and environmental compliance monitoring for various developments.
TRAINING/ CONTINUED PROFESSIONAL DEVELOPMENT	Resources & Sustainability, Physical & Biological Environment, and Informatics Project Management for Environmental Management Social & Economic Sustainability Use of Matrices in EIA Public Participation Training Introduction to Social Impact Assessment Integrating HIV/AIDS and Gender related issues into the EIA Process Integrated Water Resources Management, Water Use Authorisation and Water Use License Application One Environmental System Introduction to Environmental Law	**PROFESSIONAL AFFILIATE**	Environmental Assessment Practitioners Association of South Africa 2020/2519 South African Council of Natural Scientific Professions-400161/09 International Association for Impact Assessment SA – 2191 International Association for Public Participation Southern Africa Affiliate – IAP2SA020

3. PROJECT DESCRIPTION

3.1. BACKGROUND

The municipality has identified the need develop a new landfill site for Luckhoff/Relebohile area. The type of waste to be disposed of at the proposed SWS is general waste, which comprises of builders' rubble, garden, domestic, commercial, and general dry industrial waste. However, general waste may contain small quantities of hazardous substances dispersed within it, for example batteries, insecticides, weed killers and medical waste from domestic premises.

The waste generated in the area consists of:

- ◊ Retail and Commercial: paper, cardboard, plastic, various forms of small quantities of steel, glass, and rubber.
- ◊ Domestic: plastic, paper, foodstuffs, garden refuge and small quantities of household domestic waste.

For the construction of the proposed development to commence, a WML and EM must be obtained, which would require undertaking of the Scoping & EIA process. In addition to the EAP responsible for the process, a multi-disciplinary team was involved in the process and that was an Ecologist, Heritage Specialist, Geohydrologist as well as Civil and Geotechnical Engineers. The EAP has outlined terms of reference for the environmental specialists to ensure that the assessments are aimed on the identified key issues.

3.2. PROPOSED ACTIVITY

The proposed development triggers activities listed in *Table 4* below in terms of the NEM:WA and EIA Regulations, 2014 (as amended) of NEMA, as amended:

Table 4: Listed Activities

LISTED ACTIVITY	DESCRIPTION OF ACTIVITY	DESCRIBE THE PORTION OF THE PROPOSED PROJECT TO WHICH THE APPLICABLE LISTED ACTIVITY RELATES
NEM:WA-WML		
GNR 921: Category B-Activity 8	Establishment of a waste facility for the disposal of general waste exceeding 25 000 tons to a land covering 20 hectares.	The disposal of general waste to land covering an area in excess of 200m^2 and with a total capacity exceeding 25 000 tons. The total facility including associated infrastructure will be located on a land covering 25 hectares.
GNR 921: Category B-Activity 10	The construction of a new solid waste site as a waste management facility which will be used for handling domestic waste.	The construction of a facility for disposal of general waste including associated amenities.

NEMA-EA		
Listing Notice 2 GNR. 325 Activity 15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Clearance of indigenous vegetation covering an area of 25 hectares for the construction of a new solid waste site.

According to these regulations, a WML and EA application process is a legal requirement for these scheduled activities. Therefore, a full EIA is required, and which includes scoping (identification), assessment of issues and a comprehensive public participation process ("PPP").

DESTEA, as the Competent Authority for this application needs to be satisfied that all the impacts on the physical, biological, and social characteristics of the surrounding environment have been identified and appropriately addressed/mitigated. The Draft Scoping Report ("DSR") was be submitted to identified I&APs and key stakeholders/commenting authorities to afford them an opportunity to comment in writing on the report before the Final Scoping Report ("FSR") was submitted to DESTEA for their perusal and acceptance. Therefore, a draft EIAR will be subjected to 30 days review period before submission for review and decision-making as to whether an EA and WML will be granted.

3.3. PROJECT LOCATION

Luckhoff is one of the towns within LLM in the Xhariep District Municipality. It is located approximately 50km south-west of Koffiefontein. The proposed site is located within Portion 1 of the Farm De Dorpsgronden 577, which is to the eastern side of Luckhoff/Relebohile, approximately 3km from the Luckhoff central business district using the Provincial Road R48, along the eastern side. A future residential development is to be located approximately 700m to the west and the existing settlement is more than 1km further west. The proposed site is accessible from Rabie Street onto the 3km gravel road; therefore, it will have to be upgraded to a road worthy condition. Alternatively, an access road branching off from the future residential development could be considered once the layout is available as it would be a shorter option.

The Surveyor-General 21 Digit code of the proposed site is:

F	0	1	1	0	0	0	0	0		0	0	0	0	5	7	7	0	0	0	0	0

The locality map of the proposed (preferred) site is attached hereto as **Appendix 3.3**. The external boundary co-ordinates depicting the facility size are shown below.

Point	Latitude(E)	Longitude (E)
A	29°44'7.39"S	24°47'54.86"E
B	29°44'2.41"S	24°48'17.48"E
C	29°44'13.59"S	24°48'25.57"E
D	29°44'19.10"S	24°48'3.49"E

4. FACILITY DESIGN

4.1. DESIGN OF THE NEW SWS

The elements that were considered in determining a concept site layout for the proposed development are as follows:

1. Site area;
2. Site topography;
3. Capital Budget; and
4. Likely operational experience and capacity operator.

The elements associated with the proposed development are elaborated below and the Technical Report and design drawings are attached hereto as **Appendix 4.1A** and **B**.

4.1.1. SITE WATER MANAGEMENT

The 25ha site generally slopes from the east to west, at an average slope of 3.3%. Stormwater will be managed in such a way that, the run-off from outside the boundaries of the landfill site is diverted (from running into the site) by an earth/gravel berm northeastern boundary. All stormwater-runoff generated within the site, will be all be collected through an open-stormwater channel and retained in a retention pond southwest of the site. No stormwater generated within the site will flow outside the landfill boundaries, this is a measure put in place to prevent any form of contamination to the near-by water body.

4.1.2. LEACHATE CONTAINMENT

A landfill facility has the potential to generate highly polluted wastewater, termed leachate. The landfill cell is to be constructed with lining system to protect the receiving environment, which incorporate drainage layers that capture generated leachate from within the landfill containment cell and direct it to a leachate containment pond (LCP). The size of the LCP is to be based on a 1:50 year rainfall event, whilst the catchment is the number of uncapped cells that are linked to the pond. In terms of the Minimum Requirements, the site falls in a water deficit area and should therefore generate little to no leachate. However, in terms of the new Norms and Standards a leachate retention system is required.

All run off from the cell will be diverted to the LCP with no attenuation within the waste body. It must be noted that the LCP has been sized for the runoff from the largest anticipated cell. This approach has been taken for the following reasons:

- The LCP will be disproportionality large in comparison to the landfill facility area if all cells contribute their contaminated run off.
- It will require the municipality to proceed with continuous rehabilitation as this will be the only solution to limiting contaminated run off to the operating cell alone. Therefore, the facility has been designed to store a maximum of $5m^3$ with a freeboard of 0.5m for a 1:50 year storm event.

4.1.3. LEACHATE COLLECTION SYSTEM

A leachate collection system (LCS) consisting of perforated pipes laid out in a herringbone pattern Within a layer of stone, placed on top of the HDPE geomembrane protection layer will be installed. This will collect leachate from within the landfill and direct it to the adjacent leachate storage/ evaporation pond. The collected leachate will be used for dust suppression or be left to evaporate, any residual waste found in the pond after evaporation will be disposed of on the landfill.

4.1.4. CONTAMINATED STORMWATER

Stormwater runoff from a waste body is termed contaminated stormwater and has the potential to exceed water quality discharge standards. Therefore, any surface stormwater discharging from the waste body must either:

- Be diverted to a stormwater retention dam where it can be treated or discharged; or
- Be diverted into the leachate system. Given the small cell footprints and consequently low run-off volumes contaminated stormwater will be captured in the leachate system and be discharged into the leachate pond where it will be ‘treated’ through evaporation.

4.1.5. CLEAN STORMWATER

Clean stormwater emanating from the catchment reaches above the disposal facility will diverted around the site to minimise the potential to generate contaminated stormwater through the use of cut-off drains or diversion berms.

4.1.6. LINING SYSTEM

As the site will be accepting MSW, a Class 2 waste, the corresponding lining system is a Class B liner per the National Norms and Standards for Disposal of Waste to Landfill. Due to the unavailability of natural construction materials on site, geosynthetic materials have been specified in their place. The equivalency testing of these geosynthetic substitutes are to be done during the preliminary design stage.

4.1.7. MONITORING SYSTEMS

A borehole monitoring network will be installed on site to allow accurate monitoring of both the upstream and downstream subsoil water quality of the facility. Landfill gas (LFG) sampling points will also be installed into the waste body to allow for easy access together LFG samples for regular monitoring of the emissions from the waste body should it be required.

4.1.8. COVER, AIRSPACE AND SITE LIFE

Using a waste to cover ratio of 1:6 by volume a total airspace volume of 50 000m3 is required at an assumed waste density of 1 ton = 1 m3 to store 20 years' worth of waste. This requires a landfill Footprint of roughly 2.56Ha at a maximum height of 2m above natural ground level (NGL) (overfilled by 2m to 7m above NGL to allow for settlement before capping).

4.1.9. SITE LAYOUT

The site will be located to the east of Luckhoff town. External side slopes will be graded to 1(vertical) to 3(horizontal) sufficient to ensure stability as well as providing a soft contour to blend easier. This grade is also adequate for grassing and erosion protection when the site is capped and rehabilitated for its end use. The site will be accessed via off the Luckhoff new access road which will be constructed, and the site will be fenced, a minimum of 1,8m high, to prevent unauthorised access to the site. New direction signage and information boards will be installed.

4.1.10. PROGRESSIVE REHABILITATION PLAN

During operation of the site, rehabilitation is to occur progressively throughout the life of the site on completed areas. It is important that land shaping is undertaken correctly from the beginning to avoid returning at the closure of the landfill to conduct further earthworks as this will compromise vegetation that has established itself to that point. Progressive rehabilitation will include the placement of capping material, consisting of a 300mm thick layer of clay and a further 150mm thick layer of topsoil. The capping material must be distributed evenly, and compaction of the topsoil must be avoided, as this will inhibit vegetation regrowth. The soil should be seeded with indigenous grasses tolerant of methane gas as traces may percolate through the soil from the waste below. The progressive rehabilitation plan will be stipulated in detail in the Landfill Operational Plan.

4.2. HEALTH, HYGIENE AND WASTE MINIMISATION EDUCATION PROGRAMME

Once the project is commissioned Letsemeng Local Municipality together with the District Municipality (Environmental section) an educational programme will be done, and an awareness will be on the day of project completion to the whole community.

4.3. JOB CREATION

Proposed job creation is estimated at 3.5% of the total project cost will go towards labour component on the project (see Municipal Infrastructure Grant: Project Registration Form).

4.4. OPERATION AND MAINTENANCE

Waste collection in Luckhoff can be carried out by use of two trucks with trailers. The Town will be divided into sections to allow for all properties to be serviced once a week. A detailed maintenance and operation monitoring will be described in a separate Operations Manual that will be developed. It will include details of the work force, access control, access road, security, machinery requirements, flood control measures, cover material requirements, operating capacity, compaction rates, safety measures, fire control and overall operational quality control measures for the site.

4.5. WASTE COLLECTION AND TRANSPORT SYSTEMS

The waste collection in the area will be serviced with two trucks and a trailer, the other truck will be used as a back-up in case the other one experience any mechanical breakdown. Waste will be collected weekly.

4.6. CONSTRUCTION COST ESTIMATE

The total summarized cost of closure of the existing site and construction of the new landfill site is estimated at R6 032 877.05.

4.7. RECYCLING PROGRAMME

A waste minimization initiative should be encouraged in line with the National Waste Management Strategy, 2011, e.g., waste separation at a source. However, this initiative will need community buy-in, therefore the municipality will need to roll-out a community awareness programme for various waste minimization initiatives that could be adopted in the area by the community and businesses. This will be in line with the IDP 2020/2021 and Local Economic Development Strategy 2018, whereby Community Workers Programme and/or co-operatives will be assisted to be involved in recycling as a means to get income and have less waste disposed at the SWS.

5. LEGAL REQUIREMENTS

Legislation and guidelines applicable to the waste management license and Environmental Authorisation application as contemplated in the EIA process are the following:

1. Administered by the Government of South Africa
   - **Chapter 2 of the Constitution Act (Act 108 of 1996)**

Section 24: Everyone has the right: (a) to an environment that is not harmful to their health or wellbeing; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that: • prevent pollution and ecological degradation; • promote conservation; and • secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
Relevance: ■ The proposed development should ensure that it does not result in any harm to the health and wellbeing of anyone, especially neighbouring community by applying mitigation and/or management measures which can be adopted to prevent any pollution or ecological degradation. ■ The development should be ecologically sustainable taking into economic and social aspects.

2. The administering authority is the Department of Environmental Affairs
   Chapter 5 of National Environmental Management Act (Act 107 of 1998) as amended

It outlines the process that should be undertaken to obtain a Waste Management License and an Environmental Authorisation.
Relevance: ■ An application for a WML requires the process outlined in GNR 326, Amendments of the Environmental Impact Assessment Regulations, 2014 of 07 April 2017 in terms of NEMA, 1998 (as amended) to be followed. ■ An application to obtain an Environmental Authorisation must be lodged with DESTEA for the activity listed in GNR 325 EIA Regulations Listing Notice 2 of 2014 as amended as promulgated under NEMA, 1998 (as amended).

NEMA Principles

NEMA principles contained in Section 2 of Chapter 1 are key in the decision-making process during the EIA process to ensure its objectives are met. Some of the principles which are relevant for the development:

2. Environmental Management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural, and social interests equitably.
3. Development must be socially, environmentally, and economically sustainable.
4. (a) Sustainable development requires the consideration of the following:
   (ii) Pollution of the environment must be avoided or minimised and remedied.
   (iv) Waste must be avoided or, where it cannot be avoided, consideration must be given to minimisation, reuse, and recycling.
   (viii) Negative impacts on the environment and on the people's environmental rights should be anticipated and prevented or minimised and remedied.
   (i) Social, economic, and environmental impacts must be considered, assessed, and evaluated and decisions must be appropriate to impact assessment findings.
   (k) Decisions must be in a transparent and open manner, and access to information must be provided in accordance with the relevant laws, such as the Promotion of Access to Information, Act 2 of 2000.
   (p) The costs of remedying pollution, environmental degradation, and consequent adverse health effects and of preventing, controlling, or minimizing further pollution, environmental damage or adverse health effected must be paid for those responsible for harming the environment.
   (r) Sensitive, vulnerable, highly dynamic, or stressed ecosystems such as coastal shores, estuaries, wetlands, and similar system require specific attention in management and planning procedure, especially where they are subject to significant human resource usage and development pressure.

