

SECTION 24G RECTIFICATION PROCESS FOR A LIQUIFIED PETROLEUM GAS REFILL STATION ON ERF 62 OHRIGSTAD TOWNSHIP, FETAKGOMO- TUBATSE LOCAL MUNICIPALITY

FOR PUBLIC REVIEW

LEDET REF: 12/1/9/S24G-GS40

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Conducted on behalf of:

Redgas LPG Refill Station (Pty) Ltd

Compiled by:



Charles Chigurah

Table of Contents

1 INTRODUCTION.....	1
1.1 Project location	1
1.2 Environmental Assessment Practitioner (EAP)	3
1.2.1 Expertise of the EAP	4
2 DESCRIPTION OF THE ACTIVITY	5
2.1 Non-technical process description	5
2.2 Number of employees on site.....	6
2.3 Listed and specified activities.....	6
2.4 Alternatives Considered.....	6
3 POLICY AND LEGISLATIVE CONTEXT.....	6
4 NEED AND DESIRABILITY OF THE PROJECT	8
5 PUBLIC PARTICIPATION	9
5.1 Details of the Public Participation Process (PPP).....	9
5.2 Summary of issues raised	10
6 ENVIRONMENTAL ATTRIBUTES OF THE PROJECT AREA	10
6.1 Surrounding land uses	10
6.2 Topography	11
6.3 Biodiversity.....	13
6.3.1 Limpopo Critical Biodiversity Areas.....	17
6.4 Geology.....	18
6.5 Climate.....	20

6.5.1	Precipitation	20
6.5.2	Temperatures.....	21
6.5.3	Wind.....	22
6.6	Hydrology.....	22
7	SOCIO-ECONOMIC ATTRIBUTES.....	23
7.1	Heritage and Palaeontology.....	23
7.2	Demographics.....	25
8	IMPACTS AND RISKS.....	25
8.1	Criteria for Impact Assessment.....	26
8.2	Operational impacts.....	28
8.2.1	Impacts on physical environment	29
8.2.2	Impacts on biological environment	32
8.3	Impact on Human Environment.....	33
8.3.1	Decommissioning and Rehabilitation	38
8.3.2	Impacts from decommissioning.....	39
9	CONCLUSION	42
9.1	Assumptions, uncertainties, and gaps	42
9.2	Reasoned opinion and authorisation.....	42

List of Figures

Figure 1: Project location	3
Figure 2: Conceptual process description.....	5
Figure 3: Surrounding land uses	11
Figure 4: Elevation from East (R) to West (L)	12
Figure 5: Elevation from North (L) to South (R)	12
Figure 6: Vegetation biome in relation to site	13
Figure 7: Ecosystem risk category.....	14
Figure 8: Terrestrial biodiversity theme sensitivity.....	15
Figure 9: Animal species theme sensitivity	16
Figure 10: Plant species theme sensitivity.....	17
Figure 11: Site CBA and ESA rating.....	18
Figure 12: Site geological characteristics	19
Figure 13: Locality map, showing the distribution of the major subdivisions of the Transvaal Supergroup within the Transvaal, Griqualand West and Kanye basins in South Africa and southern Botswana.....	20
Figure 14: Average precipitation	21
Figure 15: Average temperature.....	21
Figure 16: Average wind speed.....	22
Figure 17: Hydrological map	23
Figure 18: Palaeontology theme sensitivity.....	24
Figure 19: Archaeological and cultural heritage theme sensitivity.....	24

List of Tables

Table 1: Hazardous installations identified within the premises.....	1
Table 2: Site geographical coordinates.....	2
Table 3: Details of the EAP.....	4
Table 4: Listed and specified activity	6
Table 5: Applicable legislation, policies and/or guidelines that or are relevant	7
Table 6: Details of the PPP undertaken to date.....	9
Table 7: Adjacent facilities.....	10
Table 8: Sensitivity features.....	16
Table 9: Total population	25
Table 10: Population by race.....	25

1 INTRODUCTION

Redgas LPG Refill Station (Pty) Ltd 'hereinafter' referred to as Redgas located on Erf 62 Ohrigstad Township, in Ohrigstad within the jurisdiction of Fetakgomo Tubatse Local Municipality recently embarked on the construction and installation of a bulk Liquefied Petroleum Gas (LPG) tank of 35 000 litres (refer to Table 1). The activity undertaken, constitute listed activities under the Environmental Impact Assessment (EIA) Regulations promulgated in terms of the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998). The development activity in question commenced in 2022, and applicant was made aware of the requirement for an Environmental Authorisation (EA) by the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Table 1: Hazardous installations identified within the premises

Name	Inventory	Throughput	Release Quantity
LPG tank storage	One tank of 35 000 litres	35 000 litres every 2 weeks	35 000 litres
LPG road tank	45 000 litres	45 000 litres every 2 weeks	45 000 litres 24 750 kg
LPG cylinders	2 000 cylinders of 48/19/9 kgs maximum	500 cylinders per day	48 kg

Redgas has undertaken to apply for an EA through a rectification process in terms of section 24G of NEMA.

1.1 Project location

The development is located on Erf 62, Carl Trichardt Street, Ohrigstad within Fetakgomo – Tubatse Local Municipality of Sekhukhune District. The site geographical coordinates are:

Table 2: Site geographical coordinates

Southings	24°44'59.33"
Eastings	30°33'44.05"

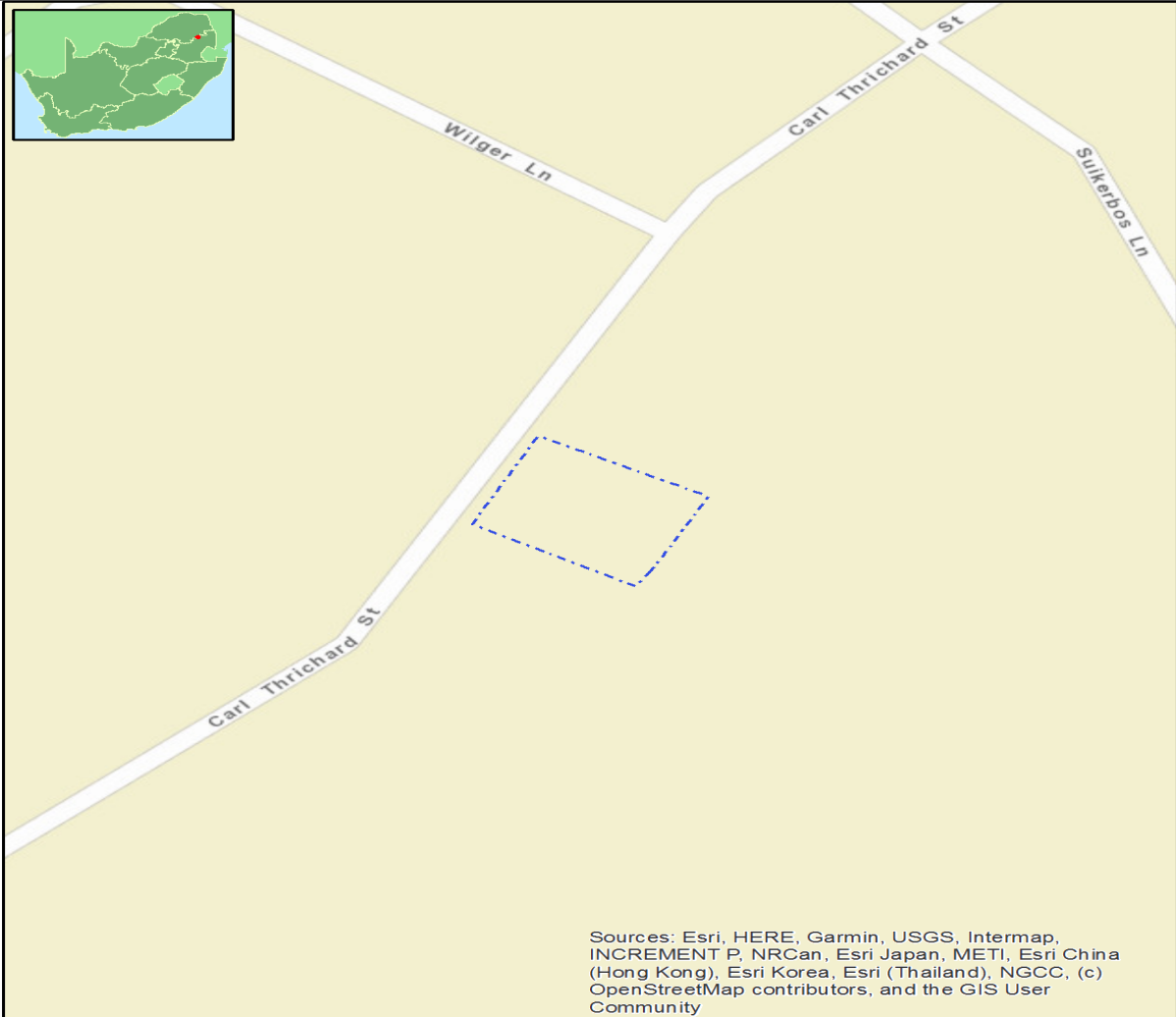




Figure 1: Project location

1.2 Environmental Assessment Practitioner (EAP)

GCC Sustainable Consulting Engineers (Pty) Ltd (henceforth, GCC Consulting) was appointed by Redgas as the Environmental Assessment Practitioner (EAP) to undertake the necessary Section 24G EA application processes required by the applicable legislation. In this regard, GCC Consulting has on behalf of Redgas, applied for the rectification of unlawful commencement of listed activities in terms of Section 24G of the NEMA, as amended, to the competent authority (CA), the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Table 3: Details of the EAP

Independent EAP	GCC Sustainable Consulting Engineers (Pty) Ltd
Responsible person	Gumisai Charles Chigurah
Address	51 Lloyd Road, Birchleigh North, Kempton Park. 1618
Email	charles@gccsustainableconsultingengineers.co.za
Professional affiliation	Environmental Assessment Practitioners Association of South Africa (EAPASA); registration number: 2019/727

1.2.1 Expertise of the EAP

Charles Chigurah holds an honours degree in Environmental Management from the Midlands State University in Zimbabwe. Postgraduate Diploma in Water Supply and Sanitation from the Institute of Water Supply, Sanitation and Development in Zimbabwe. He holds SAMTRAC and he is currently finalizing his NEBOSH International Diploma in Occupational Safety and Health. He is a Senior SHE Consultant and a member of International Association of Impact Assessors (IAIA), South African Council for Natural Scientific Professions (SACNASP). Charles is a member of Institute of Waste Management in Southern Africa (IWMSA), and he is registered with the South African Council for Project and Construction Management Professions (SACPCMP) as a Construction Health and Safety Manager (CHSM). He has more than 9 years working experience in the field of Construction, Waste Management, Environmental Management and Environmental Management Systems (EMS) Implementation and Auditing and has published a paper in Geographical Information Systems (GIS) and Remote Sensing. He has worked on a number of municipality projects and herewith is selected few completed projects:

- a) Integrated Waste Management Plan for Nkonkobe Local Municipality
- b) Integrated Waste Management Plan for Tokologo Local Municipality
- c) Integrated Environmental Management Plan for Xhariep District Municipality
- d) Environmental Management Framework for Amajuba District Municipality
- e) Integrated Waste Management Plan for Tubatse-Fetakgomo Local Municipality

Apart from doing municipality projects, Charles has also managed more than fifty (50) Environmental Impact Assessment Projects both in Zimbabwe and South Africa. He has also

worked as a Construction SHE Advisor and Consultant on a number of major construction projects across South Africa, among them include the construction of multi-storey buildings in Mpumalanga and Limpopo Provinces; the construction of gas pipelines for Sasol in Gauteng, the construction and upgrades of road networks in Limpopo Province as well the construction and upgrades of Bulk Water and Sewer Systems for Ekurhuleni Metropolitan Municipality and was also a Safety Advisor for Eskom Hendrina Power Station responsible for managing sub-contractor's safety officers.

2 DESCRIPTION OF THE ACTIVITY

Redgas proposes to install a bulk LPG tank of 35 000 litres aboveground in Ohrigstad. The LPG product is used to fill cylinders at a filling platform.

2.1 Non-technical process description

Redgas will receive LPG from road tankers (capacity 45 000 litres) and store it in one aboveground tank. Road tankers will deliver on average 17 000 litres per week to the site. LPG is used to fill cylinders. For total quantity and inventory refer to Table 1.

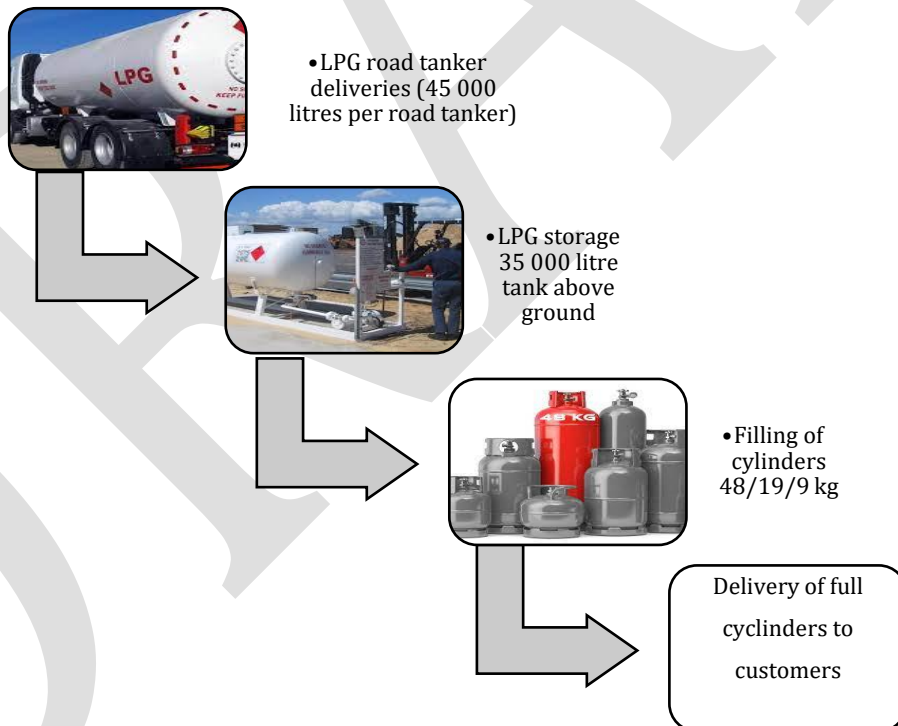


Figure 2: Conceptual process description

2.2 Number of employees on site

The maximum total number of employees, contractors and visitors on site are as follows:

- Dayshift: 4 comprising employees and contractors in peak time.
- Nightshift: 1 security guard.
- Work hours: 06:00 – 18:00.

2.3 Listed and specified activities

The listed and specified activity is provided in Table 4

Table 4: Listed and specified activity

Indicate the number and date of the relevant notice	Describe each listed activity as per project description
GNR 985, 08 December 2014 Activity 10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres

2.4 Alternatives Considered

Since the land was acquired by Redgas in December 2021 and is situated in an industrial region, no other locations were taken into consideration for the development. There are also no "no-go" options that need to be taken into account as the construction activities advance. However, the no-go alternative studied for the study refers to the effects that would have occurred if the facilities had not been updated or renovated.

3 POLICY AND LEGISLATIVE CONTEXT

Table lists the key legal systems that demand an EA. Herein, policies and regulations that apply to the project or the project region are also taken into account.

Table 5: Applicable legislation, policies and/or guidelines that or are relevant

Applicable legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments considered	Project application and type (permit / licence / authorisation / comment)
The Constitution of South Africa, Act No. 108 of 1996	<p>To guarantee that social and environmental management aspects are taken into account and put into practise, Redgas will need to abide by the Environmental Management Programme (EMPr) criteria.</p> <p>A public participation process (PPP) will be implemented in accordance with Section 24 of the Constitution because it is thought to be a crucial instrument for informing stakeholders of their rights and obligations with regard to the project.</p>
National Environmental Management Act, 1998 (Act No. 107 of 1998)	A 24G rectification process is undertaken to obtain authorisation for listed activities included within GNR 983, and GNR 985 of 2014 (as amended in 2017), that have commenced without the required environmental authorisation
<p>National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)</p> <p>Threatened Terrestrial Ecosystems for South Africa, 2011</p> <p>Limpopo Conservation Plan, 2013</p>	<p>Within the framework of the National Environmental Management Act of 1998, the Act provides for the management and conservation of South Africa's biodiversity, as well as the protection of species and ecosystems that require protection.</p> <p>The site falls within no natural remaining area in terms of Sekhukhune Bioregional Plan of 2019.</p>

Applicable legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments considered	Project application and type (permit / licence / authorisation / comment)
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	<p>In order to safeguard both human and environmental health, the National Environmental Management: Waste Act mandates measures for the management of waste and the prevention of pollution and ecological damage.</p> <p>The facilities must manage and dispose of all waste in compliance with this Act and any applicable bylaws, despite the fact that no waste management licence is necessary for operation of the facilities.</p>
Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)	<p>The Act addresses a wide range of issues, including protected areas, hunting, fishing, the preservation of native vegetation, etc. It also addresses the protection and conservation of the environment in the Limpopo Province.</p> <p>Therefore, Redgas must abide by the Act and the rules established by the Limpopo Environmental Management Act, 2003.</p>

4 NEED AND DESIRABILITY OF THE PROJECT

Redgas has access to gas for low-income households where LPG is increasingly gaining acceptance as an economical, safe, and versatile energy source. LPG has also become an alternative to conventional household energies such as electricity, biofuels, and paraffin, which has led to a soaring demand for LPG nationally. Gas utilisation is increasing in households. The greater demand of the gas for activities such as cooking, lighting, and heating has led to the greater need for the storage of the gas.

5 PUBLIC PARTICIPATION

5.1 Details of the Public Participation Process (PPP)

Consultation with the public is an integral component of the EA process. This process enables Interested and Affected Parties (I&APs) (e.g., directly affected landowners, national, provincial, and local authorities, local communities), to raise concerns and comment on the proposed activities, which they feel should be addressed in the EIA process. The PPP has been structured to provide I&APs with an opportunity to gain more knowledge about the proposed project, to provide input through the review of documents and reports, and to voice any issues or concerns at various stages throughout the EIA process. The PPP to date is summarised in Table 6. The PPP is in accordance with Chapter 6 of the EIA Regulations, 2014 (GN No. 982 of 4 December 2014). The following guideline documents published by the DEA were also used to inform the PPP approach:

- Public Participation Guidelines (Notice 807 of 2012).

Table 6: Details of the PPP undertaken to date

Task	Details	Date
I&AP identification	By identifying the organisations, people, and landowners close to the project site, an I&AP database was created for the project. Adjacent landowners, pertinent district and local municipal officials, and pertinent federal and provincial government officials are all included in the database of I&APs. New I&APs will be added to this database when they are discovered throughout the EIA process.	
Background Information Document (BID)	Background Information Documents (BIDs), written in English, were distributed to the identified I&APs for perusal and comment.	
Newspaper advertisement	A newspaper advertisement was placed in the Limpopo Mirror as notification of the proposed 24G rectification process	

Task	Details	Date
Site notice	A site notice was placed on site and a few metres away from site on Carl Trichardt Street.	
Draft Environmental Impact Report (DEIR) distributed for review	The DEIR was distributed to stakeholders and the I&APs for review during	
Addressing comments received	All comments received will be collated into the Comments and Responses Report (CRR). The responses to these comments from the applicant and the EAP will be provided in the CRR	

5.2 Summary of issues raised

Section to be completed when comments are received.

6 ENVIRONMENTAL ATTRIBUTES OF THE PROJECT AREA

6.1 Surrounding land uses

The site is located in an industrial area, but there is a residential area which approximately 225m from the site as illustrated in Table 7 and Figure 3.

Table 7: Adjacent facilities

Description	Distance (metres)
Shed. Vacant stand	55
Two sports field	100
Residential, medium density	225
Agricultural crops shed	45



Figure 3: Surrounding land uses

6.2 Topography

Slope steepness is used by municipalities to determine whether or not a particular site can be developed. As slopes become steeper, the provision of infrastructure become more difficult and more expensive. Slopes are generally measured in percentages of which steep slopes are classified as slopes of 15% and above. The average slope of a site is used in regulating steep slopes, and the proposed development footprint must preferably be outside the areas of steep slope, where slopes more than 25% are totally discouraged for any development besides that of open space and certain recreational uses (Lehigh Valley Planning Commission, 2008). The elevation on site is relatively flat as indicated in Figure 4 and Figure 5



Figure 4: Elevation from East (R) to West (L)

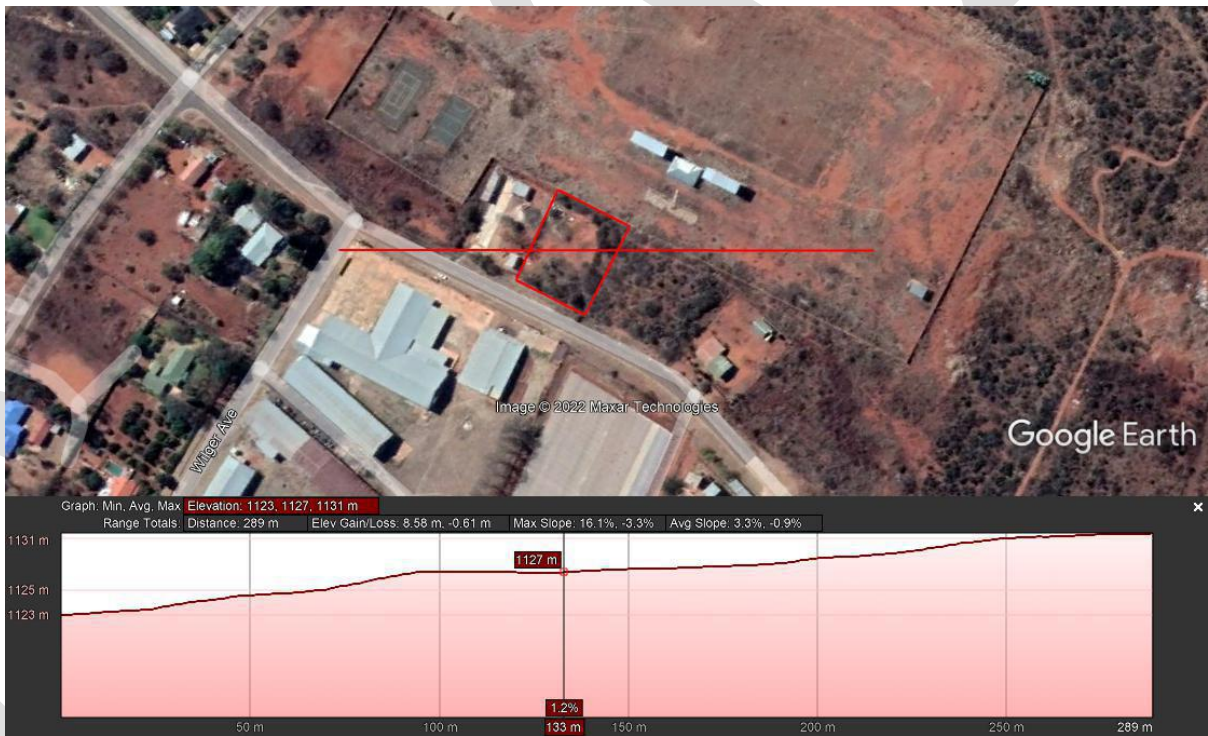


Figure 5: Elevation from North (L) to South (R)

6.3 Biodiversity

A large portion of land, possibly over 80%, in Fetakgomo Tubatse Local Municipality is natural environment, which comprises of bushveld and areas of thinly dispersed and scattered grassland. The Kruger to Canyon biosphere, which is said to contain approximately 75% of all terrestrial bird species, 80% of all raptor species, 72% of all mammals, 50% of all butterflies and 50% of all frog species found in South Africa, stretches onto the municipality's northern borders, this presents benefits for the municipality. Fetakgomo Tubatse Local Municipality has multiple nature reserves which form part of its protected areas as the municipality deems it important to preserve its natural environment.