Relevance:

- The proposed development should be based on the Environmental Management principles outlined by NEMA to ensure it does not result in any adverse impact on the receiving environment because they will be used by the competent authority, i.e., DESTEA during the decision making.

- **National Environmental Management: Biodiversity Act (Act 10 of 2004) as amended**

It relates to the management and conservation of biodiversity, the protection of ecosystems and species, the sustainable use of biological resources, and the fair and equitable sharing of biological resources.
Relevance: ▪ The proposed development should ensure that no threatened species are damaged or destroyed, by determining if there are any endangered, threatened, or protected species and assessing impacts thereto. Hence an ecological impact assessment was conducted on the proposed site.

- **National Environmental Management: Waste Act (Act 59 of 2008)**

It is set out to protect the health and environment by providing reasonable measures for the prevention or pollution and ecological degradation and for securing ecologically sustainable development. It provides norms and standards for regulating the management of waste by all spheres of government to provide for specific waste management measures. It provides for licensing and control of waste management activities. It provides for the remediation of contaminated land. It provides for compliance and enforcement.
Relevance: ▪ An application to obtain a WML for the proposed SWS is lodged with DESTEA as the activity triggers listed waste management activities that have or are likely to have a detrimental effect on the environment. ▪ The developer and applicant should ensure that Waste Management Practices are adopted to prevent any pollution and ecological degradation from construction to the operation phase as a result of improper or poor handling, storage and disposal of waste. ▪ Reuse, Recycle and Recover waste should be adopted as part of the development.

3. The administering authority is the Department of Water Affairs and Sanitation ("DWS"):

- **National Water Act (Act No. 36 of 1998)**

It is set out for protection of the quality of water resources to ensure sustainability of the nation's water resource in the interest of all water users. It makes provision for addressing both pollution prevention and remediation. It protects aquatic and associated ecosystems. It ensures that water is protected, used, developed, conserved, managed, and controlled in a sustainable and equitable manner.

Relevance:

- Although a water use license is not required for the operation of the SWS, the operation of the SWS should not result in pollution of water resources. Therefore, measures to prevent contamination should be included in the Operation and Maintenance manual of the facility.
- A borehole for monitoring groundwater quality will be established as part of the development.
- A stormwater management plan must be approved by DWS prior to construction to ensure that contaminated water from the site does not pollute water resources in the vicinity of the site.
- The draft EIAR will be sent to DWS for comments.

- **Water Services Act (Act No. 108 of 1997)**

Its main objectives it to provide for the right of access to basic water supply and the right to basic sanitation necessary to secure sufficient water and a sanitation facility that will not compromise human dignity.

Relevance:

- During the construction and operation phase of the development should have potable water and adequate sanitation for the workforce on site during construction and operation.

4 The administering authority is South African Heritage Resource Agency (SAHRA)

- **National Heritage Resource Act (Act 25 of 1999)**

It stipulates that:

1. The responsible authority should be notified if a developer is to undertake an activity that may have an impact on the heritage resources of an area and stipulates that an impact assessment report may be required, compiled by approved and qualified specialists.
2. No person may without a permit issued by the responsible heritage resources authority, destroy damage, excavate, alter, deface, or otherwise disturb any archaeological or palaeontological site.
3. No person may without a permit issued by the SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority.

Relevance:

- A Heritage Impact Assessment was undertaken as part of the Scoping/EIA process for the proposed development because the proposed site is more than 5000m^2 to ensure no archaeological or palaeontological or historical or cultural artefacts are destroyed, damaged, altered or disturbed as a result of the proposed development.
- The Draft EIAR is sent to SAHRA as a commenting Authority in terms of Section 38 of NHRA.

5 The administering authority is the Department of Agriculture, Forestry and Fisheries

- **Conservation of Agricultural Resources Act (Act 43 of 1983) and CARA Regulations of 1984**

It relates to:

1. Control and management of erosion, weeds, and invasive species amongst other things.
2. Prohibits the removal of vegetation in a watercourse in order to prevent erosion.
3. Promotes adoption of soil conservation measures.
4. Control measures for combating declared weeds and invader plants.

Relevance:

- The proposed development should adopt erosion control measures.
- Measures should be in place to control weed infestation during the construction of the facility and operational phase.

6 The administering authority is LLM-**Municipal By-laws**

Some activities would be subjected to the requirements of municipal by-laws and special condition, e.g., noise control, waste removal, etc. which should be adhered to.

7. Norms and Standards

- Draft National Standard for Disposal of Waste to Landfill (GN 432 of 2011)
- Draft Standard for Assessment of Waste for Landfill (GN 433 of 2011)
- Draft Waste Classification and Management Regulations (GN 435 of 2011)

8. Guidelines

Other guidelines and documentation although not legally binding have been considered in the drafting of Environmental Reports, which includes the:

- Guidelines made available by the Department of Environmental Affairs in terms of the EIA Regulations:
  - Guideline 3: General guide to the EIA Regulations
  - Guideline 4: Public Participation
  - Guideline 5: Assessment of alternatives and impacts
  - 2017 Guideline on Need and Desirability, Department of Environmental Affairs

6. MOTIVATION FOR PROJECT NEED AND DESIRABILITY

A closure license, (WML/BAR/22/2014) was issued for the SWS in Luckhoff, thus a site should be identified for the establishment of a new SWS. However, the municipality is still using it for disposal. To enable closure of this landfill site, it needs to be rehabilitated to ensure the conditions of the closure certificate are met and this can only be done if a WML and EA is issued for a new landfill site. The existing SWS, could not be upgraded, as it is in need of soil cover as a result, the waste disposed there, is left uncovered thus creating undesirable aesthetics and the environment prone to disease-carrying pests' infestation, soil contamination, etc. A need therefore exists for the establishment of the proposed SWS in Luckhoff. It is also pointed out in the 2016/2017 IDP that there is a need for a new landfill site, and it is pointed out that waste removal has been prioritized as one of the areas identified for improvement in service provision by the municipality's Technical Directorate and Community Services Directorate. In addition to this, a new landfill site was identified as one of the projects to be undertaken for the 2017/2018 financial year, with phase 1 being compliant with NEM:WA and Phase 2, the actual construction of the facility, however, a refusal was granted for that application hence the municipality has not completed the identified project.

To help ensure the best environmental practicable option is adopted, five alternative candidate sites were identified, and they were evaluated based on their sensitivity including future land use. During the selection process, the municipality and the councillor were involved and public input from Phase 1 of the PPP was followed. Candidate site 3 had to be shifted in a north-eastern direction and then the proposed site became site 6. For Site 1 and Site 2, the current and future land uses were main issues, and the sites could not be extended further because they would have encroached onto private land. Site 4 was identified by the small emerging farmers as an alternative to site 2, the area they are currently using for agricultural purposes and the site had a sensitivity that rendered it unsuitable for development of a landfill site. As part of the selection process, ecological sensitivity was determined by the Ecologist from a desktop study, thereafter a detailed assessment including other specialist studies was undertaken on the preferred site.

The proposed site identified for the construction of a SWS is located within 1.3km east of the Luckhoff/Relebohile area. It falls within the Northern Upper Karoo vegetation type (NKu3), which is classified as Least Concerned. From the Ecological Impact Assessment conducted, individuals of Provincially protected species were identified. No Red Data Listed, -Nationally protected species or any other species of conservational significance were found to be present. Therefore, prior to commencement of construction activities including site preparation and vegetation clearance, a Provincial Flora Permit must be obtained for the removal of the Provincially protected species, which must be relocated to a suitable or environment similar to where they were removed. A walkover botanical study must also be conducted as there could be underground bulbs that were not identified, as the site survey was done during the winter season. Although the area is categorised as Ecological Support Area 1, it is in a slightly disturbed state due to the historic and continued anthropogenic activities, these anthropogenic activities include the area being subjected to burning. The area has low conservation value, therefore, has limited impact on the ecological integrity objectives/targets/considerations of the area.

Given the condition of the proposed site, it is not anticipated that any conservationally significant or important faunal species would necessarily utilise the area for breeding purposes. However, it is important to ensure that transformation of the area is limited to the development footprint. The nearest watercourse, a small historic artificially excavated waterflow channel is located within 220m and flows in a southerly direction and discharges into an earth dam located approximately 1km to south-west. There are no heritage artefacts within the proposed site that could be negatively impacted by the development of a landfill site.

Other anticipated impacts associated with the proposed development can be lessened to a greater extent, with adoption of mitigation and management measures. Others, like avoiding mixing of clean and dirty surface run-off, will be addressed by the design of the facility, whereby there should be a berm to keep dirty water within and to keep clean water from entering the facility. Therefore, it is important that the design meets Regulation 3: Landfill Classification and Containment Barrier Design.

During the operation of the landfill site, the facility will be connected to the municipal electrical and water connections. At the moment, the design does not include use of renewable natural resources, as it is solely used for disposal of waste. The positive impacts associated with the proposed development, is that the municipality will have a designated licensed landfill site for disposal of general waste collected from the local community and the existing landfill site would be rehabilitated and no longer used for waste disposal. There will be generation of employment opportunities, although these employment opportunities will be temporary. However, in the municipal IDP, it is indicated that security personnel would be employed at the landfill site. Although, most jobs will be created during the construction period, it is important that local subcontractors be involved to improve their CIBD level and that accredited training that is based on the outcome of the skills audit be provided.

Most of the households in Luckhoff are serviced by the municipality once a week for refuse removal, therefore if the plans for a new landfill site are not realized, this will negatively affect the service. The community could resort to establishment of illegal dumping sites, or the municipality will continue to dispose waste at the landfill site due for closure and this could result in visual impact due to windblown litter on the neighbouring areas, e.g., cemetery thus creating nuisance to the residents. The identified site is the best practicable environmental option, as the site is easily accessible from waste collection areas and there are no identified fatal flaws, thus ensuring the area will be developed with least damage to the environment and without any residual impacts.

The municipality has indicated one of their objectives as to accelerate and improve basic service delivery provided to its communities in their IDP 2016/2017. Therefore, the proposed development will ensure that the municipality improves waste management, i.e., handling and disposal of waste in a safe and efficient manner that would not harm the health and wellbeing of the community thus keeping cleaning environment in the area. In the IDP 2021/2022, it is indicated that the development of the new landfill site for Luckhoff is allocated R 5 632 665-00, this includes closure of the existing one. It's also indicated that indigenous trees must be planted around the perimeter of the site, therefore, this will be incorporated in the design. Once the Luckhoff SWS is operational,

it would ensure that 80 people are employed under the Expanded Public Works Programme and Community Worker Programme recruits to be assisted to register storage facilities, which would be used to collect recyclables material and sell it to big companies. Therefore, as part of the design, dedicated recycling area will be included in the design. The proposed development will enable the municipality to improve waste management as well as creation of job opportunities.

Should this application be approved, the municipality will be able to implement one of its identified job creation strategies, *i.e.*, recycling and waste management because the new landfill site will have an operation manual, which should be followed to ensure that the facility operates optimally ensuring a clean and healthy environment. The establishment of the SWS on the identified site will not compromise the integrity of the municipality's IDP. Public participation process is underway to ensure that the identified site will be acceptable to the community of Luckhoff.

7. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT

The preferred development footprint of the proposed SWS was planned in a way that the environmental impacts are avoided and where not possible, reduced significantly, and this was done by considering environmental constraints based on the input from specialists and technical aspects. During the site inspection, no sensitive areas were identified except for the preferential water pathway thus no changes on the layout were necessary. From the geotechnical investigation, it is indicated that no groundwater seepage was observed during excavations to the depth of three (3) metres and there were no groundwater users within 1km radius except for one borehole, which is blocked thus could not be sampled. The proposed site is underlain by dolerites, which have a low permeability, thus will minimize groundwater contamination. However, it is important that clean water and dirty water are separated during the operation phase, thus stormwater management plan must be compiled prior to the commencement of the construction phase. The gravel soils within the proposed site have low permeability too but only the one classified as SM is suitable to be used for water retaining embankments. There is no underground infrastructure on the proposed site to influence the development footprint. For a development to be implemented there are associated impacts, and those that could not be avoided, mitigation and management measures were outlined in Section 9.2 below.

8. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS FOLLOWED

8.1. DEVELOPMENT FOOTPRINT ALTERNATIVES

Due to the proposed site not having any fatal flaws, no development footprint alternatives were considered. The proposed site layout plan is attached hereto as **Appendix 8.1**.

8.2. DETAILS OF PUBLIC PARTICIPATION PROCESS

A comprehensive public participation process was conducted to inform all I&APs of the proposed development and to ensure that everyone had the opportunity to raise their concerns and/or comments. The WML and EA application for the proposed development was brought to the attention of the public by the following means:

1. Newspaper advertisement was placed in the local newspaper on the 25 June-8 July 2021 publication of Free State Weekly.

2. On-site notice was placed on the 14th of May 2021

3. Posters were placed on the 14th of May 2021 at:
   - Fence of the proposed site;
   - Municipal Offices;
   - GWK Store

4. Background Information Document was sent to the following stakeholders and commenting authorities to obtain their inputs:

   - Ward 1, Councillor Xalisile Nqelani;
   - Department of Water and Sanitation;
   - Free State Department of Agriculture and Rural Development;
   - Free State Department of Police, Roads and Transport;
   - Eskom Free State Operating Unit; and
   - Luckhoff Farmers Association

No objections were received during the notification phase and comments were received from the Free State Department of Agriculture, Eskom, and Luckhoff Farmer's Association. For Phase 2 of the PPP, DSR was sent for review to the identified I&APs and inputs were incorporated into the Final Scoping Report and no objections were received. The FSR was accepted by DESTEA. For Phase 3, the draft EIAR including the findings and recommendations of the specialists will be sent for review before compilation of the Final report.

Public Participation Records for Phase 1, Notification, *i.e.*, newspaper advertisement, on-site notices (on the fence from Rabie street and the one along the provincial road R48 side), other means of contacting I&APs (background information document and posters at prominent places) and submission of and comments on the DSR to I&APs are attached as **Appendix 8.2**. The comments on the Draft EIAR will be incorporated before finalization of the EIAR for submission.

8.2.1. DATABASE OF INTERESTED AND AFFECTED PARTIES

The I&APs database that was maintained during the PPP is shown in *Table 5* below. The details have been blacked out as consent was not received in line with the POPI Act.

Table 5: Interested and Affected Parties Database

AUTHORITY/ ORGAN OF STATE/STAKEHOLDER	CONTACT PERSON (TITLE, NAME AND SURNAME)	TEL NO	E-MAIL	POSTAL OR PHYSICAL ADDRESS
[redacted]				

8.2.2. SUMMARY OF ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

Summary of issues received from I&APs are tabulated in *Table 6* below.

Table 6: Summary of Issues raised by I&APs

AUTHORITY/ STAKEHOLDERS/ I&APS	ISSUE/COMMENTS	INCOPORATION OF THE COMMENTS/ RESPONSE OF EAP
NEWSPAPER ADVERT (25 JUNE-8 JULY 2021) ON SITE NOTICE AND POSTERS (14TH JUNE 2021)		
No objections and/or comments were received		
BACKGROUND INFORMATION DOCUMENT (28TH JUNE & 12TH JULY 2021)		
Eskom 28th June 2021 Email	Comments from distribution: Eskom Distribution (Dx) had no objection to the proposed works, however indicated that the application should be sent to Transmission (Tx) as well. Conditions that must be adhered to relating to Eskom infrastructure and services were outlined.	Notification sent to Eskom Transmission too and no comments were received. Eskom Conditions included in the EA conditions and EMPr
Dept. of Police Roads and Transport 28th June 2021 Email	The concern was whether access to the proposed site will be from the provincial road so that the department is able to consider the effect. The information on the distance of the proposed site in relation to the provincial road R48. What are structures that will be erected at the site and what such structures will consist of	More clarity with regard to the access would be provided when the design of the facility is complete. The existing gravel road or access may connect to the future residential development road network. The proposed site is located within 500m from the provincial road The design will be included in the Draft EIAR

Luckhoff Farmer's Association 15th July 2021 Email	The size of the fire break around the facility around the site considering the commonly west wind as this could be a safety issue.	There will be a 3m width firebreak along the boundary of the SWS incorporated in the design.
REVIEW OF THE DRAFT SCOPING REPORT		
Luckhoff Farmer's Association 15th July 2021 Email	What is the envisaged commencement date for construction?	Envisaged date for obtaining the Waste Management License and Environmental Authorisation is February/March 2022. Thereafter, the municipality will follow tendering process to appoint a contractor.
Eskom 28th July 2021 Email	The Draft Scoping Report forwarded to the Northern Cape Region	Comment noted and the Draft EIAR will be sent to the relevant region.
Dept. of Police Roads and Transport 29th July 2021 Email	Same comment as raised previously.	Information would be included in the Draft EIAR
DESTEA-Environmental Impact Management 12th August 2021 Email	A Geotechnical Study, together with the other studies mentioned in the draft Scoping Report. Furthermore, potential cumulative impacts of the activity applied for should be reflected within the EIA process.	The Geotechnical Investigation report will be included with reports of the Specialists studies mentioned in the Draft Scoping Report. Cumulative impacts were considered as part of the EIA process.
REVIEW OF THE DRAFT EIAR		
Comments to be incorporated in the final EIAR after the reviewing of the draft EIAR		

8.3. BROAD DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

A comprehensive survey of the study area was conducted including studies by specialists to determine the environmental baseline data and the findings are detailed below.

8.3.1. CLIMATE

Luckhoff normally receives about 236mm of rain per year, with most rainfall occurring mainly during autumn. It receives the lowest rainfall (0mm) in July and the highest (51mm) in March. The average midday temperatures for Luckhoff range from 16.4^{0}C in June to 31^{0}C in January. The area is the coldest during July when the mercury drops to 0.3^{0}C on average during the night.

8.3.2. TOPOGRAPHY

The topography of Luckhoff is generally flat. The area has bottomlands flats forming a matrix of large landscape interrupted by dolerites, koppies and ring dykes. The site is gently sloping in a south-westerly direction with rocky outcrops. The topographical survey was done and the Survey Layout for the proposed site is attached hereto as **Appendix 8.3.2**.

8.3.3. GEOLOGY AND SOILS

The area is characterized by alternating layers of mudstone and sandstone mostly of the Permian Adelaide Subgroup (Beaufort Group, Karoo Supergroup). Part of the area is covered with soils with diagnostic pedocutanic and prismacutanic (dark clayey) B-horizons and belongs to soil forms such as Estcourt, Rensburg and Oakleaf. In some areas, especially towards the more arid west, patches of calcrete on the soil surface are notable- here the soil forms such as Kimberly and Plooysburg prevail (dwarf karroid shrubs usually concentrate on these areas of limestone rich patches). A geotechnical investigation was undertaken to determine the site-specific geology. The findings and recommendations are contained in Section 8.7 below.

8.3.4. GROUND, SURFACE WATER AND DRAINAGE

The area falls within the D33C Quartenary Surface Water. There is a drainage line within ±340m and a small historic artificially excavated waterflow channel situated 220m west, which flows southerly and discharges to the earth dam, which is approximately 1km south-west. One borehole was found but could not be sampled because it was blocked. There are no prominent groundwater flow paths. Surface water drainage is primarily into a south-western and western direction. The findings and recommendations are contained in Section 8.7 below.

8.3.5. FAUNA AND FLORA

8.3.5.1. GENERAL FAUNA DESCRIPTION

Luckhoff is a town with a population that largely depends on agriculture therefore there is a likelihood of identifying livestock within the region, hence there is evidence of the site being used for grazing purposes although it is not a formal grazing area. Due to the area being undeveloped, the potential habitat for fauna is intact and animals, inclusive of reptiles, amphibians, birdlife, and small mammals are expected to inhabit the area. However, except

for grazing livestock, burrows and droppings, no animals were observed during the site inspection.

8.3.5.1.1. Site Specific Fauna Description

During the site inspection no animals were observed except for the local common birds. However, the Ecologist spotted one individual of provincially protected species, steenbok. The animals could have relocated due to the recent partial burning of the proposed site. There were termite hills too within the assessment area. The assessment area does not fall within any Important Bird Area (IBA) as per the latest IBA map obtained from the Birdlife SA website. No conservationally significant or important bird species/nests or locally distinct habitats were observed. Due to the location of town in relation to the proposed site, it is not anticipated that any conservationally significant or important faunal species would necessarily utilize the assessment area or the localised surrounding undeveloped landscape for breeding, foraging and/or persistence purposes. The findings and recommendations of the Ecologist are contained in Section 8.7 below.

8.3.5.2. GENERAL FLORA DESCRIPTION

Luckhoff area falls within the Grassland Biome. According to (Mucina & Rutherford 2006), the area is characterized by Shrubland dominated by dwarf Karoo shrubs. The preferred site falls within the Xhariep Karroid Grassland vegetation type (Gh3), whilst only the most northerly portion forms part of the Northern Upper karoo vegetation type (NKu 3) (Mucina & Rutherford, 2006).

8.3.5.2.1. Site Specific Flora Description

During the site inspection, the site was characterized by a layer of grass and few scattered shrubs and small-sized trees. Few species which are provincially protected were identified, thus before any commencement of earthworks including vegetation clearance, a Provincial Flora Permit must be obtained from DESTEA. No Red Data Listed-, other provincially- or nationally protected plant species or any other species of conservational significance were found to be present. The findings and recommendations of the Ecologist are contained in Section 8.7 below.

8.3.6. LAND USE

The proposed site is located approximately 1.2km to the western side of Luckhoff/Relebohile. In the vicinity to the northern side is the Provincial Road R48, within ±500m. Within 740m, the area is identified for future residential development. An earth dam is located south-westerly within approximately 1km. Within 1 km radius is Eskom powerline and substation. The current and different land uses in proximity of the proposed site are shown in **Figure 1** below.

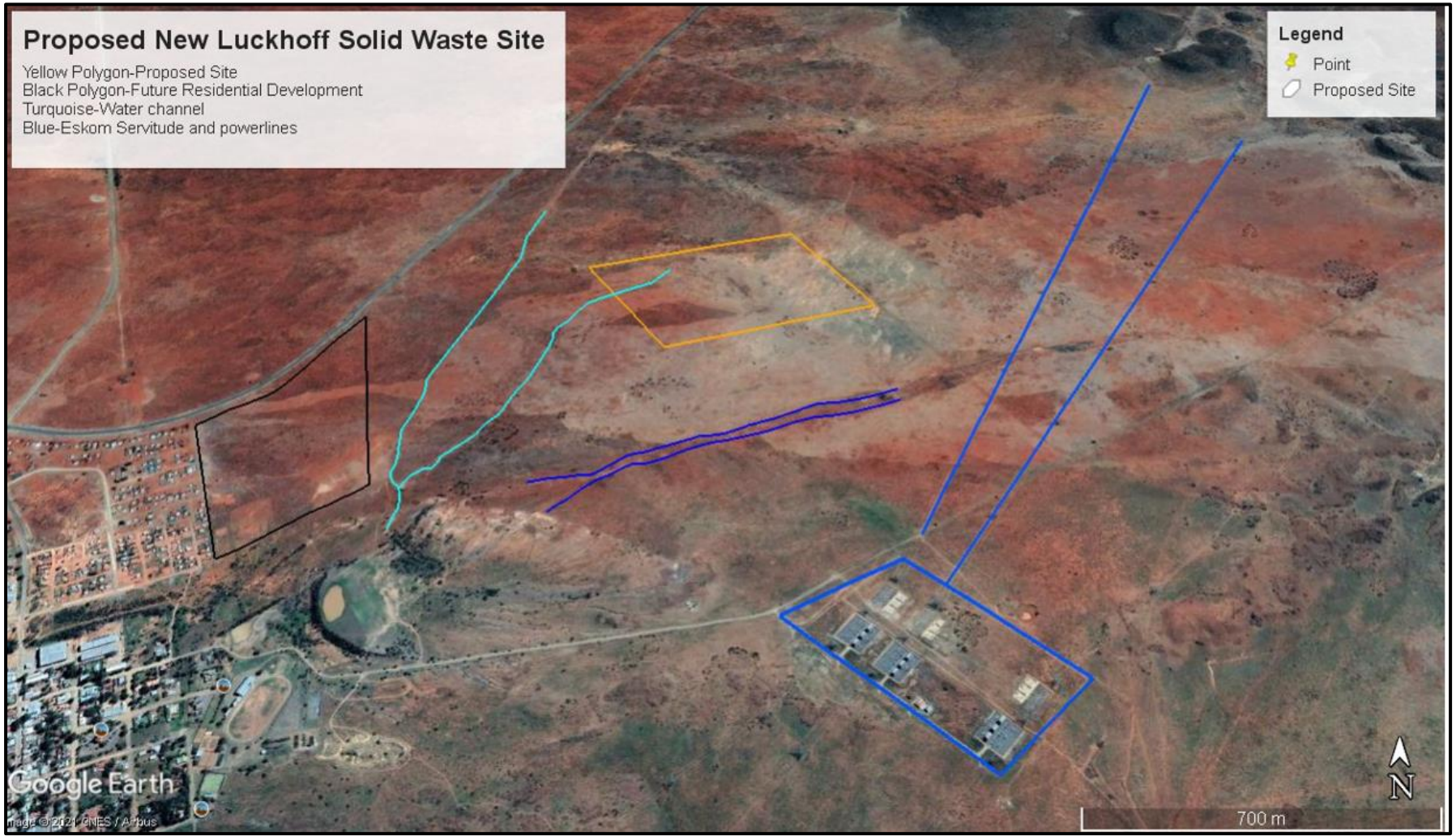

Figure 1: Land Use within and Surrounding the Proposed Site

8.3.7. SOCIO-ECONOMIC STRUCTURE OF THE AREA

The Luckhoff/Relebohile/Teisesville area of jurisdiction of the LLM is situated in Xhariep District Municipality. The municipality covers an area of 10 180 71 km², it comprises of Koffiefontein which constitutes the Head Office of the municipality, Jacobsdal, Petrusburg, Luckhoff and Oppermansgronde. During the Census, 2011, Luckhoff had a population 3699, and the male population was 1759 and female was 1904. However, the municipality had a declining population growth from 2001 to 2011. The area is dominated by the agricultural sector as it serves as an agricultural service centre and other social functions includes residence, education, and medical services. There are no industries within the municipal area. According to the IDP of 2016-2017, the unemployment rate was 32.9%, with male at 27.8% and female at 39.8%. Only 10.2% of households in the area fall within the "No income" category and 7.4% have an income of less than R10 000 and 23.9% have an annual income of less than R19 601.00. There is high unemployment level, and this can be associated with the area not having any further education training or tertiary institutions in the area. There is one primary school, one combined and one intermediate school. The residents rely on informal trading, seasonal work, and social grants. Like other municipalities, LLM also faces challenges of poverty, shortage of skilled workers and reduction of agriculture sector dependency. Therefore, addressing the plague of poverty, the municipality has initiatives in place, e.g., working for water, expanded public works programme, etc. However, the municipality aims to develop and enhance infrastructure for economic growth and ensure a safe environment for all.

8.3.8. CULTURAL, HISTORICAL AND ARCHAEOLOGICAL ASPECTS

Due to the size of the proposed site, it is necessary to perform a Phase 1 Heritage Assessment to determine if there is any archaeological, heritage, cultural and/or paleontological artefacts that could be affected by the proposed development. The heritage report containing findings and recommendations will be contained in the EIAR.

8.3.9. PHOTOGRAPHIC HISTORY OF THE PROPOSED SITE

Photographic history of the proposed site is shown in *Photo 1* to *9* below. Significant on the photographs is the following:

- Panoramic view of the proposed site and surrounding land use;
- Typical topography of the site;
- Vegetation condition;
- Potential habitat for fauna;
- Location of the Luckhoff/Relebohile in relation to the proposed site; and
- Location of the nearest Eskom Overhead Powerline in relation to the proposed site.

VANTAGE POINTS

Figure 2: Vantage Points for Photographs taken

POINT A

Photo 1: Panoramic View towards point A

Photo 2: Typical vegetation within the proposed site

Typical on the Photographs:
1. Typical veld condition
2. View of the Eskom Overhead Powerline
3. View of the proposed site towards point A from the neighbouring camp

POINT B

Typical of Photographs:
1. Evidence of grazing land use-cow dung
2. Few bare patches showing slight disturbance within the proposed site
3. View of the Eskom overhead from Point B
4. Fence bordering the northern site
5. Termite hill

Photo 3: South-Eastern View of the Proposed Site from Point B

Photo 4: South-western view from the Point B

Photo 5: Termite hill

POINT C

Photo 6: Panoramic View of the Proposed Site from Point C towards Luckhoff area

Photo 7: Partially burnt section of the proposed site and the bare patch at Point C

Typical of Photographs:

1. Bare soil section
2. Burnt section
3. View of Luckhoff hill in relation to the proposed site

POINT D

Photo 8: View of the Proposed Site from Point D

Photo 9: South-western view from Point D toward Luckhoff area

8.4. INFORMATION ON THE METHODOLOGY TO BE ADOPTED IN THE ASSESSMENT OF IDENTIFIED IMPACTS

The methodology adopted for the assessment of identified impacts is the Impact Rating Matrix, which is explained below.