The site was cleared prior to Redgas buying the property. The site falls under the Savanna Biome as indicated in Figure 6. Groupings called Biomes (large-scale biotic communities) have been described for plants and/or animals living together with some degree of permanence, so that large-size patterns in global plant cover can be observed. Biomes broadly correspond with climatic regions, although other environmental controls are sometimes important. Each biome has a characteristic set of plant and animal species as well as a characteristic overall physiognomy (for example a general appearance given by the plant shapes). The general plant characteristics give a characteristic visual signature to the vegetation of the biome.

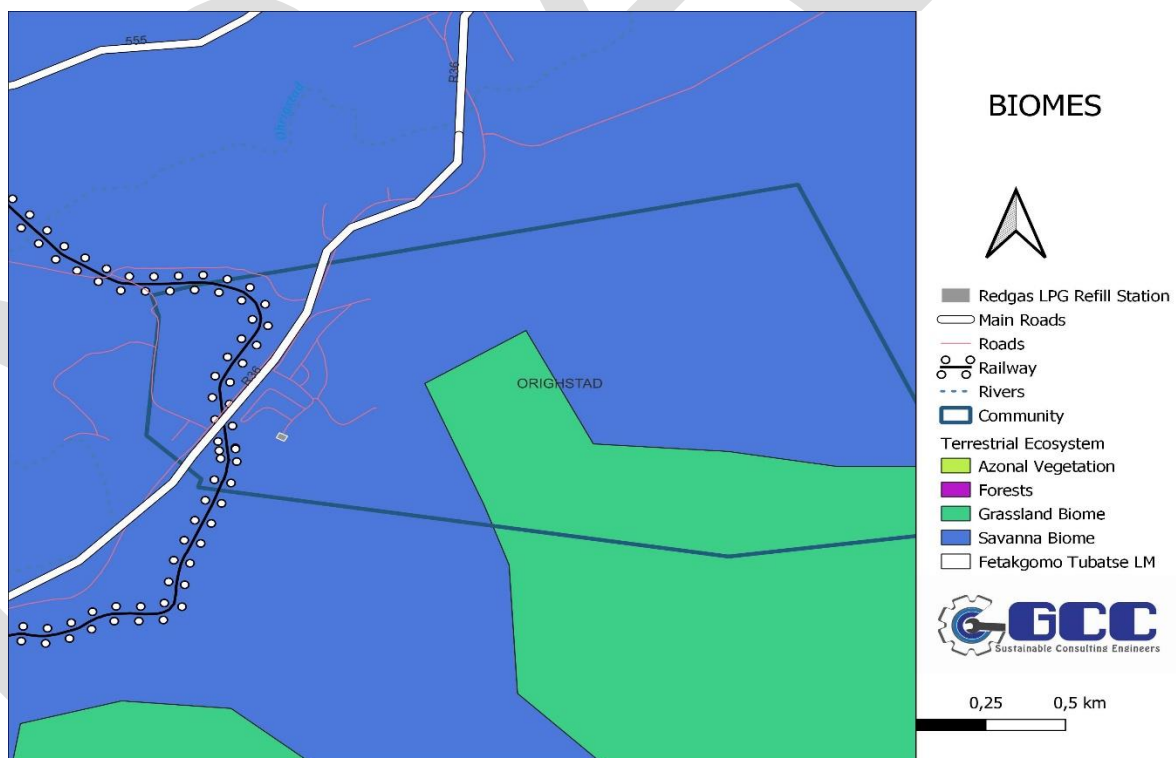


Figure 6: Vegetation biome in relation to site

The Savanna Biome is the largest Biome in southern Africa, occupying 46% of its area, and over one third the area of South Africa. It is well developed over the lowveld and Kalahari region of South Africa and is also the dominant vegetation in neighbouring Botswana, Namibia and Zimbabwe. It is characterized by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground vegetation may be referred to as Shrub veld (see also Thicket Biome below), where it is dense as Woodland, and the intermediate stages are locally known as Bushveld.

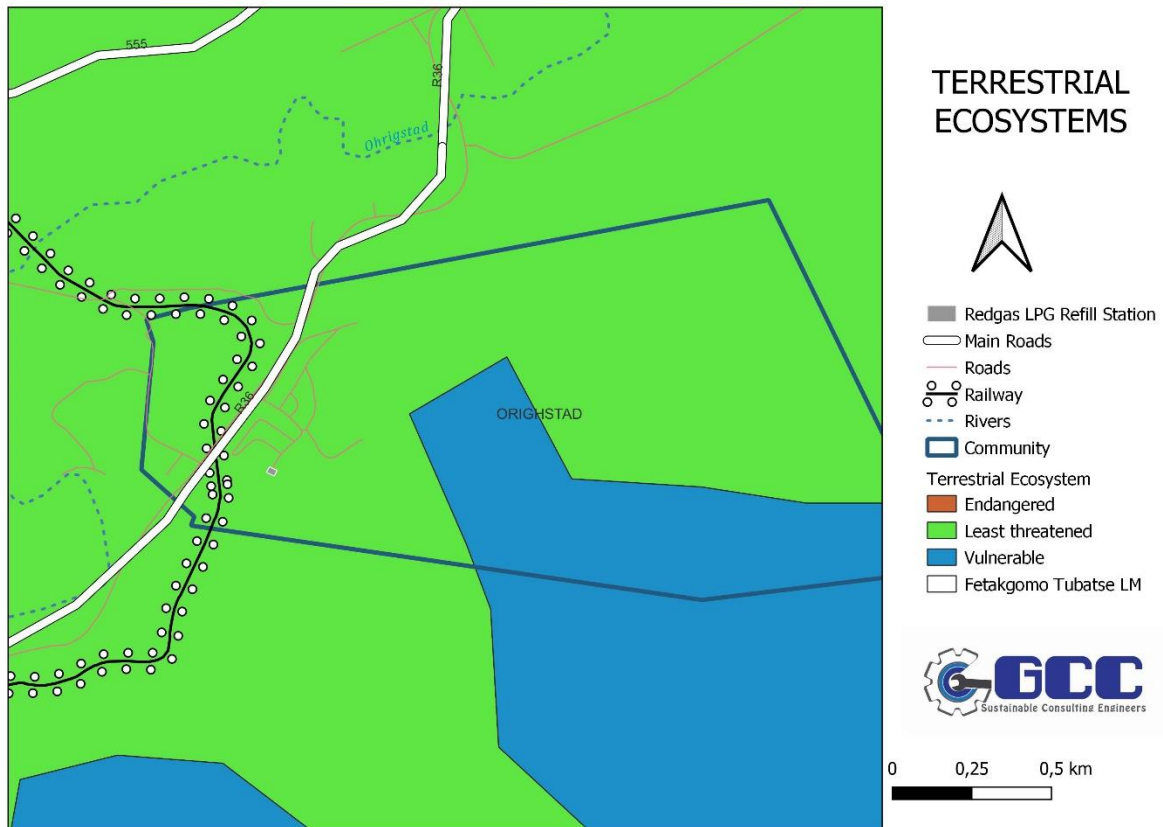


Figure 7: Ecosystem risk category

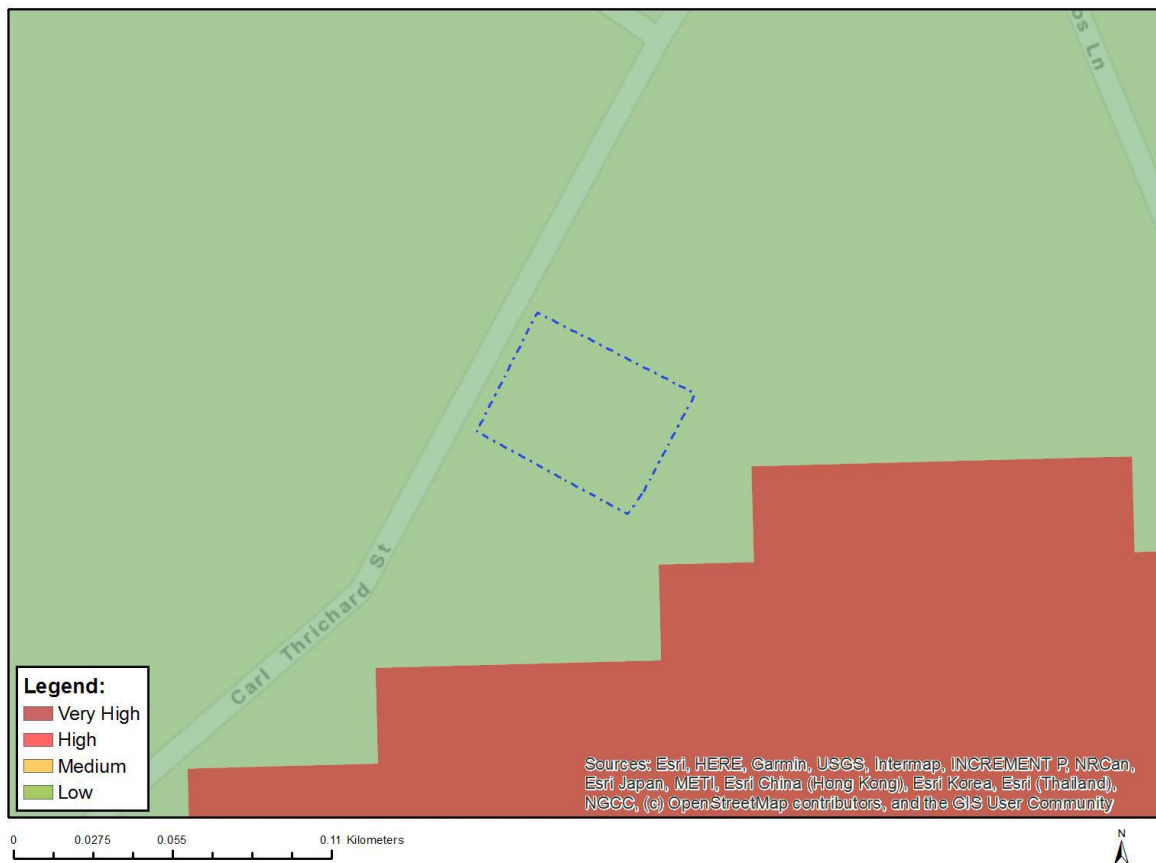


Figure 8: Terrestrial biodiversity theme sensitivity

The site is least threatened (Figure 7) due to the development that has happened in the area. An ecosystem is Least Threatened when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widely distributed and relatively undegraded ecosystems are included in this category. Theoretically, all ecosystems have some risk of collapse, just as all species face some risk of extinction. The term Least threatened reflects the fact that this risk is relatively low. In practice this category is reserved for ecosystems that unambiguously meet none of the quantitative criteria (decline in distribution, restricted distribution, degradation of environmental conditions or disruption of biotic processes and interactions).

An environmental screening report was compiled using the Department of Environment, Fisheries and Forestry (DEFF) and the results were low to medium sensitivity.