<table>
<tr><td colspan="4">NATURE: The character of the impact</td></tr>
<tr><th>EXTENT</th><th>DURATION</th><th>PROBABILITY</th><th>MAGNITUDE</th></tr>
<tr><td>Area</td><td>Time Frame</td><td>Likelihood</td><td>Intensity of impact to destroy or alter the environment.</td></tr>
<tr><td>IRREPLACEABLE LOSS OF RESOURCES</td><td colspan="3">This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.</td></tr>
<tr><td>REVERSIBILITY</td><td colspan="3">This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity</td></tr>
<tr><td colspan="4">SIGNIFICANCE:
Implication of the impact both with or without mitigation</td></tr>
<tr><td colspan="4">TYPE:
Description as to whether the impact is negative or positive or neutral.</td></tr>
<tr><td colspan="4">MITIGATION:
Possible impact management, minimization and mitigation of the identified impacts.</td></tr>
</table>

8.4.1. NATURE OF IMPACT

Nature of impact describes the character of the impact in terms of the effect on the relevant environmental aspect.

8.4.2. SPATIAL EXTENT OF IMPACT

Measures the area extent, physical and spatial scale over which the impact will occur. This implies the scale limited to the Project Site (footprint) - including adjacent areas; or the town and neighbouring areas (localized), or the Local Municipality area (regional) or the entire Province (Provincial), or the entire country (National) or beyond the borders of South Africa.

Criteria	Footprint/ Surroundings (F)	Site/Local (S-L)	Regional (R)	Provincial (P)	National and Beyond (International) (N)
Rating	**1**	**2**	**3**	**4**	**5**

8.4.3. DURATION OF IMPACT

Duration measures the timeframe of the impact in relation to the lifetime of the project. It gives an assessment of whether the impact can be eliminated by mitigation immediately (0-1 year) after a short time (1-5 years), medium term (5-10 years), long term (11- 30

years of the Project activities), or permanent (persists beyond life) due to the Project activities.

Criteria	Temporary (T)	Short Term (ST)	Medium Term (MT)	Long Term (LT)	Permanent (P)
Rating	1	2	3	4	5

8.4.4. MAGNITUDE/INTENSITY OF IMPACT

Magnitude or intensity of the impact measures whether the impact is destructive or benign, whether it destroys, alters the functioning of the environment, or alters the environment itself. It is rated as insignificant, low, medium, high or very high.

Criteria	Insignificant (I)	Low (L)	Medium (M)	High (H)	Very High (VH)
Rating	2	4	6	8	10

8.4.5. IRREPLACEABILITY OF NATURAL RESOURCES BEING IMPACTED UPON

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

Criteria	Very Low (VL)	Low (L)	Moderate (M)	High (H)	Definite (D)
Rating	1	2	3	4	5

8.4.6. REVERSIBILITY OF IMPACT

This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity

Criteria	Reversible (R)	High Reversibility (HR)	Moderate Reversibility (MR)	Low Reversibility (LR)	Irreversible (IR)
Rating	1	2	3	4	5

8.4.7. PROBABILITY OF IMPACT

Probability measures the probability or likelihood of the impact occurring, as either probable, possible, likely, highly likely or definite (impact will occur regardless of preventative measures).

Criteria	Probable (PR) (0-10%)	Possible (PO) (10-25%)	Likely (L) (25-50%)	Highly Likely (HL) (50-75%)	Definite (D) (75-100%)
Rating	1	2	3	4	5

8.4.8. SIGNIFICANCE OF IMPACT

Significance measures the foreseeable significance of the impacts of the Project both with and without mitigation measures. The significance on the aspects of the environment is classified as:

Significance Score (SS) =	(Extent + Duration + Magnitude + Irreplaceability + Reversibility) x Probability

The Significance Score is then used to rate the Environmental Significance of each potential environmental impact with or without mitigation.

Significance Score	Significance Rating	Description/ Criteria
125-150	**Very High**	the impact will result in large, permanent and severe impacts, such as local species extinction, minor human migrations or local economic collapses; even projects with major benefits may not go ahead with this level of impact; project alternatives which are substantially different should be looked at, otherwise the project should not be approved.
100-124	**High**	the impact will affect the environment to such an extent that permanent damage is likely, and recovery will be slow and difficult; the impact is unacceptable without significant mitigation efforts or reversal plans; project benefits must be proven to be very substantial; the approval of the project will be in jeopardy if this impact cannot be addressed.
75-99	**Medium-High**	the impact is significant and will affect the integrity of the environment; effort must be made to mitigate and reverse this impact; in addition, the project benefits must be clearly shown as outweighing the negative impact.
50-74	**Medium**	the impact will be noticeable but should be localised or occur over a limited time period and not cause permanent or unacceptable changes; it should be addressed in the EMPr and managed appropriately.
<50	**Low**	the impact should cause no real damage to the environment, except where it could contribute to cumulative impacts.
+	**Positive Impact**	A positive impact is likely to result in a beneficial consequences/effect and should therefore be viewed as a motivation for the development

8.5. IDENTIFIED ENVIRONMENTAL IMPACTS

The environmental impacts that were identified during the scoping process are shown in Table 7 below are assessed in Section 9.2 using the methodology outlined in Section 8.4 above.

Table 7: Environmental Impacts identified during the Scoping Phase

ASPECT	IMPACT
CONSTRUCTION	
Socio-Economic	Creation of job opportunities for local communities for the lifetime of the project activity.
Geology and Soils	Loss of topsoil during the construction period from vegetation clearance, movement of construction vehicles and earthmoving activities and operation from operation of the waste facility, which could result in soil erosion
Nuisance	Excessive generation of noise due to noise produced by construction machinery and activities
	Excessive generation of dust during construction.
Fauna	Potential destruction or loss of sensitive habitat and irreversible loss of habitat during construction.
Flora	Potential destruction or loss of vegetation including threatened or protected species during construction.
Alien Invasive Species	Introduction and uncontrolled infestation of alien invasive species within the site and surrounding area resulting in displacement of indigenous vegetation.
Cultural, Historic and Archaeological	Potential damage or destruction of undiscovered heritage sites during construction.
Surface Water and Drainage	Continued impeding and contamination of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area

OPERATION	
Nuisance	Excessive generation of dust
Groundwater	Potential contamination of groundwater
Surface Water	Potential contamination of surface water
Visual and Aesthetics	Potential impact due to the change in landscape and overall aesthetics due to the operation activities
ISSUE RAISED FROM SPECIALIST STUDIES AND PUBLIC PARTICIPATION	
Fire Hazard	Potential destruction of the neighbouring area due to uncontrolled veld fires
Surface Water and drainage	Continued impeding and contamination of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area

8.6. SUMMARY OF POSITIVE AND NEGATIVE IMPACTS AND RISKS OF THE PROPOSED ACTIVITY

Positive and negative impacts that the proposed development will have on the environment and possible management and mitigation measures to reduce or avoid the impacts are shown in *Table 8* below.

Positive impacts on the social and economic aspects are listed below, however, they are not assessed using the significance methodology:

- Improvement in waste management in the municipal area.
- Short-term employment of local the community during the construction phase.
- Job creation opportunities from recycling and security services during operation
- Improvement in the health and wellbeing of residents living near the existing SWS as it will be rehabilitated one the new facility is operational.
- Improvement in the overall cleanliness of the town as the existing SWS will be rehabilitated and illegal dumping curbed.

Table 8: Negative Impacts due to the Proposed Development on Environmental Attributes

ASPECT	IMPACTS	EFFECT ON THE ENVIRONMENTAL ATTRIBUTES
Geology and Soils	Loss of topsoil during the construction period from vegetation clearance, movement of construction vehicles and earthmoving activities and operation from operation of the waste facility, which could result in soil erosion	Loss of topsoil will result on the exposure of bare ground, thus leaving it exposed to harsh action of the wind and water and this in turn will affect the soil's ability to regulate water flow. The impact will affect the development footprint and the surrounding areas.
Noise	Increased noise levels during the construction phase due to noise produced by construction machinery and activities.	There are no sensitive noise receptors within 1 km radius. Therefore, there are no receptors that would be affected by the increased noise during construction except for the workforce.
Air Quality	Excessive generation of dust during construction phase due to the use of heavy construction equipment and machinery during the vegetation clearing and transportation of building material causing nuisance to the surrounding land users and decrease in the air quality.	The generation of dust could pose threat to the public health, however due to the location of the proposed SWS, sensitive receptors are located more than 1 km from the site therefore, the workforce, who will be on site for the duration of the construction phase would be affected and those employed during operation.
Palaeontological, Cultural, Historical or Archaeological	Potential damage or destruction to discovered heritage artefacts in the area.	This will affect the preservation of heritage artefacts in the Luckhoff area.
Fauna	Potential destruction or loss of sensitive habitat and irreversible loss of habitat during construction.	The potential destruction of sensitive habitat could result in fragmentation of once continuous habitat, leading to alteration or loss of sensitive habitat and the reduction in the local faunal biodiversity. Most of the faunal species will migrate to the neighbouring areas due to the disturbance whilst few could be subjected to mortality during construction.
Flora	Potential destruction or loss of vegetation including threatened or protected species during construction.	Biological plant communities occurring on the proposed site that could be affected by the vegetation clearance and prior to earthmoving activities the construction phase. This could result in reduction in the local plant

		biodiversity and loss of protected biota. Loss of indigenous vegetation could increase the potential of establishment of weeds and alien species in the study area, which could disperse to the neighbouring area.
Surface Water and Drainage	*Impeding of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area*	It is important that the natural drainage is not altered so that there is water flow into drainage lines and finally the earth dam as well as to prevent any ponding inside the SWS.
Surface Water Pollution	Potential contamination of surface water runoff during operation phase.	Surface water runoff from the landfill site especially during the rainy season, polluting the earth dam and broader catchment area, thus reducing the water quality thus rendering the water unfit to sustain animal and water life.
Groundwater	Potential contamination of groundwater resources due to the wastewater that the solid waste facility will produce during operation.	Surface water from the waste site infiltrating the groundwater resources reducing the quality of the water and affecting the neighbouring groundwater users.
Visual and Aesthetics	Potential impact due to the change in landscape and overall aesthetics due to the operation activities	The change that the proposed SWS will have on the landscape of the receiving environment
Fire hazard	Potential destruction of biodiversity and habitat, and damage to neighbouring properties.	Accidental fires from the SWS may burn and damage indigenous vegetation communities, faunal habitats as well as the wildlife as well as neighbouring properties.

8.7. SUMMARY OF THE FINDINGS AND RECOMMENDATIONS OF SPECIALISTS

Specialists' studies that were undertaken as part of the EIA are as follows:

- Heritage Impact Assessment – Paleo Field Services: Dr. Lloyd Rossouw
- Ecological Impact Assessment – EcoFocus Consulting: Rikus Lamprecht *Pr. Sci. Nat.*
- Geohydrological Impact Assessment – Novacraff Groundwater Consultants: Dirk Moolman
- Geotechnical Impact Assessment – Geotechnical Engineering Laboratory: Thato Litabe

The specialists' reports are attached hereto as **Appendix 8.7** and the findings and recommendations from specialist's studies undertaken including their incorporation in the assessment report are summarised in *Table 9* below

Table 9: Findings and Recommendations of Specialist Studies

SPECIALIST STUDY	FINDINGS	RECOMMENDATIONS
HERITAGE ASSESSMENT		
	• Dolerite in the form of dykes and sills, is common throughout the region, however, are not regarded as palaeontologically sensitive. It is capped by non-fossil bearing regolith. • There is no evidence for the accumulation and preservation of intact fossil material within the Quartenary sediments (topsoils) and the likelihood of finding fossil vertebrate fauna within the geologically recent superficial deposits at the site are considered very low to non-existent. • There is no evidence of Stone-Age open sites, pre-historic settlement structure, rock engravings, graves or historically significant buildings older than 60 years within the boundary of the study area. • From Archaeological Heritage, the proposed footprint is General Protection C..	• The development can proceed provided all landfill activities are restricted to within the boundaries of the development footprint.
ECOLOGICAL ASSESSMENT		
Flora	• The study area falls within Northern Upper Karoo vegetation type (NkU3), which is classified as Least Threatened and consists of a flat to slightly sloping shrubland, dominated by dwarf karoo shrubs and sparse grasses.	• A sufficient gazing management plan and practices must be implemented in the broader surrounding areas for livestock of the local community in order to prevent continue4d

• "Ground truthing" suggest that the broader areas form part of a transitional zone between the Northern Upper Karoo (NKu3) and Xhariep Karroid Grassland (GH3) vegetation type. The latter is in a slightly disturbed state, which has mainly been caused by historic and continued anthropogenic activities. • Although the majority of the study area has been burnt at the time of the assessment, it still possesses a well-defined karroid shrub layer, while merely a limited number of small stee or woody shrub individual species are very sporadically present throughout the landscape. • The Karroid grassland landscape is mainly dominated by the hardy unpalatable grass species. • Provincially protected species *Ruschia spinosa, Ammocharis coranica* and individuals/clusters of *Aloe broomi* and *Aloe claviflora* were merely found sparsley present. • The entire study area is categorised as an Ecological Support Area 1 (ESA 1) in accordance with the Free State Provincial Spatial Biodiversity Plan, which sets out biodiversity priority areas in the province. • The broader region surrounding the study area, however, constitutes undeveloped and relatively homogenous natural landscape, *i.e.*, an open medium-height terrestrial Karroid grassland landscape. • The provincially protected species *Euphorbia crassipen* and provincially specially protected species *Hoodia gordonii* were found to be very sparsley present throughout the landscape surrounding the study area. Therefore, the likelihood of these species being present within the study area is high. • No Red Data Listed, nationally protected or any species of conservation significance were found to be present within the study area. • A very small slightly elevated isolated rocky outcrop is present within the central portion of the study area. However, it does not possess any significant variation in vegetation species composition or structure, relative to the surrounding terrestrial karroid grassland landscape and it is therefore not viewed as being of any specific conservational significance. **Fauna**	significant overgrazing and to attempt to improve or restore ecological condition over time. • A Provincial Flora Permit must be obtained from DESTEA, prior to the commencement of any construction activities and the subsequent potential removal of any provincially protected species individuals. • Representative number of individuals/clusters of the identified provincially protected species be adequately relocated to other suitable and similar areas as to where they were removed from. These relocations must be completed prior to commencement of any vegetation clearance and/or construction activities. • A sufficient stormwater cut-off berm/trench be constructed on the upstream side directly adjacent outside and along the northern and eastern boundaries of the study area to prevent clean surface water from entering the proposed development footprint by directing and channeling surface water run-off around the footprint towards the south-west for dispersal. • A similar cut-off berm/trench be constructed on the downstream side directly adjacent inside the boundary of the assessment area to prevent dirty surface water run-off from the footprint area for evaporation and subsequent adequate disposal of undesired solid materials. • The landfill site must be line underground in the norms and standards in order to prevent

• No other conservationally significant or important species or locally distinct habitats were observed throughout the study area. • Merely a single individual oof the provincially protected antelope species *Raphicerus campestris* (steenbok) was found traversing the study area. • Open shrubland is utilised by various smaller antelopes' species, burrowing mammals as well as numerous reptiles such as lizards, snakes, and tortoises for foraging/persistence. • Due to the presence of the existing town to the west, the study area is subjected to continued anthropogenic activity and disturbance. It is therefore not anticipated that any conservationally significant or important faunal species would necessarily utilise the study area or the localised surrounding undeveloped landscape for breeding, foraging and/or persistence purposes. **Birds** • The assessment area does not fall within any important Bird Areas as per the latest IBA map obtained from the Birdlife SA Website. • No unique or specialised bird habitats were observed. • Only common local resident bird species and nests were found to be present. **Surface Water:** • The study area falls within the D33C Quartenary surface water catchment and drainage area. • A significant first order ephemeral water drainage is located approximately 370m south of the study area. • Drainage line flows in a South-westerly direction and discharge into a large artificially constructed earth dam, located 1km south-west of the study area. • The earth dam and significant watercourse forms part of the local and broader Quartenary surface water catchment and drainage towards the west. It is however, not anticipated that the proposed development will result in any significant direct/indirect ecological impact on the drainage line, due to the distance between the drainage line and assessment area as well as the ephemeral nature of the drainage line.	undesired seepages or leaks into the groundwater. • The proposed development should be considered for the Environmental Authorisation and approval by competent authority.

• A small historic artificially excavated water flow channel is situated approximately 220m west of the study area. This channel flows in a southerly direction and discharge into earth dam. However, it is not anticipated that the proposed development will result in any significant direct/indirect ecological impact. • A very small preferential water flow path transverse the assessment area, which flows in a south-westerly direction and discharges into the earth dam. **Present Ecological State** • PES of the assessment area is classified as Class B as it is largely natural. However, a small change in natural habitat and biota has taken place mainly as a result of historic and continued anthropogenic burning. The ecosystem function has however, remained unchanged. **Ecological Importance** • The Ecological Importance is classified as Class C (moderate) at it is viewed as being ecologically important and sensitive on local scale.	
GEOHYDROLOGICAL ASSESSMENT	
• Study area is located in Drainage Area D, Quartenary Sub-Catchment D33C. • Two downstream waterbodies were identified within proximity, one (1) upstream and one (1) downstream. • Study area is located within Zone b3 indicating possible groundwater occurrence of 0.5 – 2l/s. • It is located on a minor aquifer, which is classified as moderately vulnerable. • The groundwater depth is approximately 10 – 20 meters below surface. • No major groundwater abstraction within the local area. • The DWA mean annual recharge between 15 – 25 mm/a. and the Vegter recharge maps estimate the recharges as of 20mm/a. Therefore, the DWA and Vegter data estimates the recharge as 20mm per annum under investigation. • A dolerite sill is underlying the study area and dolerite outcrops from the sill was encountered throughout the study area. • There are no prominent groundwater flow paths.	• To contain run-off water on-site, as contaminated run-off water will flow to the downstream dam if not contained. • Water levels, water strikes, and groundwater occurrences can be established during drilling of upstream and downstream monitoring borehole. • The monitoring boreholes will be able to give background groundwater quality (upstream) and to identify if any pollution is entering the groundwater system (downstream). • The lining of the site to ensure no leaching of pollutants into the subsurface.

• Predominant magnetic anomalies are evident across the entire traverse, indicating a possible underlying dolerite sill and this is verified with outcrops encountered throughout the study area. • Only one borehole was found although it was blocked thus not sampled. • Surface water downstream, which is used for livestock watering was sampled and from the chemistry results, no pollution was detected for the elements analysed indicating no current surface water pollution from the surrounding environment.	
GEOTECHNICAL ASSESSMENT	
• The soils on site are classified as silty gravel of low compressibility, gravel and sand of low compressibility, silty sand of low compressibility and stone fragment, gravel, and sand of low compressibility to AASHTO classification system. • According to unified Soil Classification, the project soils are classified as GW (well graded/silty gravel), GM (silty gravels, gravel-sand-silt mixtures) and SM (Silty sands, poorly graded silt-sand mixture). The soils have low compressibility, low potential heave for GW and GM and low potential collapsibility for SM. • The GW/GM can be used for founding material for building foundations as they possess good compaction characteristics, however, they are unstable to use as fill material as they possess average compaction characteristics. • Soils of a section of the study area are classified as G6 and G7 whilst other section are unclassified thus are unsuitable for use as construction material. • Gravels within the study area possess low degree of permeability. • The study area is located on dolerite intrusion and partly on sand. The material from this intrusion is porous and this property makes it easy for water/leachate to flow. • During construction of the landfill, the gravel from this area will have to be compacted to atleast 95% of MOD AASHTO in order to reduce porosity. • The site is dominated by reddish silty sand underlain by greyish white, brown to grey sugary gravel and silty sand at some points. • The upper soils are expected to have high susceptibility to erosion and once exposed it will be subjected to concentrated water flow.	• Any excavation should be inspected by a competent person (Geotechnical Engineers and/or Engineering Geologist) as per Occupational Health and Safety Regulations. • Permission to enter excavation should be granted in writing by the competent person before/after the events for each excavation. • Excavation work requirements as per construction Regulations should be implemented by the client/Agent/Principal Contracts/Contractor or in writing by responsible engineer. • Basic Surface Water Management must be in place to avoid concentrated water flow in order to limit excessive soil erosion. • Basic Erosion Control measure and site water management is recommended, especially if construction phase is during wet season, in order to avoid concentrated water flow that may result in severe erosion of the upper soil horizons and/or undercutting structures. • Site drainage and services/plumbing precautions are recommended.

• All materials were excavated using TLB and as such the excavation can be classified as soft to intermediate excavation as per SABS 1200 D-1988 (as amended 1990). • No natural steep slopes exist, and natural slope instability cannot occur. • Site is classified as S, S1 and C1.	• Phase 2 Assessment or Construction Report is recommended, and competent person must be present during material selection, placement, and compaction. • S Site Class normal construction does not require reinforcement therefore strip footing, or slab-on-the-ground foundation is recommended. S1 and C1-Class Site modified normal construction, therefore lightly reinforced strip footing, articulation joints at all internal and external doors and openings, light reinforcement in masonry is recommended. • `GW/GM material is unsuitable to be used as Water Retaining embankments, but GW have excellent and GM average qualities to be used as None-Water retaining Embankment. • SM materials are suitable with compaction to be used as None-Water retaining embankment.

8.8. PROJECT ALTERNATIVES

The municipality is responsible for removal of waste in the Luckhoff/Relebohile area, therefore it is their responsibility to ensure that waste collected is transported to the licensed landfill site for disposal as landfilling is the primary means of solid waste management. Therefore, the purpose of the proposed activity is to find a suitable site that could be used by the municipality to dispose of their general waste. Alternatives should be considered for the proposed activity as part of the EIA process, which will enable the municipality to meet their need of having a facility where the waste collected from households and businesses is disposed in a safe and economically feasible manner. In this process, alternative sites were considered, and they were subjected to a selection process, thereafter the proposed site was identified as a suitable site without any fatal flaws or sensitive areas that needed to be avoided.

8.8.1. SITE ALTERNATIVES

Five alternative sites situated on Portion 1 of the Remaining Extent of Farm Dorpsgronden van Luckhoff 577 in Letsemeng Local Municipality under Xhariep District Municipality within Free State Province were identified. The site selection was based on land availability, distance from the source of waste generation and current land use, future development plans of the municipality and input from the Ecologist based on desktop study. Thereafter, it was recommended that alternative site 5 be shifted in a north-easterly direction, and therefore would be referred to as site 6, the proposed site that has been identified for further assessment.

Location of the identified sites in consultation with the municipality and ward councillor are shown in the map shown in *Figure 3* below.

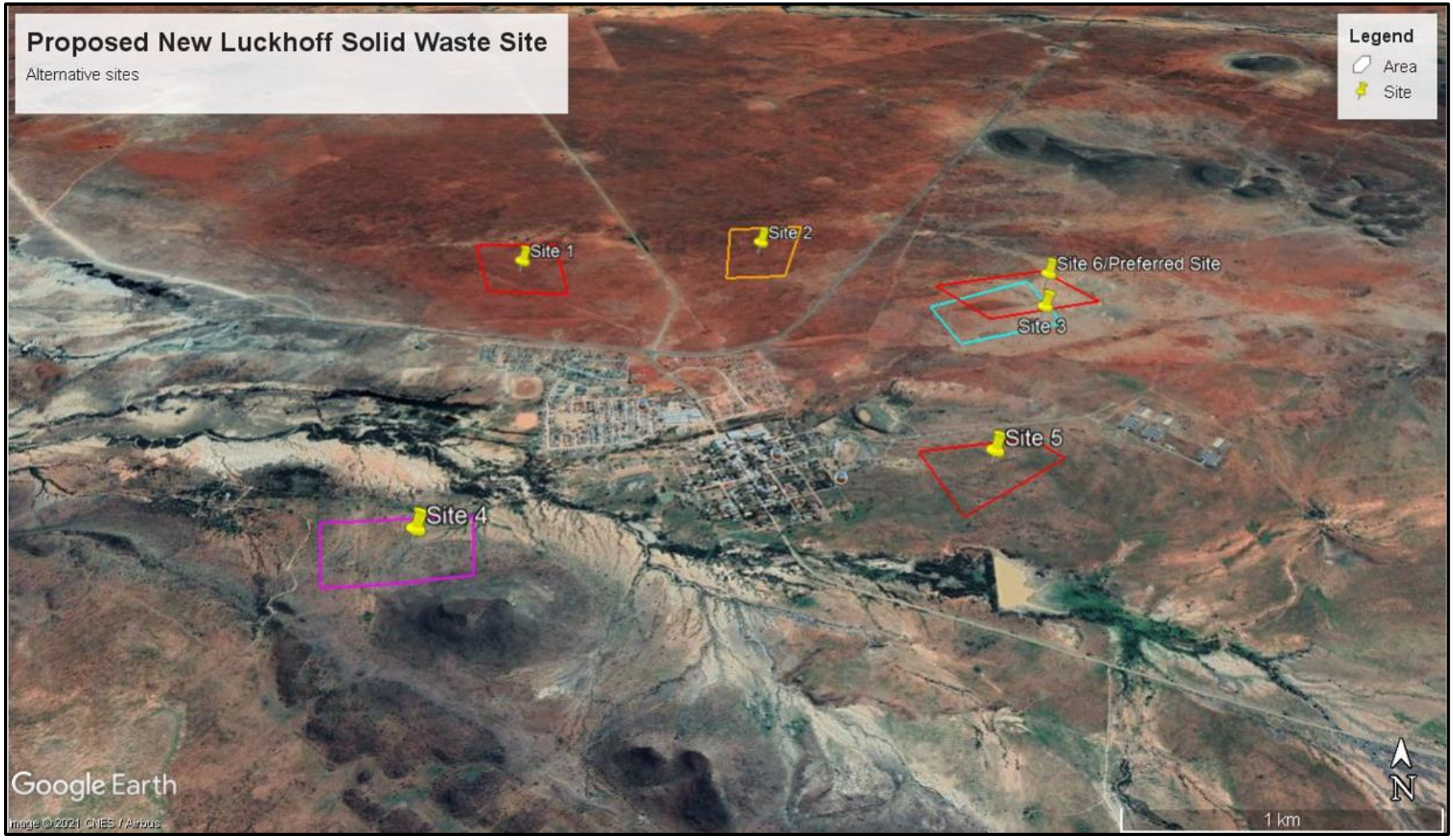

Figure 3: Identified Alternative Sites

The outcome of the selection process is shown in *Table 10* below.

Table 10: Site Selection

SITE	OWNERSHIP	LAND USE		POTENTIAL FATAL FLAWS/ SENSITIVITY	ECOLOGICAL INPUT-DESKTOP OVERVIEW
		CURRENT	FUTURE		
1	Municipal Land	Vacant	Residential development per SDF	No, it is earmarked for residential use	N/A
2	Municipal Land	Livestock enclosures	Farming	Yes, it is earmarked for agricultural use	N/A
3	Refusal was granted by DESTEA for this site, hence a new site had to be identified.				
4	Municipal Land	Vacant	Unknown, not included in the SDF	Yes, number of watercourses traversing it, which discharge into the significant watercourse to the north	Potentially highly significant contamination of the watercourses and broader catchment and drainage area
5	Municipal Land	Vacant	Unknown, not included in the SDF	Yes, site is located closer to the watercourse and the earth dam. Therefore, could be negatively affected by the runoff and seepage	From the ecological study it was recommended that the proposed site be shifted further north-easterly to increase the distance between the proposed site to the watercourses and earth dam.
6	Municipal Land	Vacant	None, not included in the SDF	No	A thorough site assessment and technical investigation must be conducted

For Site 1 and 2, it was pointed out by Luckhoff Farmer's Association that it would encroach onto private land. Site 4 was proposed by the Emerging Farmers, and it was deemed not suitable for development. Therefore, a WML and EA application has been lodged for the preferred site, *i.e.,* Site 6 as it does not have inherent fatal flaws and it is not identified for any future development and further environmental specialist studies, assessment and technical investigations were undertaken, and the findings and recommendations presented on the EIAR.

8.8.2. NO-GO ALTERNATIVE

If the proposed licensing and new development of the SWS does not take place, the municipality will be in contravention of NEM:WA and other Environmental Legislation, as they will continue to use the existing landfill site, which has been granted a closure certificate instead of it being rehabilitated as per conditions outlined in the certificate. Waste disposal in the existing solid waste is poor, there is no adequate cover material for waste and after every waste disposal, litter is blown by the wind. There is no alternative site that could be used for disposal of waste, and this would indicate no improvement in the overall waste management in the area especially waste disposal. This could result in establishment of illegal dumping sites in areas that are not suitable, and these areas will negatively affect the visual aesthetics as well as result in land degradation/soil contamination. These illegal dumping sites would attract rodents, flies, etc. and this could negatively affect the neighbouring residents and the windblown litter can also block stormwater drains and sewer. Given the abovementioned, the municipality would not be able to meet its strategic objectives of improving access to services, *i.e.*, waste disposal and ensuring proper operations and maintenance of their infrastructure. It is therefore not a desirable alternative as the option of not applying for a waste license, this will be detrimental to the environment as well as health and well-being of the residents.