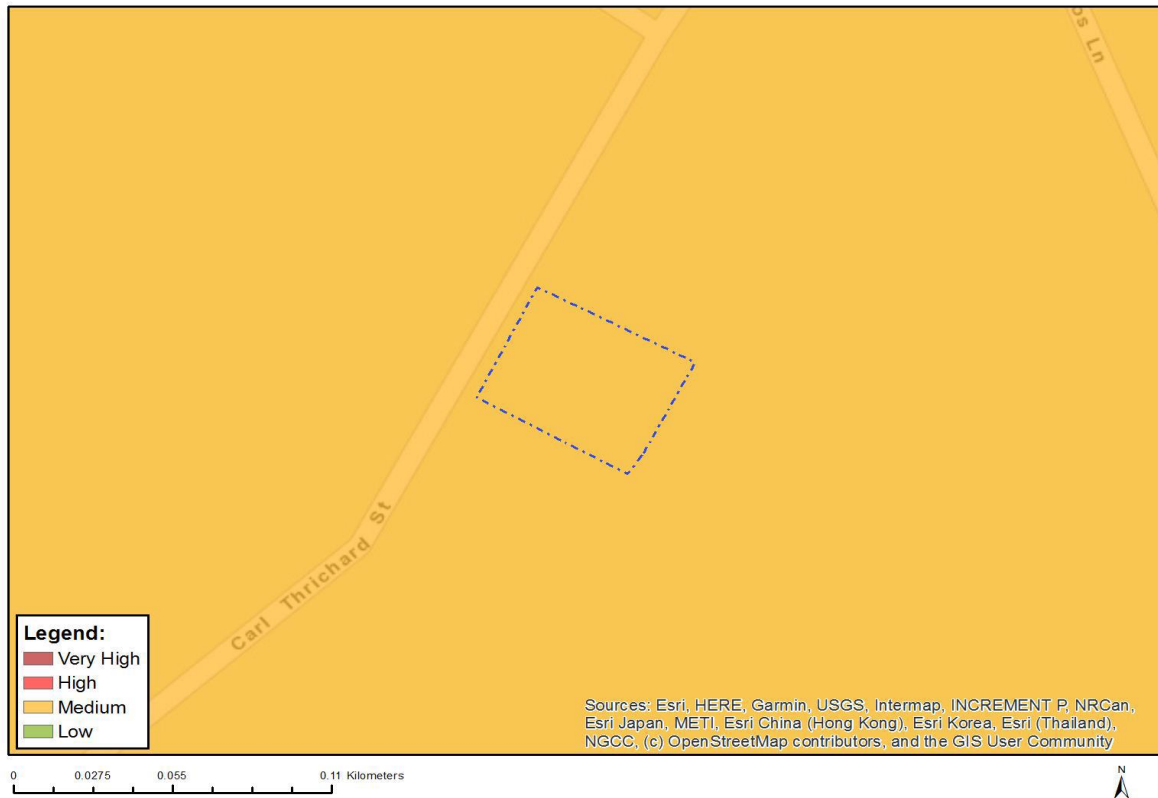


Figure 9: Animal species theme sensitivity

Table 8: Sensitivity features

Sensitivity	Feature (s)
Medium	Aves – <i>Sagittarius serpentarius</i>
Medium	Aves – <i>Eupodotis senegalensis</i>
Medium	Mammalia- <i>Crocidura maquassiensis</i>
Medium	Mammalia – <i>Dasymys robertsii</i>
Medium	Mammalia – <i>Ourebia ourebi</i>
Medium	Invertebrate – <i>Aroegs fuscus</i>

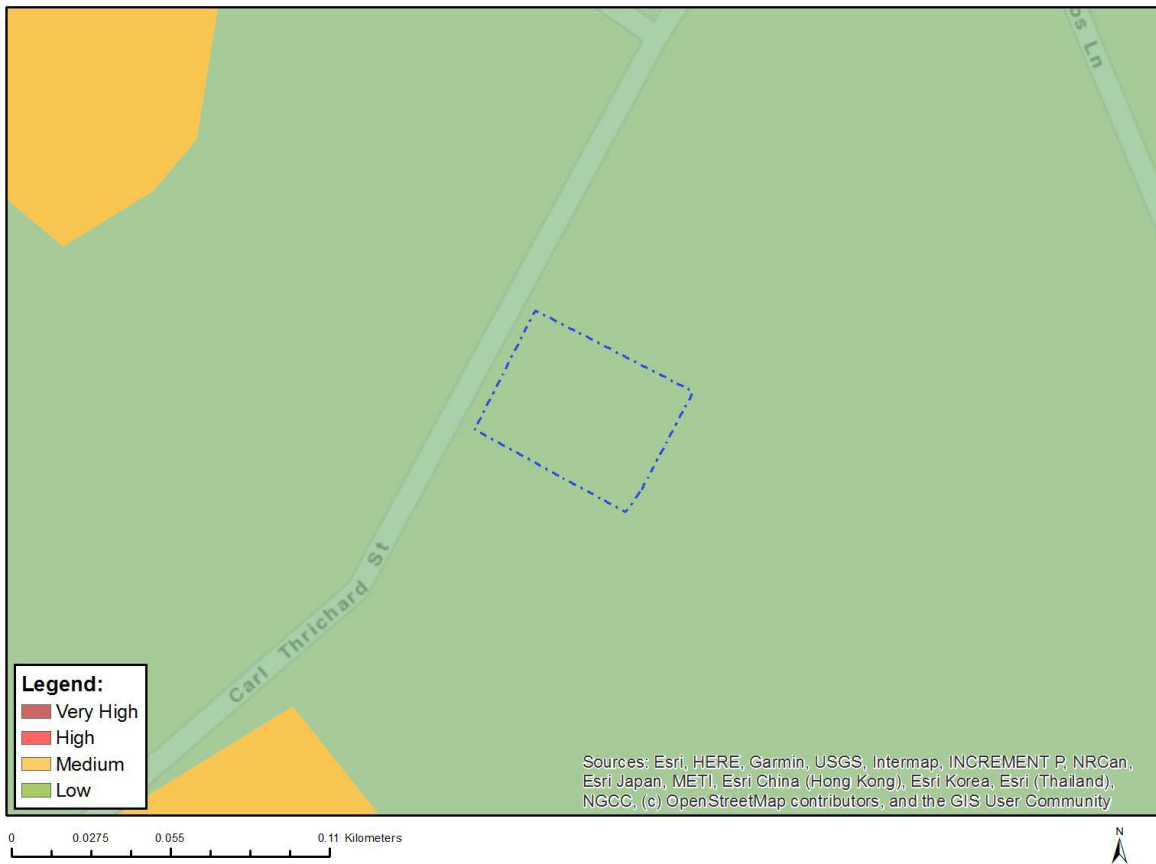


Figure 10: Plant species theme sensitivity

6.3.1 Limpopo Critical Biodiversity Areas

Critical Biodiversity Areas (CBA) within the bioregion are the portfolio of sites that are required to meet the region's biodiversity targets and need to be maintained in the appropriate condition for their category. A map of CBAs for the site was produced as part of this assessment and was assigned to CBA categories based on their biodiversity characteristics, spatial configuration and requirement for meeting targets for both biodiversity pattern and ecological processes. Based on the mapping done the site does not fall under any CBA or Ecological Support Area as indicated in Figure 11.

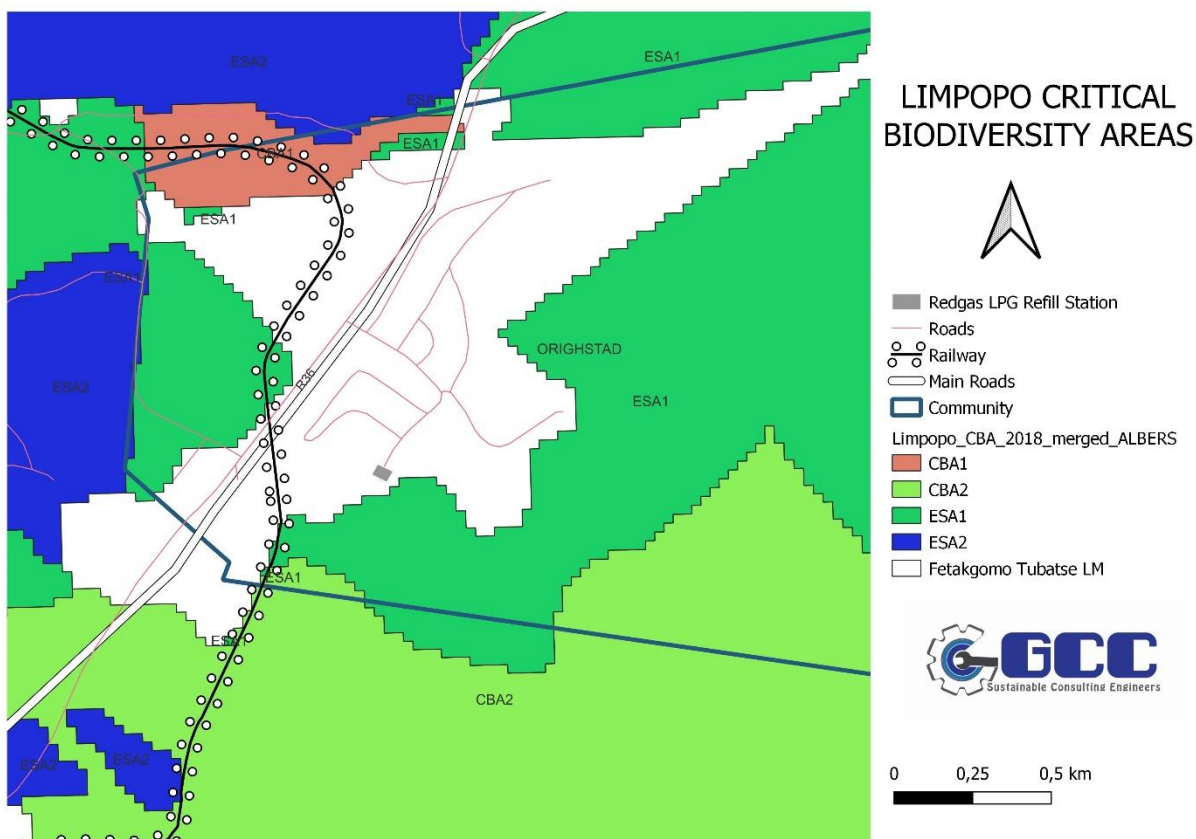


Figure 11: Site CBA and ESA rating

6.4 Geology

Geology influences the topography of an area, as well as its soil types and its potential for agriculture. Usually, there is more than one rock type for each rock formation. Fetakgomo Tubatse Local Municipality is located in the eastern part of the Bushveld Igneous Complex and the Transvaal geological system and as a result, it is underlain by sedimentary and volcanic rock formations. The municipal area is covered by quite a number of geological elements; however, Gabbro covers the largest area of the municipality as it covers approximately 25.9% of the municipal area, followed by Shale covering approximately 22.1% of the area. The third element is Norite which covers over 9% of the municipal area. Due to its geological composition, the municipal area is characterised by steep rising mountains.

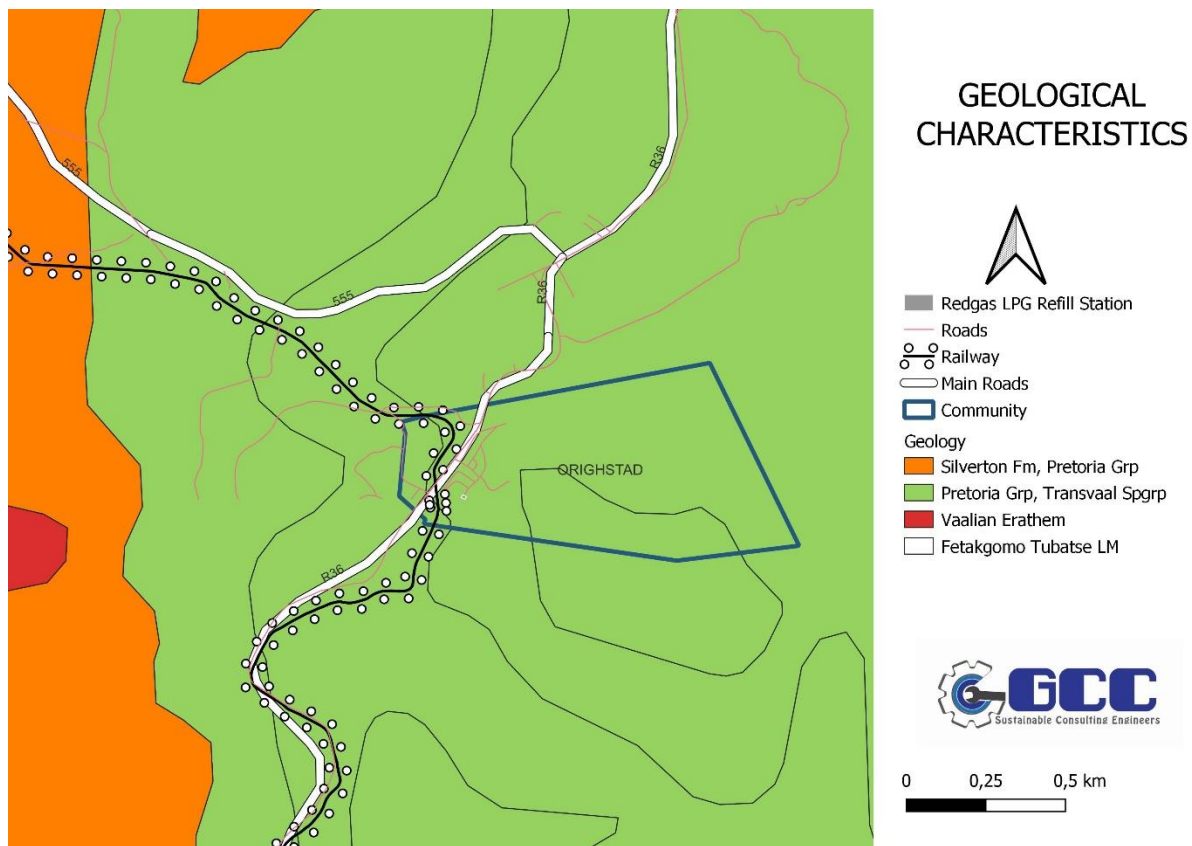


Figure 12: Site geological characteristics

The site is underlain by the Pretoria Group as indicated in Figure 12. The Pretoria Group in the Transvaal basin is dominated by numerous alternating mudrock and sandstone units with lesser diamictite/conglomerate members and volcanic units that represent an alternation of alluvial sedimentation with epeiric marine sedimentation (Catuneanu and Eriksson, 1999). Lithological and thickness variations are common, and the depositional setting has been described as falling within the continuum between intracratonic rift and sag basins (Eriksson and Reczko, 1995). The stratigraphy is truncated by several disconformities, some underlain by palaeosols (Button, 1986). Some 12–14 formations are recognised for the Pretoria Group, but only four in the Postmasburg Group. In marked contrast, the Postmasburg Group in the Griqualand West basin consists of a conformable sheetlike sequence of diverse lithologies, commencing with a basal glacial diamictite, overlain by basaltic andesite lavas, iron formation and Mn-, Ca-, Mg-carbonates. In its chemical sedimentary nature, the succession is more comparable with the underlying Ghaap Group than the Pretoria Group (Tiko's and Moore, 1997).

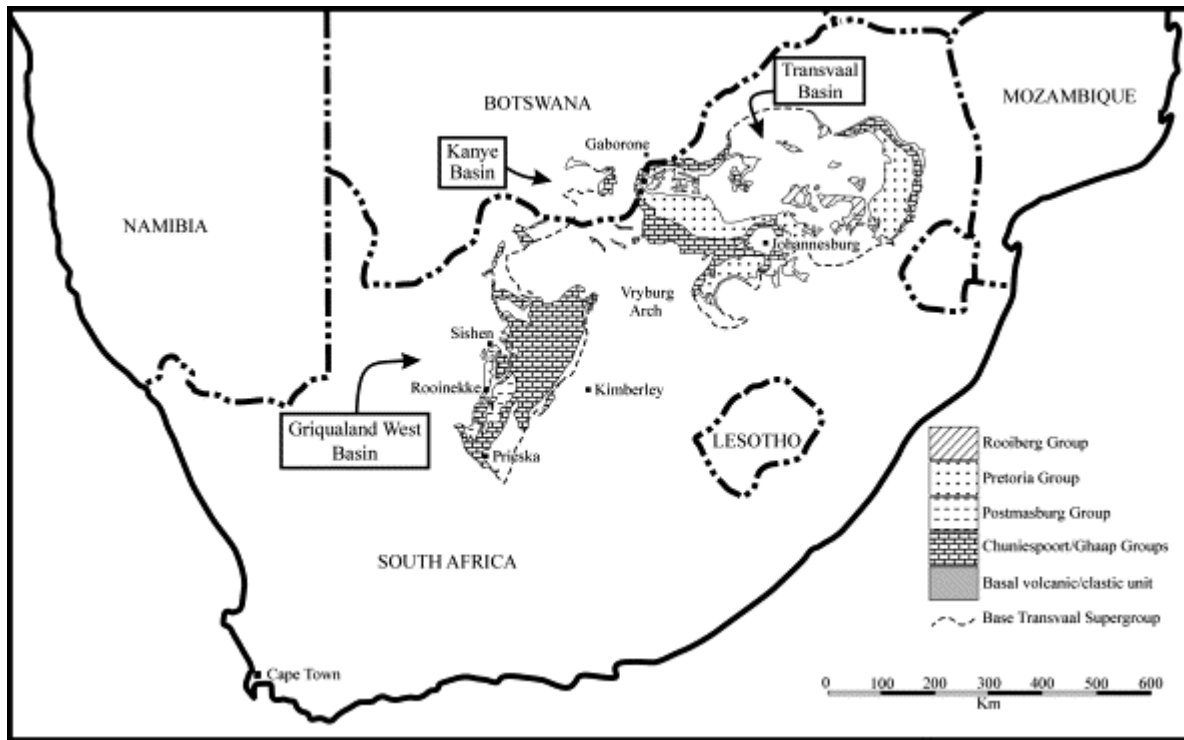


Figure 13: Locality map, showing the distribution of the major subdivisions of the Transvaal Supergroup within the Transvaal, Griqualand West and Kanye basins in South Africa and southern Botswana

6.5 Climate

6.5.1 Precipitation

The wettest month (with the highest rainfall) is December (136mm). The driest month (with the least rainfall) is July (3mm).

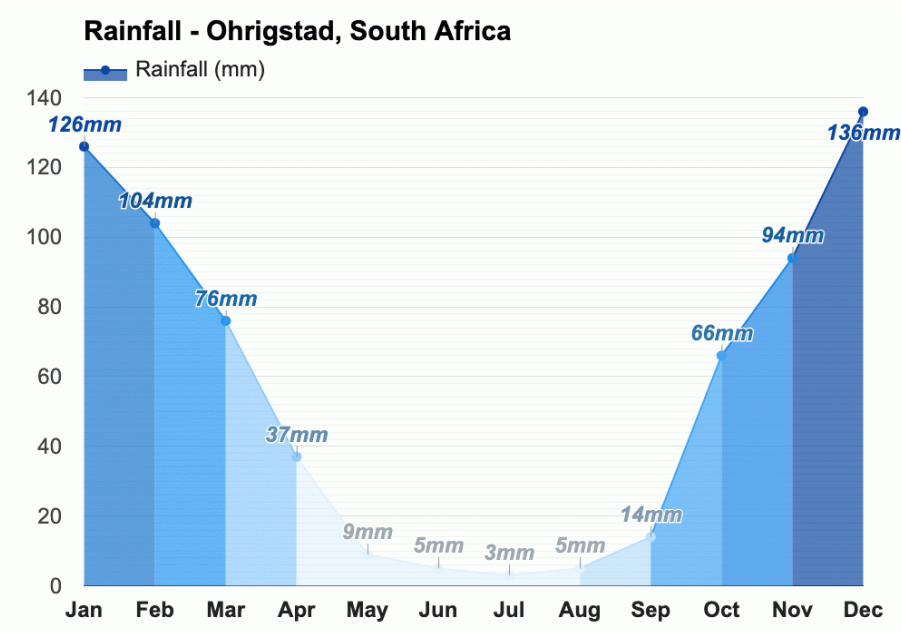


Figure 14: Average precipitation

6.5.2 Temperatures

The month with the highest average low temperature is December (15°C). The coldest month (with the lowest average low temperature) is July (4.4°C).

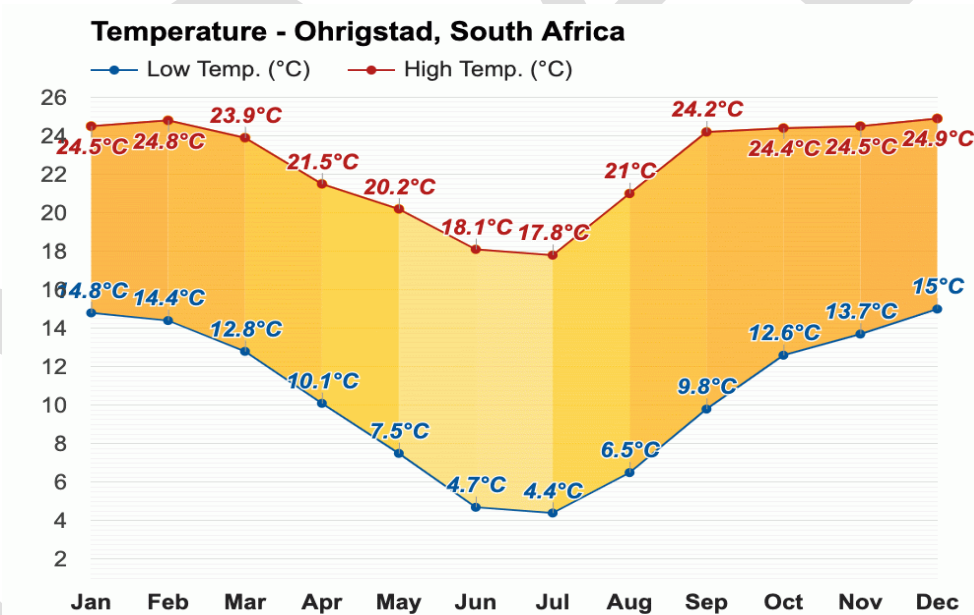


Figure 15: Average temperature

6.5.3 Wind

The windiest months (with the highest average wind speed) are September and October (7.6km/h). The calmest months (with the lowest average wind speed) are March and May (5.9km/h).

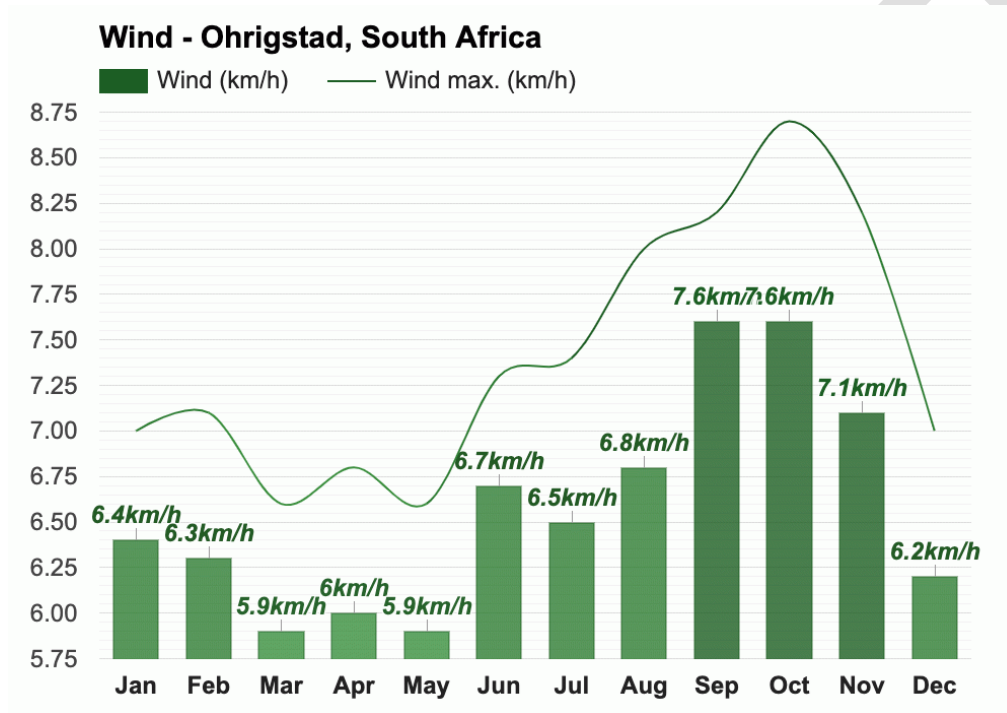


Figure 16: Average wind speed

6.6 Hydrology

There is no river or wetland in close proximity to the site. The nearest river which is Ohrigstad river is approximately 2km.