8.9. CONCLUDING STATEMENT

Based on the findings documented in this report, the proposed Luckhoff Landfill Site will assist in meeting current and future demands for an environmentally sound waste management solution in the municipality. An EMPr has been drafted to ensure the site is operated in an environmentally sound manner across its entire construction life cycle. The assessment of the issues identified in the FSR and considered in greater detail in the EIAR with its related specialists' studies, indicated that the significance of potential impacts associated with the proposed development can be reduced to a "low" or "medium" significance, if the recommended mitigation and monitoring measures are adhered to accordingly. The EAP is of the opinion that the development of a SWS on the proposed site, should be authorised. Conditions of the WML and EA should include the recommendations of specialists and the appointment of an independent Environmental Control Officer to monitor compliance with the Site-Specific EMPr during construction phase.

9. PROCESSES UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS THE ACTIVITY AND RELATED INFRASTRUCTURE WILL IMPOSE ON THE PREFFERED LOCATION THROUGH THE LIFE OF THE ACTIVITY

9.1. DESCRIPTION OF ENVIRONMENTAL ISSUES THAT WERE IDENTIFIED DURING THE EIA PROCESS

All the environmental concerns that were identified during the environmental impact assessment process are listed below and will be assessed in Section 9.2.

1. **Socio-Economic Aspects of the Area**
   Job creation and potential employment of local communities during construction

2. **Geology and Soils**
   Loss of topsoil during construction.
   Loss of topsoil during operational phase.

3. ***Social Impacts (nuisance)***
   Noise created by the construction activities during construction and operation.
   Excessive generation of dust during construction and operation

4. **Fauna & Flora**
   Potential destruction or loss of sensitive habitat and irreversible loss of habitat during construction.
   Potential destruction or loss of vegetation including threatened or protected species during construction.
   Introduction of alien invasive species during construction.

5. **Cultural, Historical and Archaeological aspects**
   Potential damage or destruction of undiscovered heritage sites in the area during construction.

6. **Ground water and surface water Pollution**
   Potential pollution of the groundwater and surface water during operation.
   Impeding and contamination of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area.
7. **Visual and Aesthetics Impacts**
   Potential impact due to the change in landscape during operation phase.

In addition to the issues mentioned below fire hazard was raised as a concern during operation and thus will be assessed and mitigation/management measures outlined.

9.2. AN ASSESSMENT OF THE SIGNIFICANCE OF EACH IMPACT AND AN INDICATION OF THE EXTENT TO WHICH THE IMPACT COULD BE AVOIDED OR ADDRESSED BY THE ADOPTION OF MITIGATION MEASURES

The Identified environmental Impacts have been assessed using the Significance Methodology outlined in Section 8.4 above, therefore the impacts are assessed with and without adoption of mitigation measures, taking into consideration the extent, duration, reversibility, probability, and magnitude as shown in Table 11 below.

Table 11: Assessment of Identified Potentially Significant Impact and Risk

ASPECT: SOCIO-ECONOMIC IMPACT		
NATURE OF IMPACT: Creation of job opportunities for the local community for during construction phase to decrease unemployment rate in the area		
	Without Augmentation	**With Augmentation**
Extent of Impact	Provincial (4)	Local (2)
Duration of Impact	Short term (2)	Short term (2)
Magnitude	Low (4)	Low (4)
Irreplaceability of Natural Resources	Very Low (1)	Very Low (1)
Degree of Reversibility	Irreversible (5)	Irreversible (5)
Probability of Impact	Possible (2)	Definite (5)
Significance	Low (32)	Medium (70)
Status (Positive or Negative)	Positive	Positive
Can impact be ~~avoided,~~ managed ~~or mitigated~~/augmented	Yes	
Mitigation: ◊ Local labourers, local sub-contractors and SMMEs must be utilized to a greater extent especially for unskilled work. ◊ Workforce should include youth, disabled and women. ◊ Labour intensive construction methods must be adopted where possible. ◊ Community Liaison Officer should be appointed, and Project Steering Committee established prior to construction to ensure all social issues are resolved, e.g., recruitment of local labourers to avoid social unrest and project delays.		
Cumulative impacts: Low		
Residual Impacts: Yes, the general workers would have gained experience and skills to work in similar projects in the future and the CIBD grading of sub-contractors could be improved.		
Discussion: It is important to involve the ward councillor during labour recruitment and skills audit to determine training that could be offered as part of the project implementation. For skilled labourers, the contractor may recruit individuals from outside the area but not unskilled labour.		

ASPECT: GEOLOGY and SOIL		
NATURE OF IMPACT: Loss of topsoil during the construction period from movement of construction vehicles and operation from earthmoving activities, which could result in soil erosion.		
	Without Mitigation	**With Mitigation**
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Permanent (5)	Short-term (2)
Magnitude	Very High (10)	Low (4)
Irreplaceability of Natural Resources	Definite (5)	Low (2)
Degree of Reversibility	Low Reversibility (4)	High Reversibility (2)
Probability of Impact	Definite (5)	Probable (1)
Significance	Very High (130)	Low (11)
Status (Positive or Negative)	Negative	Negative
Can impact be ~~avoided, managed or~~ mitigated	Yes	
Mitigation: ◊ Vegetation clearance must be done in phases to minimize exposure of bare soil and must be confined to the development footprint. ◊ Movement of construction vehicles must be confined to the existing access dirt road and development footprint. ◊ An adequate Storm water and Erosion Management Plan must be implemented. This must be done in order to sufficiently manage storm water runoff and clean/dirty water separation in order to prevent any significant erosion from occurring. ◊ Environmental Control Officer and Designated Environmental Officer must routinely inspect erosion management features for functionality. ◊ Areas within and immediately surrounding the assessment area must be adequately rehabilitated post construction to prevent significant erosion and excavations not used for operation must be filled and rehabilitated before contractor moves off site. ◊ GW/GM material mut be used for Non water retaining embankments and SM with compaction for water retaining embankments and it also has average quality for none-water retaining embankments.		
Cumulative impacts: Low		
Residual Impacts: Limited		
Discussion: No soil erosion was observed within the proposed site therefore routine inspection of the must be done to ensure any signs of erosion are attended to immediately.		

ASPECT: NOISE POLLUTION		
NATURE OF IMPACT: Increased noise levels during the construction phase due to noise generated by construction machinery and vehicles causing nuisance to the neighbouring landowners and/or users.		
	Without Mitigation	**With Mitigation**
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Short-term (2)	Short-term (2)
Magnitude	High (4)	insignificant (2)

Irreplaceability of Natural Resources	Low (2)	Low (2)
Degree of Reversibility	Low Reversibility (4)	High Reversibility (2)
Probability of Impact	Definite (5)	Possible (2)
Significance	Medium (70)	Low (18)
Status (Positive or Negative)	Negative	Positive
Can impacts be mitigated?	Yes	

Mitigation:

◊ All vehicles and equipment used on site must conform to the noise regulations standard.
◊ Construction should be limited to normal working days and office hours from 08h00 to 17h00. Should there be any deviation, then the surrounding community should be informed.
◊ Ensure that employees and staff conduct themselves in an acceptable manner while on site, both during work hours and after hours.
◊ Limit working hours of noisy equipment to daylight hours
◊ Fit silencers to construction equipment and vehicles.
◊ All operators of heavy construction equipment must wear earplugs and mufflers should be used.

Cumulative impacts: Low

Residual Impacts:
Minimal noise is still expected from the vehicles and the equipment to be used on site during construction activities.

Discussion:
The proposed site is not located near any sensitive receptors. Luckhoff area is located more than 1km from the proposed site. However, since the surrounding land use is used for livestock grazing, noise levels during construction and operation should be within the acceptable limits. No blasting is anticipated but if necessary then a necessary permit must be obtained. Acceptable noise levels that are not harmful to the health and well-being of the workforce is prohibited and necessary Personal Protective Equipment must be provided.

ASPECT: AIR QUALITY		
NATURE OF IMPACT: Excessive generation of dust during construction phase due to the use of heavy construction equipment and machinery during the clearing and transportation of building material causing nuisance to the surrounding land users.		
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Temporary (1)	Temporary (1)
Magnitude	High (8)	Insignificant (2)
Irreplaceability of Natural Resources	Low (2)	Low (2)
Degree of Reversibility	Low Reversible (4)	High Reversibility (2)
Probability of Impact	Definite (5)	Possible (2)
Significance	Medium-High (85)	Low (16)
Status (Positive or Negative)	Negative	Positive
Can impact be ~~avoided, managed or~~ mitigated	Yes	

Mitigation:

◊ Occasional wetting of access roads, hauling roads and construction site should be done by using a water tank.

◊ Speed limit of 20km/h should be adhered to and 40km/h on the access road. ◊ Water should be obtained from the Letsemeng Local Municipality, if alternatively, supply is used, then a written agreement must be in place. ◊ No abstraction of water from the earth dam. ◊ Provision of Personal Protection Equipment, e.g., masks. ◊ Adequate operational procedures for machinery and equipment must be developed to strictly govern and restrict movement of machinery, in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible construction practices and activities
Cumulative impacts: Low
Residual Impacts: Dust generation will cease immediately when construction is completed and due to the nature of landfill operations, dust control must be in place during operation phase.
Discussion Dust generation is expected during construction of SWS, however, should the outlined mitigation measures be implemented, the surrounding land users won't be affected. Contractor should inform engineers and municipality of the source of water that could be used during construction phase. If, no mitigation is provided, people exposed to dust particles could have long term respiratory illnesses. Therefore, provision of PPE and dust suppression measures is mandatory. Continued routine maintenance and servicing of the construction vehicles and equipment.

ASPECT: FAUNA		
NATURE OF IMPACT: Potential destruction of sensitive habitat and irreversible loss of natural habitat for fauna during construction.		
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Permanent (5)	Long term (4)
Magnitude	Very High (10)	Low (4)
Irreplaceability of Natural Resources	Definite (5)	Low (2)
Degree of Reversibility	Low Reversibility (4)	Moderate Reversibility (3)
Probability of Impact	Definite (5)	Likely (3)
Significance	Very High (130)	Low (42)
Status (Positive or Negative)	Negative	Negative
Can impact be ~~avoided, managed or~~ mitigated	Yes	
Mitigation: Although no sensitive habitats were identified within the proposed site, to minimise impact on the natural habitat for fauna, construction must be confined to the development footprint. Due to the disturbance to be caused by the construction activities, the small burrowing animals, reptiles, insects, and birds, are expected to relocate to the surrounding vast undeveloped areas, therefore disturbance should be minimized.		
Cumulative impacts: Low		
Residual Impacts: The proposed site will be transformed and not suitable for inhabitation, however, the animals will relocate to the neighbouring undisturbed areas.		
Discussion:		

The development would impact on the habitat, especially small mammals, and birdlife. Therefore, it is important that when these are spotted during construction not to be killed but given an opportunity to migrate from the site.

ASPECT: FLORA		
NATURE OF IMPACT: Potential destruction or loss of vegetation including threatened or protected species during construction.		
	Without Mitigation	**With Mitigation**
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Long term (4)	Medium-term (3)
Magnitude	Medium (4)	Low (4)
Irreplaceability of Natural Resources	Moderate (3)	Moderate (3)
Degree of Reversibility	Low Reversibility (4)	High Reversibility (3)
Probability of Impact	Highly Likely (4)	Likely (3)
Significance	Medium (68)	Low (42)
Status (Positive or Negative)	Negative	Negative
Can impact be ~~avoided, managed or~~ mitigated	Yes	

Mitigation:

- ◊ Provincial Flora Permit must be obtained from DESTEA, prior to the commencement of any construction activities and the subsequent potential removal of any provincially protected species individuals.
- ◊ Representative numbers of individuals/clusters of the identified provincially protected species be adequately relocated to other suitable and similar areas as to where they were removed from. These relocation processes must be completed prior to the commencement of any vegetation clearance and/or construction activities.
- ◊ The project construction footprint must be kept as small as practically possible to reduce the actual surface impact on vegetation and no unnecessary/unauthorised footprint expansion into the surrounding areas may take place.
- ◊ No construction activities, machines or equipment operate or impact outside the fenced off area.
- ◊ Mechanical tools should be used for vegetation clearance and the land surveyor should peg the development footprint and cordon off the proposed site from the surrounding area.
- ◊ Areas that were disturbed by the construction activities and roads, which would not be required should be scarified, graded and re-vegetated.
- ◊ No site construction camp may be established in any natural surrounding areas outside the proposed development area. Site camps only to be established within the proposed development footprint.
- ◊ Existing roads and farm tracks in close proximity to the proposed project area must be used during construction. No new roads or tracks to be constructed or implemented through any of the surrounding natural areas.
- ◊ Disturbed areas within and immediately surrounding the proposed development footprint area must be adequately rehabilitated as soon as practicably possible after construction. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.
- ◊ Sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of surrounding

undeveloped areas and to attempt to improve/restore the ecological condition, over time.
Cumulative impacts: Low The surrounding areas although undeveloped, are subjected to anthropogenic activities, therefore there is a moderate impact expected on the existing provincial species.
Residual Impacts: Limited to the development footprint
Discussion: The proposed site has provincially protected individuals/species, which must be protected and rescued prior to commencement of the construction phase as transformation of the vegetation on site is inevitable. The relevant vegetation type is classified as Least Concerned and although the assessment area is situated within an area classified as an Ecological Support Area one (ESA 1) in accordance with the Free State Provincial Spatial Biodiversity Plan, 2014, the surrounding natural landscape is undeveloped although regularly subjected to anthropogenic activities, *i.e.*, grazing and seasonal veld burning. According to the Ecologist, the proposed site is classified as Class C moderate Ecological Importance and Sensitivity for preservation and Ecological functionality persistence.

ASPECT: ALIEN INVASIVE SPECIES		
NATURE OF IMPACT: Spread of alien invasive species		
	Without Mitigation	**With Mitigation**
Extent	Local (2)	Footprint (1)
Duration	Long Term (4)	Short Term (3)
Magnitude	Insignificant (2)	Insignificant (2)
Irreplaceable loss of Natural Resources	Low (2)	Low (2)
Reversibility	High (2)	High (2)
Probability	Likely (3)	Probable (1)
Significance	Medium (36)	Low (10)
Status (positive or negative)	Negative	Negative
Can impact be ~~avoided, managed or~~ mitigated	Yes	
Mitigation: ◊ Construction activities must be limited to the development footprint. ◊ All the identified alien invasive species individuals must be actively eradicated from the assessment area and adequately disposed of in accordance with the National Environmental Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. ◊ Adequate Alien Invasive Species Establishment Management and Prevention Plan compiled by a suitably qualified and experienced Ecologist must be implemented during the construction and operational phase. ◊ Areas within and immediately surrounding the proposed development footprint must be adequately rehabilitated as soon as practicably possible after construction in order to prevent significant alien invasive species establishment. ◊ Routine monitoring must be undertaken to control the spread of invasive species.		
Cumulative impacts: Low		

Residual Impacts: Limited
Discussion: The disturbance of soils will enhance the growth and recruitment of exotic and pioneering vegetation, therefore, the construction site must be kept weed and alien free because if there is an infestation, it could spread to the surrounding undeveloped areas. Thus, resulting in displacement of indigenous species.