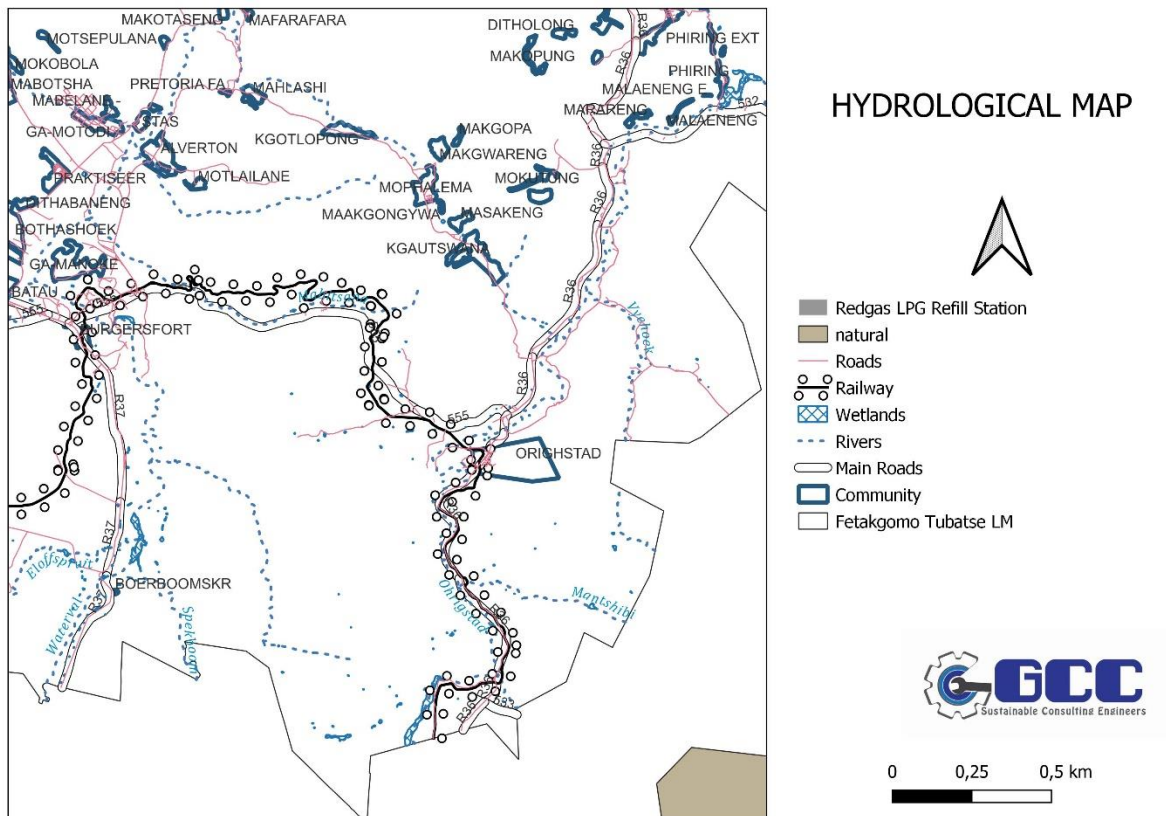


Figure 17: Hydrological map

7 SOCIO-ECONOMIC ATTRIBUTES

7.1 Heritage and Palaeontology

As the activity already commenced, the impact already occurred, and should there have been any artefacts or findings of cultural or historical significance, it is unlikely it would have remained on the areas impacted. However, a screening was done using the DEFF screening tool and results showed low to medium sensitivity as indicated in Figure 18 and Figure 19.

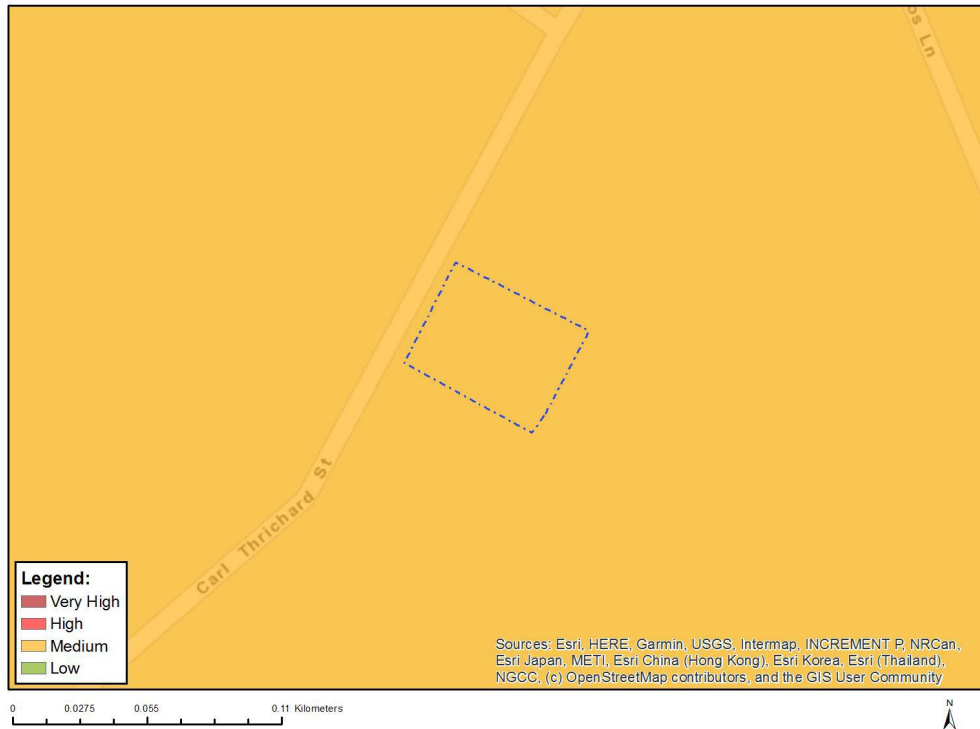


Figure 18: Palaeontology theme sensitivity



Figure 19: Archaeological and cultural heritage theme sensitivity

7.2 Demographics

The population of Ohrigstad as of 2011 stood at 520 people with 278 households.

Table 9: Total population

Gender	People	Percentage
Male	272	52.31%
Female	284	47.69%

Table 10: Population by race

Race	People	Percentage
White	255	48.94%
Black African	253	48.56%
Other	11	2.11%
Coloured	1	0.19%
Indian or Asian	1	0.19%

8 IMPACTS AND RISKS

The effects and dangers that have been identified are evaluated in this part based on their nature, importance, consequence, extent, duration, and probability. The extent to which the repercussions can be avoided, managed, or minimised, as well as the likelihood that they would result in the irreparable loss of resources, are also mentioned. The geographical, physical, biological, social, economic, heritage, and cultural components of the consequences are likewise categorised as either good or bad. This report provides the amount of residual risk as well as the mitigation strategies for the effects and risks.

Also included is the approach for identifying and ranking these impacts and hazards. As a result, Section 3 (1) (h) (v) - (viii) and I and (j) of Appendix 3 of the EIA Regulations of 2014 are satisfied by this section (GN R 982 of 2014).

The EIA Regulations would not have been followed because this EIA report was filed as part of a 24G rectification process. Thus, in this EIA report, a thorough impact evaluation of the chosen option (the current development) is conducted.

8.1 Criteria for Impact Assessment

The approach for determining and analysing impacts is undertaken into two steps.

- Impact Determination; during this step, the impact is assessed based on severity, spatial scale, and its duration.
- Impact Significance; various rating exists to determine the overall rating of the impact

Impact significance is determined under two mitigation scenarios; **without mitigation** and **with mitigation**. The confidence of impact mitigation depends on the level of certainty based on available information to assess the impact.

Risk Event	Rating	Description of the risk that may lead to an impact
Impact	0	No Impact
	+ve	Positive
	-ve	Negative
Probability	The probability that an impact may occur under the following analysis	
	1	Improbable (Low likelihood)
	2	Low probability
	3	Probable (Likely to occur)
	4	Highly Probable (Most likely)
	5	Definite (Impact will occur irrespective of the applied mitigation measure)
Confidence level	The confidence level of occurrence in the prediction, based on available knowledge	
	L	Low

Risk Event	Rating	Description of the risk that may lead to an impact
	M	Medium
	H	High
Significance	0	None (Based on the available information, the potential impact is found to not have a significant impact)
	L	Low (The presence of the impact's magnitude is expected to be temporal or localized, that may not require alteration to the operation of the project)
	M	Medium (This is when the impact is expected to be of short term moderate and normally regionally. In most cases, such impacts require that the projects is altered to mitigate the impact or alternative method of mitigation is implemented)
	H	High (The impact is definite, can be regional or national and in long term. The impact could have a no-go implication unless the project is re-designed or proper mitigation can practically be applied)
Duration	Time duration of the impacts	
	1	Immediate
	2	Short-term (0-5 years)
	3	Medium-term (5-15 years)
	4	Long-term
	5	Permanent
Scale	The geographical scale of the impact	
	1	Site specific
	2	Local
	3	Regional

Risk Event	Rating	Description of the risk that may lead to an impact
	4	National
	5	International

8.2 Operational impacts

The operational impact analysis shall mainly focus on the Health and Safety of operating the LPG depot. It should be noted that, the operation of an LPG depot is a highly technologized operation with standard regulatory principles. These guidelines ranges from the type of tanks and pipes to be used as well as the dispensary units. Of most important aspects is how the operator ensures that, the facility is protected from bush fires, workers are aware of the high fire and explosion risk and all necessary firefighting equipment is available and workers know how to use them.