ASPECT: HERITAGE ARTEFACTS		
NATURE OF IMPACT: Destruction of Heritage, Cultural and Historic Artefacts during by construction activities.		
	Without Mitigation	**With Mitigation**
Extent	Regional (3)	Local (2)
Duration	Permanent (5)	Temporary (1)
Magnitude	High (8)	Low (4)
Irreplaceable loss of natural resources	Definite (5)	Low (2)
Reversibility	Irreversible (5)	High (2)
Probability	Highly Likely (4)	Possible (2)
Significance	High (104)	Low (22)
Status (positive or negative)	Negative	Negative
Can impact be ~~avoided, managed or~~ mitigated	Yes	
◊ Should the contractors make any archaeological, geological, or paleontological findings, it must be reported to the RE and an archaeologist and/or archaeologist should confirm the findings. SAHRA should be informed of the findings within 24 hours. Construction work must not proceed if it will cause damage to such findings. Unauthorized persons may not remove artefacts or cultural or historical importance from the site. ◊ In the event that fossil remains are discovered during any phase of construction, either on the surface or unearthed by fresh excavations, the ECO in charge of these developments ought to be alerted immediately. These discoveries ought to be protected and the ECO must report to SAHRA so that appropriate mitigation (*e.g.,* recording, collection) can be carry out by a professional palaeontologist.		
Cumulative impacts: Low		
Residual Impacts: Limited		
Discussion: The contractor must work diligently and train the workforce so that the understand the process that needs to be followed in case there is unearthing of Archaeological, Palaeontological Artefacts or human remains during earthmoving activities.		

ASPECT: SURFACE WATER AND DRAINAGE		
NATURE OF IMPACT: Impeding and contamination of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area		
	Without Mitigation	**With Mitigation**
Extent of Impact	Localized (3)	Footprint (1)
Duration of Impact	Short term (2)	Short term (2)
Magnitude	Medium (3)	Insignificant (2)
Irreplaceable loss of natural resources	Moderate (3)	Very Low (1)
Degree of Reversibility	Low (4)	Reversible (1)
Probability of Impact	Likely (3)	Possible (2)
Significance	Low (48)	Low (14)
Status (Positive or Negative)	Negative	Negative
Can impact be avoided, managed or mitigated?	Yes	

Mitigation:

- ◊ Implement an adequate Stormwater and Erosion Management Plan of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation within the local and broader quaternary surface water catchment- and drainage area, in order to attempt to improve the ecological functionality and -integrity of the catchment.
- ◊ Sufficient stormwater cut-off berm/trench be constructed on the upstream side directly adjacent outside and along the northern and eastern boundaries of the assessment area. This cut-off berm/trench must prevent clean surface water runoff from entering the proposed development footprint area by diverting and channelling surface water runoff around the footprint area towards the south-west for dispersal. This will ensure clean/dirty water separation on site as well as ensuring continued flow within the local and broader quaternary surface water catchment- and drainage area, in order to maintain its ecological functionality and -integrity.
- ◊ A similar cut-off berm/trench and associated contamination/evaporation ponds be constructed on the downstream side directly adjacent inside the boundary of the assessment area. This cut-off berm/trench and associated contamination/evaporation ponds must prevent dirty surface water runoff from leaving the proposed development footprint area by containing and storing surface water runoff from the footprint area for evaporation and subsequent adequate disposal of undesired solid materials.
- ◊ The detailed design layouts and measurement/capacity parameters of the cut-off berms/trenches and contamination/evaporation ponds must be calculated and determined by a suitably qualified and experienced engineer.
- ◊ f hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably possible from the significant water drainage line and the flow channel.
- ◊ Hydrocarbon and other chemical storage areas must be adequately bunded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.
- ◊ Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed, and all relevant construction personnel must be sufficiently trained on- and apply these procedures during the entire construction phase. Spill kits must be readily available on the construction site.

◊ All employees must be adequately trained on the correct procedure and use of the spill kits. ◊ A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation if required, in accordance with the National Water Act (Act 36 of 1998).
Cumulative impacts: Low
Residual Impacts: None will be expected if all mitigation measures and recommendations are adhered to during the construction phase.
Discussion: Although there are no significant drainage lines within the proposed site, drainage should be in a way that during rains, clean water does not mix with dirty water from the development footprint, especially the working face during construction as it would affect the watercourse nearby and eventually the broader Quartenary drainage area.

ASPECT: SURFACE WATER		
NATURE OF IMPACT: Potential contamination of surface water resources due to the operation of the SWS.		
	Without Mitigation	**With Mitigation**
Extent of Impact	Localized (3)	Footprint (1)
Duration of Impact	Medium term (3)	Short-term (2)
Magnitude	Medium (6)	Low (2)
Irreplaceable loss of natural resources	Moderate (3)	Very Low (1)
Degree of Reversibility	Low (4)	High (2)
Probability of Impact	Likely (3)	Probable (2)
Significance	Medium (57)	Low (16)
Status (Positive or Negative)	Negative	Negative
Can impact be avoided, managed or mitigated?	Yes	
Mitigation: ◊ If all the recommended mitigation measures for the construction phase are adequately implemented and managed, it should prove sufficient in preventing any continued impeding of- or significant impact on the significant water drainage line and flow channel within the associated local and broader quaternary surface water catchment- and drainage area. ◊ . An adequate Stormwater and Erosion Management Plan must be implemented. This must be done to sufficiently manage storm water runoff and clean/dirty water separation within the local and broader quaternary surface water catchment- and drainage area, in order to attempt to improve the ecological functionality and -integrity of the catchment. ◊ A sufficient stormwater cut-off berm/trench be constructed on the upstream side directly adjacent outside and along the northern and eastern boundaries of the assessment area. This cut-off berm/trench must prevent clean surface water runoff from entering the proposed development footprint area by diverting and channelling surface water runoff around the footprint area towards the south-west for dispersal. This will ensure clean/dirty water separation on site as well as ensuring continued flow within the local and broader quaternary surface water catchment- and drainage area, in order to maintain its ecological functionality and -integrity. ◊ A cut-off berm/trench and associated contamination/evaporation ponds be constructed on the downstream side directly adjacent inside the boundary of the assessment area. This		

cut-off berm/trench and associated contamination/evaporation ponds must prevent dirty surface water runoff from leaving the proposed development footprint area by containing and storing surface water runoff from the footprint area for evaporation and subsequent adequate disposal of undesired solid materials. ◊ The detailed design layouts and measurement/capacity parameters of the cut-off berms/trenches and contamination/evaporation ponds must be calculated and determined by a suitably qualified and experienced engineer. ◊ The storm water management measures incorporated into the development layout designs should be inspected on a minimum biannual basis (twice a year). They must be adequately maintained to ensure that sufficient volumes and quality of surface water runoff from the footprint area are still channelled back into the local and broader quaternary surface water catchment- and drainage area.
Cumulative impacts: Low
Residual Impacts: None will be expected if all migration measures and recommendations are adhered to during the construction phase.
Discussion: Due to the existing preferential water pathway that flows to the drainage line and eventually the earth day, it is important the clean water is diverted from the working face thus there should be regular inspection of the cut-off berms. The surface run-off water within the facility must be channelled to the evaporation dam to minimize ponding in the working face that could increase leachate generation.

ASPECT: GROUNDWATER		
NATURE OF IMPACT: Potential contamination of groundwater resources due to the operation of the SWS.		
	Without Mitigation	**With Mitigation**
Extent of Impact	Regional (3)	Footprint (2)
Duration of Impact	Long term (4)	Short term (2)
Magnitude	High (8)	Low (4)
Irreplaceable loss of natural resources	Moderate (3)	Very Low (1)
Degree of Reversibility	Low (4)	High (2)
Probability of Impact	Definite (5)	Possible (2)
Significance	High (110)	Low (22)
Status (Positive or Negative)	Negative	Negative
Can impact be avoided, managed or mitigated?	Yes	
Mitigation: ◊ The landfill site must be sufficiently lined underground in accordance with the relevant minimum norms and standards, in order to prevent undesired seepages or leaks into the groundwater. The integrity of the lining must be re-evaluated and maintained annually in order to ensure its continued functionality. ◊ A leachate pond must be constructed in order to store and treat leachates for adequate disposal. ◊ Adequate leakage detection and prevention systems must be installed in order to detect any potential leakages and subsequent contamination of underground water. ◊ Boreholes must be established to give background groundwater quality (upstream) and to identify if any pollution is entering the system.		
Cumulative impacts: Low		

Residual Impacts: Limited
Discussion: Although Luckhoff area is mainly dependent on the surface water from the canal system from Vanderkloof dam and no groundwater users were identified near the proposed SWS, groundwater monitoring is still required. The soils within the study area possess low degree of permeability.

ASPECT: VISUAL AND AESTHETICS

NATURE OF IMPACT: Potential visual impact due to the change in landscape and overall aesthetics due to the operation activities

	Without Mitigation	**With Mitigation**
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Long term (4)	Long term (4)
Magnitude	High (8)	Insignificant (2)
Irreplaceable loss of natural resources	High (4)	Low (2)
Degree of Reversibility	Low (4)	High (4)
Probability of Impact	Definite (5)	Possible (2)
Significance	High (115)	Low (26)
Status (Positive or Negative)	Negative	Negative
Can impact be avoided, managed or mitigated?	Yes	

Mitigation:

- ◊ Planting of indigenous trees around boundary of the facility.
- ◊ The facility must be fenced off with a 1.8m fence to contain wind-blown litter from scattering in the neighbouring areas. The fence must be cleaned once a month. There should be regular maintenance of the fence.
- ◊ Daily covering of the disposed waste to prevent windblown litter.

Cumulative impacts: Low

Residual Impacts: Limited

Discussion: Although there are no sensitive receptors in close proximity, general housing keeping must be maintained to keep the operation site aesthetically pleasing.

ASPECT: FIRE HAZARD

NATURE OF IMPACT: Potential destruction of biodiversity and habitat, and damage to neighbouring properties due to accidental fires especially during windy season

	Without Mitigation	**With Mitigation**
Extent of Impact	Local (2)	Footprint (1)
Duration of Impact	Long term (4)	Short term (2))
Magnitude	Very High (10)	low (2)
Irreplaceable loss of natural resources	Definite (5)	Low (2)
Degree of Reversibility	High (2)	Low (4)
Probability of Impact	Highly Likely (4)	Possible (2)
Significance	Medium-High (92)	Low (22)
Status (Positive or Negative)	Negative	Negative

Can impact be avoided, managed or mitigated?	Yes
Mitigation: ◊ A firebreak must be maintained along the facility boundary/ ◊ Burning of waste is prohibited ◊ Access control must be in place. ◊ No disposal of hot ashes in the cells.	
Cumulative impacts: Low	
Residual Impacts: Limited	
Discussion: Since there is no construction of an incinerator, burning of waste is prohibited. Access control must be in place to prevent starting of illegal fires.	

It is evident that the significance before mitigation ranged between medium and high and with mitigation or augmentation and management measures, it was reduced to low:

10. ENVIRONMENTAL IMPACT STATEMENT

10.1. SUMMARY OF KEY FINDINGS

The report contains assessments of the potential impacts and provided mitigation measures to ensure that the impact on the receiving environment is minimal and/or avoided. The key findings of the EIA are as follows:

1. The proposed site belongs to the LLM, which is the applicant.
2. The proposed site is vacant, undeveloped and still largely in a natural state although it is subjected to anthropogenic activities, e.g., livestock grazing and seasonal burning.
3. Within 500m radius there is no development and further than that is Eskom transmission, overhead powerlines and residential area.
4. There are no wetlands located within the proposed site or within 1 km radius.
5. There are drainage lines in proximity of the site with the closest being 220m and surface water drainage is primarily into a southwestern and western direction.
6. The south-western drainage contributes to an earth dam located downstream used for livestock drinking. From sampling done, no pollution was detected indicating that currently there is no surface water pollution from the surrounding environment.
7. There is a very small preferential water flow path that traverse the site in a south-westerly direction, which discharges into the earth dam, but it is not viewed as being of any conservational significance.
8. There is only one borehole in the vicinity of the proposed site, which is blocked. There is no major groundwater abstraction identified. There are no prominent groundwater flow paths.
9. The site is accessible from Rabie street on the existing gravel road that is used for maintenance of Eskom infrastructure.
10. There are no underground infrastructures to be impacted by the proposed development.
11. The area falls within Northern Upper Karoo vegetation type (Nku3) which is classified as Least Concerned but the proposed site forms part of a transitional zone between the Northern Upper Karoo (NKu 3) and Xhariep Karroid Grassland (GH 3), and it falls

within the Ecological Support Area 1. Virtually the entire karroid grassland is in a slightly disturbed state.

12. Although there are no Red Data Listed species and Nationally Protected or any species of conservation significance were found, provincially protected species were found thus Provincial Flora Permit must be obtained before commencement of construction activities and representatives of these species must be relocated.
13. The Present Ecological State is classified as Class B as it is largely natural and the Ecological Importance and Sensitivity as Class C (moderate) as it is viewed as being ecologically important and sensitivity on a local scale.
14. The assessment area does not fall within any Important Bird Area.
15. Termite hills were identified within the study area.
16. Biodiversity is still relatively ubiquitous and not usually sensitive to habitat motivation.
17. The soils within the site are GW (well graded/silty gravel), GM (silty gravels/gravel-sand silt mixtures) and SM (silty sands/poorly graded silt-sand mixtures). These soils have low compressibility, low potential heave and low potential collapsibility. Gravels within the proposed site possess low degree of permeability.
18. The proposed footprint is considered a General Protection C for Archaeological Heritage.
19. There is no evidence of Stone Age open sites, prehistoric settlement structures, rock engravings, graves, or historically significant buildings older than 60 years within boundary on the study area
20. The site is underlain by palaeontologically insignificant dolerite capped by a non-fossil bearing regolith.
21. No objections were received during the public participation process regarding the proposed development or the site.
22. If a no-go alternative is considered, the existing landfill site will continue to be used by the municipality and this will have an adverse impact on the environment and the health and wellbeing of the community. The residents have also emphasized the need for the site to be rehabilitated as it is negatively affecting on their livelihood.

10.2. MAP INDICATING SENSITIVE AREAS TO BE AVOIDED

Sensitivity mapping was undertaken to reflect the site suitable and unsuitable (no-go) development footprint, and it was used to guide the planning of the preferred location. This was done with the input obtained from undertaking the field survey of the area to determine elements that would influence the development footprint, specialists' input and comments obtained during the public participation process. From the various studies done, it was confirmed that the proposed site does not have any sensitive areas, except for the very small size preferential water flow path that is not viewed as being of any conservational significance. The sensitive area in close proximity were included in the Sensitivity Map including area the surrounding area is attached hereto as **Appendix 10.2**.