8.2.1 Impacts on physical environment

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>Land Degradation</p> <p>During operation, land degradation is not expected since the areas shall be paved, and the roads shall be tarred</p>	<p>All trucks and vehicle accessing the site must be on tarred roads</p>	Type	-ve
		Severity	Low
		Scale	Site Specific
		Probability	Possibly
		Confidence level	High
		Without mitigation	Low
		With Mitigation	Low
<p>Surface and Ground Water Pollution</p> <p>Water may be contaminated from used materials such as, oil cans from</p>	<ul style="list-style-type: none"> • Develop a waste management strategy with strong emphasis on Reduce, Re-Use, Re-Cycle • Provide skip bins for hazardous waste such as oil cans 	Type	-ve
		Severity	Low
		Scale	Site Specific

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
vehicle and trucks, paints containers, oil leaks from trucks	<ul style="list-style-type: none"> Introduce oil leak prevention such as drip trays under stationary vehicles etc. All hydrocarbons must be stored on concrete banded areas 	Probability	Possibly
		Confidence level	High
		Without mitigation	Low
		With Mitigation	Low
Air Quality LPG is a clean fuel technology and itself shall not pose threat to the environment through emissions. However, emission from indirect sources such as trucks and vehicle exhaust may increase. The areas shall be paved, hence there shall be no aspects of dust pollution	<ul style="list-style-type: none"> All stationary vehicles must be switched off Ensure road worthiness and encourage trucks and vehicle are frequently serviced by owners 	Type	-ve
		Severity	Low
		Scale	Local
		Probability	Definite
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>Noise Pollution</p> <p>The operation of the LPG plant shall not produce noise. However, noise will produce from loading and delivery trucks</p>	<ul style="list-style-type: none"> • Delivery trucks must be well serviced to prevent excessive noise • Stationary truck must have their engine switched off at all times 	Type	-ve
		Severity	Low
		Scale	Local
		Probability	Probable
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low

8.2.2 Impacts on biological environment

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact
<p>Flora</p> <p>The operation of the project is not expected to impact flora. The remaining trees must be well kept, and trimmed to ensure good landscape</p>	<ul style="list-style-type: none"> • Ensure good landscaping by trimming remaining trees • Frequent watering of the remaining trees 	<p>Insignificant</p>
<p>Fauna</p> <p>The operation of the project is not expected to impact on fauna, since the area shall be fenced off and animals shall not have access to the site</p>	<p>No killing of any type of animal is allowed.</p>	<p>Insignificant</p>

8.3 Impact on Human Environment

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
Health LP Gas is not known to cause health problems aside from cold burns to the skin and unconsciousness at high concentrations	<ul style="list-style-type: none"> For cold burns, immediately flush the area with cold water. If exposed to high concentration, switch off the gas transmission and go to an open area with sufficient air circulation 	Type	-ve
		Severity	Medium
		Scale	Site Specific
		Probability	Probable
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
Safety If leakage occurs, LPG vapours can collect on the ground and in drains or basements and if the gas meets a source of ignition it can burn. LPG	<ul style="list-style-type: none"> Avoid at all times any source of ignition material on the premises Develop a fire safety policy with clear procedures and guidelines on how to react to LP gas fire Staff must be properly trained on how to react and handle fire 	Type	-ve
		Severity	Low
		Scale	Site Specific
		Probability	Possibly

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
cylinders can explode if involved within a fire.	<ul style="list-style-type: none"> • There must be an automatic fire alarm system installed at the site • Firefighting equipment must be on site 24hours and regularly inspected to ensure that they are working • Emergency response numbers must be on clear and visible space • There must be clear hazard signage reading “NO OPEN FIRE” “NO SMOKING” and “SWITCH ENGINE OFF” • There must be drills to test staff on their readiness to fight fires • The site must be fenced off by a boundary wall (in case there is bush / veld fire outbreak) • Provide personnel with full protective clothing such as full- face air supplied or self- contained breathing apparatus, overalls, thermal insulated gloves, splash-proof goggles and non-sparking boots. 	Confidence level	High
		Without mitigation	Low
		With Mitigation	Low

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>Air Quality</p> <p>LPG is a clean fuel technology and itself shall not pose threat to the environment through emissions. However, emission from indirect sources such as trucks and vehicle exhaust may increase. The areas shall be paved, hence there shall be no aspects of dust pollution</p>	<ul style="list-style-type: none"> All stationary vehicles must be switched off Ensure road worthiness and encourage trucks and vehicle are frequently serviced by owners 	Type	-ve
		Severity	Low
		Scale	Local
		Probability	Definite
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
<p>HIV/AIDS, Alcohol and Drug Abuse</p> <p>The employment opportunity to be created may cause behaviour change in a society. Truck driver are mostly</p>	<ul style="list-style-type: none"> Provide awareness to the employees / recyclers on the danger of alcohol and drug abuse Provide condoms on site 	Type	-ve
		Severity	Medium
		Scale	National
		Probability	Probable

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>compromised by risky sexual behaviour. South Africa has high prevalence of HIV/AIDS and it is important to ensure that employees are sensitized about the pandemic</p>		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
<p>Waste Management</p> <p>The improper storage of waste and hydrocarbons could potentially result in the contamination of stormwater flows from the site during operation</p>	<ul style="list-style-type: none"> All hazardous waste generated by the facility must be stored in an enclosed, bunded purpose-built facility for collection by a registered waste contractor prior to safe disposal. Such disposal facilities must not be located within close proximity to adjacent industrial areas. General waste from the site will be disposed of into the municipal waste stream 	Type	-ve
		Severity	Medium
		Scale	Local
		Probability	Definite
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
Employment	<p>Ensure that any new job opportunities are extended to local community members</p>	Positive impact.	

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact
<p>The project is expected to create permanent employment opportunities that will improve the socio-economic condition of the people.</p>		

8.3.1 Decommissioning and Rehabilitation

Decommissioning is normally the reverse of construction, and all installed materials must be removed. It is likely that during the time the project is to be decommissioned, the environment has changed hence a decommissioning and rehabilitation plan must be developed and approved by the competent authority.

Nonetheless, during decommissioning, LPG tanks must be removed, the piping system shall be re-installed, concrete foundation must be dismantled resulting in the production of a huge volume of waste. During this stage, it is important to develop a decommissioning waste management strategy which shall ensure appropriate handling of different types of waste and disposal as per the national and international laws. It is important to ensure that all tanks are empty, this can be done by flushing tanks with air or water. After the removal of all material, the site must be rehabilitated through levelling and compactions. Since it is town land, with potential to accommodate another developmental project, re-vegetation is not recommended.

The following is a systematic decommissioning plan:

- Prior to decommissioning, the proponent must inform all the relevant authorities;
- All work must be supervised by qualified and competent engineers,
- It is recommended that an environmental specialist must monitor any possible contamination during decommissioning;
- There must be clear signs to the public about the closure of the project;
- The contractor must use the right tools and equipment;
- Workers must be provided with all necessary PPE;
- All waste generated must be disposed of approved sites;

8.3.2 Impacts from decommissioning

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>Health</p> <p>LP Gas is not known to cause health problems aside from cold burns to the skin and unconsciousness at high concentrations</p>	<ul style="list-style-type: none"> For cold burns, immediately flush the area with cold water. If exposed to high concentration, switch off the gas transmission and go to an open area with sufficient air circulation 	Type	-ve
		Severity	Medium
		Scale	Site Specific
		Probability	Probable
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
<p>Air Quality (Dust)</p> <p>During the decommissioning phase of the development, there will be localised fugitive dust emissions due</p>	<p>Ensure that appropriate dust suppression is undertaken on site so as to avoid nuisance impacts to neighbouring properties.</p>	Type	-ve
		Severity	Low
		Scale	Site Specific

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
to decommissioning activities and the hauling and trucking of materials around the site		Probability	Possibly
		Confidence level	High
		Without mitigation	Low
		With Mitigation	Low
Traffic Impacts A short-term, limited increase of vehicles on the roads could potentially result in traffic impacts in the vicinity of the site	Ensure that vehicles conduct decommissioning activities during non-peak times to minimise traffic disruption.	Type	-ve
		Severity	Low
		Scale	Local
		Probability	Definite
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
Waste Management		Type	-ve

Potential Environmental/Social Impact	Mitigation Measures	Significance of the Impact	
<p>The improper storage of waste and hydrocarbons could potentially result in the contamination of stormwater flows from the site during decommissioning</p>	<ul style="list-style-type: none"> All hazardous waste generated by the facility must be stored in an enclosed, bunded purpose-built facility for collection by a registered waste contractor prior to safe disposal. Such disposal facilities must not be located within close proximity to adjacent industrial areas. General waste from the site will be disposed of into the municipal waste stream 	Severity	Medium
		Scale	Local
		Probability	Definite
		Confidence level	High
		Without mitigation	Medium
		With Mitigation	Low
<p>Employment</p> <p>Decommissioning is expected to create temporary employment opportunities that will improve the socio-economic condition of the people</p>	<p>Ensure that any new job opportunities are extended to local community members</p>	<p>Positive impact.</p>	

9 CONCLUSION

9.1 Assumptions, uncertainties, and gaps

This report is based on the following assumptions:

- The information provided by Redgas is accurate, sufficient and unbiased, and no information that could change the outcome of the EIA process has been withheld.
- The proponent will follow the conditions of the EA and applicable legislation.

9.2 Reasoned opinion and authorisation

The authorisation of the activity and facility will allow the proponent to lawfully operate the site. The continuation of its operations will ensure that the employment and contractor opportunities it currently provides, are maintained. Furthermore, after mitigation, few moderate impacts remain, and most of these can be mitigated to a Low or Very Low level through the continued implementation of the EMPr and regular monitoring of compliance thereto

APPENDIX A: DETAILS OF EAP

DRAFT

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EDUCATION

- MSc Environmental Sciences – University of Witwatersrand (Left with Dissertation) – Pending
- Bachelor of Law (LLB) (Jan 2017- Dec 2022)- UNISA – Pending
- BSc Hons Geography and Environmental Sciences (Midlands State University 2004-2007) Postgraduate Diploma in Water Supply, Sanitation and Hygiene (Institute of Water Supply and Sanitation Development)

SHORT COURSES

- SAMTRAC
- IEMA ISO14001 Auditor's Foundation Course
- Nebosh International Management of Health and Safety Certificate
- Nebosh International Management of Hazardous Substances Certificate
- Sustainable Development in Mining and Industry

ACCREDITATIONS

- South African Council for Natural Scientific Professions (SACNASP) **Reg No. 300001/15**
- Institute of Waste Management South Africa (IWMSA) **Reg No.10215041**
- South African Institute of Occupational Safety and Health (SAIOSH) **Reg No. 38303194**
- South African Council of Project and Construction Management Professions (SACPCMP)-**CHSM/501/2018**
- Environmental Assessment Practitioners Association of South Africa (EAPASA). **Reg. Number 2019/727**

JOURNAL PUBLICATIONS

Analysis of Veldfire Incidents in Makoni and Chimanimani Districts of Zimbabwe using GIS, Remote Sensing and Public Domain Data; (2010). Journal of Sustainable Development in Africa (Volume 12, No.7, 2010) Clarion University of Pennsylvania, Clarion, Pennsylvania (http://www.jsd-africa.com/Jsda/V12No7_Winter2010_A/PDF/Analysis%20of%20Veldfire%20Incidents%20in%20Makoni%20and%20Chimanimani%20Districts%20Using%20GIS.pdf).

WORK EXPERIENCE

Technical Director

GCC Consulting: Midrand, Johannesburg

February 2021- Current

Consulting

I am currently the Technical Director at Minenviro. My main duties involve management of project budgets, management and undertaking of departmental projects and provision of Environmental and Waste Management advisory services to our clientele portfolio in the oil, gas, mining, construction, government, manufacture and industrial sectors. I am also involved in business development and mentoring of junior employees.

Environmental Division Manager

Kimopax: Midrand, Johannesburg

September 2012-January 2021

Consulting

I was heading the environmental division comprising of 8 team members based at the head office and 2 satellite offices in Mpumalanga and Eastern Cape Province. My main duties involved monthly reporting to EXCO, management of project budgets, management and undertaking of departmental projects and provision of Environmental and Waste Management advisory services to our clientele portfolio in the mining, construction,

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government, manufacture and industrial sectors. I was also involved in business development and mentoring of junior employees.

Safety Advisor

ISO-Q: Hendrina Power Station

September 2011—June 2012

Seconded to Eskom Hendrina Power Station

Reported directly to the Power Station Outage Manager. Main duties included the management of Eskom Sub-Contractors; ensured the full implementation of Eskom OHS guidelines, specifications and work instruction at site; coordinated activities of sub-contractors with respect to OHS, especially where interfaces are involved with other contractors or operational areas of the plant; advise site personnel on all aspects of OHS applicable to site; chairing safety meetings; investigations of near misses and incidents.

Site Environmental Health and Safety Officer

Basumi Safety: Pretoria

February 2011— August 2011

Construction

I was based full time on site working on the outfall sewer pipeline project for Ekurhuleni Metropolitan Municipality. Main duties included collection of data and information on environmental monitoring; ensuring contractors implement OHS and environmental monitoring programs in their respective work areas; enforcing compliance to EMP, environmental authorizations and other environmental and OHS specifications.; undertaking of monthly audits and presentation of audit findings on a monthly basis to the client.

Environmental Scientist

**Tshikovha Environmental Consulting:
Pretoria**

January 2009—February 2011

Consulting

I was a Senior Environmental Scientist whose main responsibilities were to compile Environmental Impact Assessments (EIA), Waste Licensing, Landfill Audits and Environmental Management Plans (EMP) reports; Writing of tender proposals; Coordination and the planning of monthly budgets; Provision of OHS services to clients in the construction industry; Undertaking of Water Use License Application (WULA) processes, Integrated Waste Management Plans (IWMPs) and mentoring junior employees and interns.