10.3. SUMMARY OF THE POSITIVE AND NEGATIVE IMPACTS AND THE RISKS OF THE PROPOSED ACTIVITY

The identified negative impacts are Nuisance pollution *i.e.*, dust and noise generation; Improper handling, storage and disposal of waste; Impact on biophysical aspects, *i.e.*, change in drainage patterns, contamination of surface water, ground water, destruction of habitat for fauna and the destruction and damaging of indigenous vegetation including the provincially protected species and the visual impact due to the change in landscape and land use. Accessibility issue to the proposed site and fire hazards during operation during the scoping process but only the latter was assessed because access will not be from the provincial road R48 but the existing dirt road branching from Rabie Street that is used by Eskom to access their infrastructure in the area. Following the mitigation hierarchy, none of these impacts could be avoided but their significance was reduced by outlining mitigation and management measures.

For impacts which have potential residual risks, *i.e.*, groundwater and surface water pollution, monitoring has been recommended to be undertaken during operation of the facility, thus the residual risk will be limited. Furthermore, the proposed site will include a Leachate containment facility to hold and evaporate wastewater from the SWS, thus providing adequate protection for clean water resources to remain uncontaminated.

These impacts have low contribution to the cumulative impacts as the proposed development would not set a precedent. The impacts would mostly be limited to the development footprint except for the operational impacts; hence it is important that adherence to the mitigation measures is ensured so that during operation the impacts are reduced. The proposed monitoring measures, e.g., for groundwater and maintenance of the cut-off berms will also curtail operational impacts to a greater extent.

A positive impact with regards to the socio-economic aspects of Luckhoff will result in the local community receiving employment during and after construction of the waste facility and boosting the local economy, although it would be short-term, whereby recruitment of labour will be from the local community. And long-term employment opportunities. The other positive impact, although not assessed is that the current SWS will be rehabilitated when the new one becomes operational, therefore the health and wellbeing of the residents, will not be affected anymore and land degradation will no longer be an issue as the area will have to be rehabilitated. The municipal infrastructure enabling the municipality to handle their waste management efficiently, which will result in improved cleanliness of the town. Recycling is also a component of the development that the municipality must create awareness to the community of the possible “green economy” benefit.

Given the above, it is evident that the positive impacts identified will outweigh the negative impacts and with the adoption of mitigation and management measures, the latter will have minimal impact on the environment. The proposed development will also be beneficial to the local community as well as improve the municipality’s handling of waste management.

The summary in Table 12 below indicates that the significance of identified impacts without mitigation can be reduced to a greater extent with adoption of mitigation and management measures.

Table 12: Summary of the Identified Environmental Impact with and without Mitigation/Augmentation and Management Measures

ASPECT	IMPACTS	MITIGATION/AUGMENTATION AND MANAGEMENT MEASURES	
		WITHOUT	WITH
Geology and Soils	Loss of topsoil during the construction period from vegetation clearance, movement of construction vehicles and earthmoving activities and operation from operation of the waste facility, which could result in soil erosion	Very high	Low
Noise	Increased noise levels during the construction phase due to noise produced by construction machinery and activities.	Medium	Low
Air Quality	Excessive generation of dust during construction phase due to the use of heavy construction equipment and machinery during the vegetation clearing and transportation of building material causing nuisance to the surrounding land users and decrease in the air quality.	Medium-High	Low
Palaeontological, Cultural, Historical or Archaeological	Potential damage or destruction to discovered heritage artefacts in the area.	Medium	Low
Fauna	Potential destruction or loss of sensitive habitat and irreversible loss of habitat during construction.	Very High	Low
Flora	Potential destruction or loss of vegetation including threatened or protected species during construction.	Medium	Low

ASPECT	IMPACTS	MITIGATION/AUGMENTATION AND/OR MANAGEMENT MEASURES	
		WITHOUT	WITH
Surface water and drainage	Impeding and contamination of the flow regime of the significant first-order ephemeral water drainage line and the small historic artificially excavated water flow channel within the associated local and broader quaternary surface water catchment- and drainage area	Low	Low
Surface Water Pollution	Potential contamination of surface water runoff during operation phase.	Medium	Low
Groundwater	Potential contamination of groundwater resources due to the wastewater that the solid waste facility will produce during operation.	High	Low
Visual and Aesthetics	Potential impact due to the change in landscape and overall aesthetics due to the operation activities	High	Low
Fire hazard	Potential destruction of biodiversity and habitat, and damage to neighbouring properties.	Medium-High	Low

After the assessment of identified impacts with regard to the preferred site, with adoption of the mitigation measures outlined, the significance was reduced to low. Therefore, this will ensure that the proposed activity does not result in total loss of natural resources and adverse impacts on the receiving environment. Adherence to the EMPr will also ensure that impacts occurring due to the development will be reduced to a greater extent.

For impacts associated with the operation phase, it is imperative that training is provided to the personnel that will be working on-site at that time on site operations and responsibilities. They should be able to identify the various types of waste and how to handle/treat them.

11. PROPOSED IMPACT MANAGEMENT OBJECTIVES, AND OUTCOMES FOR THE DEVELOPMENT FOR INCLUSION IN THE EMPR AND CONDITIONS IN THE EA AND WML

Based on the assessment and input from the specialists, the impact management objectives and outcomes for the proposed development are indicated in *Table 13* below and will be included in the EMPr.

Table 13: Proposed Impact Objectives and Management Outcome

ASPECT	IMPACT OBJECTIVE	IMPACT MANAGEMENT OUTCOME
Air quality	To ensure that there is no excessive generation of dust during construction phase.	Dust suppression measures should be implemented, such as wetting the routes identified to be used for the duration of construction activities.
Palaeontological, Cultural, Historical or Archaeological	To ensure that there is no potential damage or destruction to the undiscovered heritage site or artefacts in the proposed site during construction.	Awareness training for measures to follow in case artefacts are unearthed.
Fauna	To ensure that there is no killing of fauna within the proposed side. Undisturbed migration to the neighbouring or surrounding areas.	Training to the workforce emphasising that killing of animals is prohibited.
Flora	To prevent destruction and/or of Provincially protected species occurring on the proposed site. To minimize loss of natural habitat on the proposed site.	Ecological specialist should be appointed before commencement of construction phase to undertake search and rescue of the species and a Provincial Flora permit must be obtained from DESTEA before commencement of construction. Relocation of the species to a similar environment they were removed from. Method statement for vegetation clearing should be provided by the contractor for approval by the RE and ECO.

ASPECT	**IMPACT OBJECTIVE**	**IMPACT MANAGEMENT OUTCOME**
Geology and Soils	To prevent collapsing of top structures. To prevent flooding incidents To use suitable soils for water retaining embankments	Any change in ground level will be rehabilitated to its original state in order to prevent any flooding around the proposed location of the SWS.
Soil erosion	To avoid changes to the natural drainage patterns.	Monitoring of stormwater outlets yearly prior to rainy season and regular inspection of the cut-off berms. Stormwater Management Plan implemented.
Noise	To ensure that noise levels are kept to a minimum during construction.	Complaint's register should be kept on-site
Groundwater	Prevent contamination of groundwater due to the wastewater produced by the SWS, *i.e.,* properly lined waste facility.	Leachate containments should be in good working conditions to evaporate all the wastewater from the SWS. Groundwater monitoring prior to commencement of operation and during construction phase.
Surface water	To prevent contamination due to mixing of clean and unclean water	Well maintained cut-off berms/trenches and evaporation pond must be in a good working condition to prevent ponding and percolating through the waste. Regular inspections are required to ensure that stormwater is diverted around the landfill. A fully functional leachate containment structure with regular monitoring and inspections.
Visual	To contain windblown litter	Regular maintenance of the fence. Collection of litter accumulated on the fence.

12. ASPECTS WHICH ARE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT BY EAP OR SPECIALISTS

The following aspects are conditional for the proposed development is the following:

1. Before the commencement of the development the LLM must obtain a Permit to remove Provincially protected species from DESTEA
2. A comprehensive storm water management plan must be compiled and sent to DWS for input before the commencement of construction.
3. Groundwater quality monitoring at the preferred site should be undertaken prior to construction, therefore boreholes for monitoring should be drilled upstream and downstream during construction so that monitoring may be done prior to commencement of the operation phase. Groundwater samples must be collected, and the quality be chemically and biologically analysed, by an accredited laboratory on a continual minimum 6 monthly basis and compared with the baseline data.
4. Lining of the site to minimize possibility of groundwater pollution.
5. The likelihood of finding fossil vertebrate fauna within the geologically recent superficial deposits are considered very low to non-existent.

13. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

Assumptions:

1. The scope is limited to assessing the potential impacts associated with the proposed development; therefore, the effect on the surrounding environment is based on the current land use or lack thereof.
2. All information provided to NSVT Consultants by Environmental and Technical specialists involved is deemed valid and correct at the time it was provided.
3. Since during the public participation process, no indigenous local knowledge came forth regarding the proposed site, it is assumed that there are no sensitive cultural sites on the proposed site.
4. One must always assume that there are Palaeontological/Archaeological Heritage within any development site prior to development as they can be unearthed during excavations.
5. During construction, the contractor will appoint a Designated Environmental Control Officer or Environmental Site Agent for the duration of the construction phase to ensure adherence to the conditions of the EA, WML and EMPr.
6. No borrow pits will be opened to source material for construction and during operation as this did not form part of the scope.
7. Training will be provided to the personnel during operation.

Limitations/Gaps in Knowledge:

1. Not many scientific research has been undertaken in the area.
2. The groundwater movement of the site was not monitored during wet-season cycles and the degree of seasonal seepage are not known, therefore Site Water Management is recommended. (Geotechnical Engineer)

14. REASONED OPINION FOR THE ACTIVITY TO BE AUTHORISED

The EAP hereby recommends that the activity should be authorised because of the following:

a. There are no sensitive areas that are identified as no-go areas except for the preferential water flow path, which is not viewed as being of any conservational significance.
b. The identified negative impacts can be curbed to a greater extent with the adoption of the mitigation and management measures.
c. There are proposed monitoring measures that should be adopted to ensure that the proposed development would limit the residual impacts on the receiving environment.
d. No objections were received from the PPP conducted.
e. The compiled EMPr will form part of the contractual obligation between the contractor and the applicant, *i.e.*, LLM and Dipabala will oversee the construction activities as well as adherence to the EMPr and EA and WUL conditions.

The following are the conditions to the reasoned opinion:

a. Environmental Compliance Officer will be appointed prior to preparation of the site before construction.
b. A Provincial Flora Permit must be obtained from DESTEA prior to commencement of construction period and relocation of representative numbers of individuals /clusters of the identified provincially protected species adequately relocated to other suitable and similar areas as to where they where removed.
c. Engineering blueprints of the buildings to be constructed on site must be in place to ascertain whether the development will be suitable for the proposed site.
d. If material for construction will not be obtained from commercial sources, then a mining permit and Environmental Authorisation should be obtained from DMR.
e. Post-construction officials from DWS and DESTEA should do a site inspection to ensure compliance to the WML conditions and EMPr or an audit should be undertaken by an independent EAP.
f. Groundwater monitoring should be done monthly for the first twelve (12) months, thereafter a six (6) months cycle will apply.

15. THE PERIOD FOR WHICH THE WML IS REQUIRED, THE DATE TO WHICH THE ACTIVITY WILL BE CONCLUDED AND THE POST CONSTRUCTION MONITORING REQUIREMENTS

The WML will be used for the lifecycle of the proposed development, and the envisaged lifespan is 20 years excluding the construction phase, which could be 6 months.

16. AFFIRMATION BY THE EAP

I, Lorato Tigedi Reg. EAP (EAPASA) *Pr. Sci. Nat.*, hereby affirm the following:

1. The information provided in this report is correct, should there be any changes that come to light after reviewing of the available literature, and then the information will be amended accordingly.
2. All issues received from identified I&APs including stakeholders have been included in the report.
3. Information provided by the EAP to the I&APs and responses made by the EAP to comments or inputs made by I&APs is incorporated in the Environmental Reports.

17. AFFIRMATION BY EAP IN RELATION TO THE LEVEL OF AGREEMENT BETWEEN THE EAP AND INTERESTED AND AFFECTED PARTIES

I, Lorato Tigedi Reg. EAP (EAPASA) *Pr. Sci. Nat.*, hereby affirm that I&APs have been informed of the establishment of timeframes within the full Scoping and EIA Process for the proposed development. To ensure that they are afforded enough time to obtain and review documents, as well as understand the issues and provide meaningful comments on the document and input to the proposed development that could assist in decision making.

18. DETAILS OF FINANCIAL PROVISION FOR REHABILITATION CLOSURE

The determination of financial provision for rehabilitation closure did not form part of the EIA process. However, a WML should be obtained for closure of the facility.

19. AN INDICATION TO ANY DEVIATION FROM THE APPROVED SCOPING REPORT, INCLUDING THE PLAN OF STUDY

There are no deviations from the accepted final Scoping Report including the plan of study.

20. DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr identifies possible impacts of the project on the environment and the mitigation thereof. It gives guidelines to the responsible person(s) to follow appropriate contingency plans in the case of various possible impacts, thus the copy of the EMPr should be form part of the contractual agreement to ensure that the contractor adhere to it. The EMPr is attached hereto as **Appendix 20**.

LIST OF REFERENCES

2016/2017, Draft Integrated Development Plan of the Letsemeng Local Municipality

2021/2022, Integrated Development Plan of the Letsemeng Local Municipality

2018 Letsemeng Local Municipality Local Economic Development Strategy

2016/2017 Letsemeng Local Municipality Spatial Development Framework

Mucina, L. & Rutherford, MC (eds) 2006. The vegetation of South Africa, Lesotho and Swaziland. *Strelitzia* 19. *South African National Biodiversity Institute, Pretoria.*

DEA (2017), Guideline on Need and Desirability, Department of Environmental Affairs (DEA), Pretoria, South Africa

APPENDIX 2.1.3
CURRICULUM VITAE OF EAP

APPENDIX 3.3
LOCALITY MAP

APPENDIX 4A
TECHNICAL REPORT

APPENDIX 4B
DESIGN DRAWINGS

APPENDIX 8.1
SITE LAYOUT PLAN

APPENDIX 8.2
RECORDS OF PUBLIC PARTICIPATION PROCESS

APPENDIX 8.3.2
TOPOGRAPHICAL SURVEY LAYOUT

APPENDIX 8.7
SPECIALISTS REPORTS

- Heritage Impact Assessment Report
- Ecological Impact Assessment Report
- Geohydrological Impact Assessment Report
- Geotechnical Investigation Report

APPENDIX 10.2
SENSITIVITY MAP

APPENDIX 20
ENVIRONMENTAL MANAGEMENT PROGRAMME