Provincial Environmental Officer

**Environmental Management Agency: Mutare;
Zimbabwe**

September 2007—December 2008

Government

As a Provincial Environmental Officer my main responsibilities was to ensure compliance with all the relevant Environmental Legislations and liaising with the Local Authorities to ensure that there is enforcement of environmental laws; Reviewing approval of EIA reports; Undertaking of environmental research with the assistance of donor funding; contribution in the compilation of strategic environmental and natural resources management reports and masterplans.

WASTE MANAGEMENT MASTER PLANS COMPLETED

- Integrated Waste Management Plan for Nkonkobe Local Municipality, 2011. (Project Manager),
- Integrated Waste Management Plan for Tokologo Local Municipality, 2012. (Project Manager)
- Integrated Waste Management Plan for Fetakgomo-Tubatse Local Municipality, 2018 (Project Manager)

ENVIRONMENTAL IMPACT ASSESSMENT PROJECTS FOR INFRASTRUCTURAL DEVELOPMENT.

- Environmental Impact Assessment and Environmental Management Plan for

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- Redwing Mine Gold Prospecting Project (2008). ZIMBABWE
- Environmental Impact Assessment and Environmental Management Plan for Surrey Mine 24 Milling Project (2007). ZIMBABWE
- Environmental Impact Assessment and Environmental Management Plan Coal Liquefaction Project (2008). ZIMBABWE
- Environmental Impact Assessment and Environmental Management Plan for Premium Gold Mine (2008). ZIMBABWE
- Power lines Environmental Assessment and Environmental Management Plan for Shinja-Nyanyadzi ZESA 3kV Power line (2007). ZIMBABWE
- Environmental Impact Assessment and Environmental Management Plan for Causeway Dam (2008). ZIMBABWE
- Environmental Impact Assessment and Environmental Management Plan for Marovanyati Dam (2008). ZIMBABWE
- Basic Assessment and Environmental Management Plan for Upgrading of Transnet's Lohatla Iron and Manganese Ore Loading Site (2009). SOUTH AFRICA
- Environmental Impact Assessment and Management Plan for Tokologo Bulk Water Supply, Tokologo Local Municipality (2009). SOUTH AFRICA
- Basic Assessment and Environmental Management Plan for Viljoenskroon Water and Wastewater Treatment Plants, Moqhaka Local Municipality (2009). SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for the Establishment of a Mixed Development for Agewell Investments in Aliwal North (2010). SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for a Mixed Development in Willowmore (2010). SOUTH AFRICA
- Basic Assessment and Environmental Management Plan for the Construction of Social Development Offices in Hendrina, Marapyane, Carolina, Ermelo and Kwa-Macqekeza (2009). SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for Black Diamond's Mixed Development in Marapyane (2010). SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for Sasol Gas Pipeline. SOUTH AFRICA
- Basic Assessment and Environmental Management Plan for the Upgrading of Kabokweni Stadium. SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for the Construction of Basuz Filling Station. SOUTH AFRICA
- Environmental Impact Assessment and Environmental Management Plan for the Constriction of Ethinma Filling Station. SOUTH AFRICA
- Basic Assessment and Environmental Management Plan for the Construction of an Access Road in Odinburg. SOUTH AFRICA
- Integrated Environmental Management Plan for Amajuba District Municipality (2010). SOUTH AFRICA
- Integrated Waste Management Plan for Tokologo Local Municipality (2011). SOUTH AFRICA
- Integrated Waste Management Plan for Nkonkobe Local Municipality (2011-2012). SOUTH AFRICA
- Integrated Environmental Management Plan for Xhariep District Municipality (2011-2012). SOUTH AFRICA
- Environmental Impact Assessment for a Bulk Water Supply Scheme for Phumelela Local Municipality, Phumelela Local Municipality (2011-2012). SOUTH AFRICA
- Basic Environmental Impact Assessment Process for Phumelela Waste Water Treatment Works, Phumelela Local Municipality (2010-2011). SOUTH AFRICA
- Environmental Rectification for Evaton Cemetery (2010). SOUTH AFRICA
- Amendment of Environmental Authorisation for Tokologo Bulk Water Supply Scheme, Tokologo Local Municipality (2010-2011). SOUTH AFRICA

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- Basic Environmental Impact Assessment Process for Establishment of LPG Tanks in Anchorville Extension 8 township, Lenasia, (2011). SOUTH AFRICA
- Environmental Impact Assessment for Cemetery Development on cemetery on portion 53 Vlaktefontein farm 546 IQ Vaal, (2011). SOUTH AFRICA

MINING AND EXPLORATION

- Gold Prospecting Environmental Management Plans for Victoblox Pty Ltd, (2012). SOUTH AFRICA
- Limestone Prospecting Environmental Management Plans for Thathong Development Consulting, (2012). SOUTH AFRICA
- Silverbank Environmental Impact Assessment and Environmental Management Plans for underground mining operation on the farm Silverbank 611 IR is (2012). SOUTH AFRICA
- Environmental Performance Report for African Brick Pty Ltd, 2012). SOUTH AFRICA
- Environmental Performance Report for Just Coal, (2012-2013). SOUTH AFRICA
- Revision of the Environmental Management Plan for Just Coal, (2012-2013). SOUTH AFRICA
- Mining Right Application for Matai Mining (Pty) Ltd (2018-2019). SOUTH AFRICA
- Exxaro Coal Central Mines Closure and Rehabilitation Reports (2018-2019). SOUTH AFRICA
- Exxaro Coal Prospecting Rehabilitation and Closure Process on Farm Van Wykspan 441 LQ and Farm Zonderwayer 442 LQ (2018). SOUTH AFRICA.

WASTE MANAGEMENT

- Waste Licence Application for Sephaku Cement Aganang Operations (2013). SOUTH AFRICA
- Basic Environmental Impact Assessment and Waste Licence Application for the closure of Komatipoort Waste Disposal Site (2014). SOUTH AFRICA
- Basic Environmental Impact Assessment and Waste Licence Application for the closure of

Thulamahashe Waste Disposal Site (2014). SOUTH AFRICA.

- Basic Assessment and Waste Licence Application for the operational of Pongola Landfill Site (2014). SOUTH AFRICA.
- Basic Assessment and Waste Licence Application for the Closure of Casteel Waste Disposal Site (2014). SOUTH AFRICA
- Basic Environmental Impact Assessment and Waste Licence Application for the Closure of Shatale Waste Disposal Site (2014). SOUTH AFRICA.
- Basic Environmental Impact Assessment and Waste Licence Application for the Closure of Grootvlei Waste Disposal Site (2014). SOUTH AFRICA.
- Basic Environmental Impact Assessment and Waste Licence Application for operational of Dullstroom Waste Disposal Site (2014). SOUTH AFRICA.

SAFETY, HEALTH AND ENVIRONMENTAL MONITORING FOR CONSTRUCTION PROJECTS

Zimbabwe

Construction of Shinja-Nyanyadzi ZESA 3kV Power line.

South Africa

- Sasol Gas Pipeline Construction.
- Upgrading of Kabokweni Stadium
- Construction of Benoni Lakeside Mall 1km Outfall Sewer Pipeline
- Construction of Benoni Dunswart Outfall 4.5km Outfall Sewer Pipeline
- Construction of Tokologo Bulk Water Supply Project



Registration No. 2019/727

Herewith certifies that
Gumisai Charles Chigurah
is registered as an
Environmental Assessment Practitioner

*Registered in accordance with the prescribed criteria of Regulation 15. (1)
of the Section 24H Registration Authority Regulations
(Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the
National Environmental Management Act (NEMA), Act No. 107 of 1998, as
amended).*

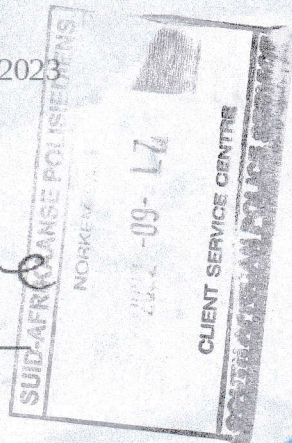
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Expires: 28 February 2023

Chairperson

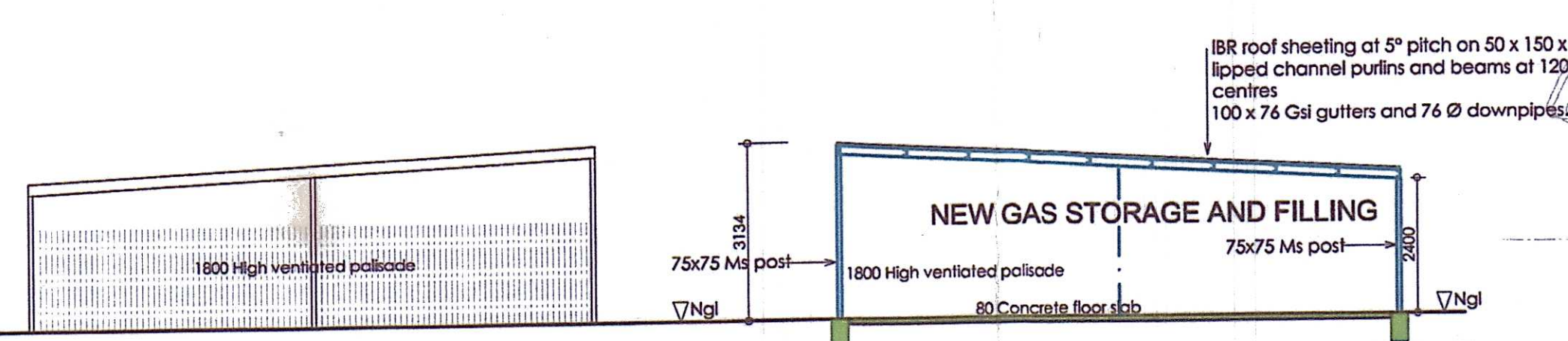
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MORMOCE SST

Registrar

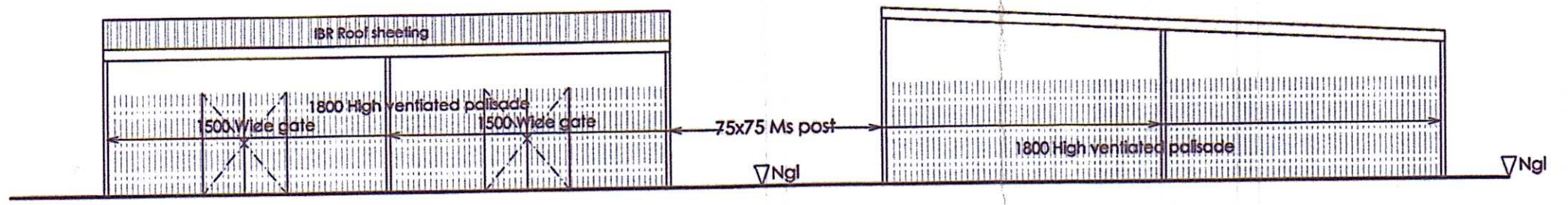


APPENDIX B: LAYOUT AND DESIGNS

DRAFT



WEST ELEVATION
Scale 1:100



NORTH ELEVATION
Scale 1:100

SECTION B-B
Scale 1:100

EAST ELEVATION
Scale 1:100

ELECTRICAL LEGEND

SYMBOL	DESCRIPTION
⊕	11W Compact fluorescent light fitting, ceiling mounted
⊖	11W Compact fluorescent light fitting, wall mounted
⊙	11W Compact fluorescent light fitting, wall mounted
⊗	3x6W Compact fluorescent light fitting, ceiling mounted
⊘	2x5W Fluorescent tube light fitting, ceiling mounted
⊙	4W LED recessed downlighter
⊙	250W LED High bay fitting

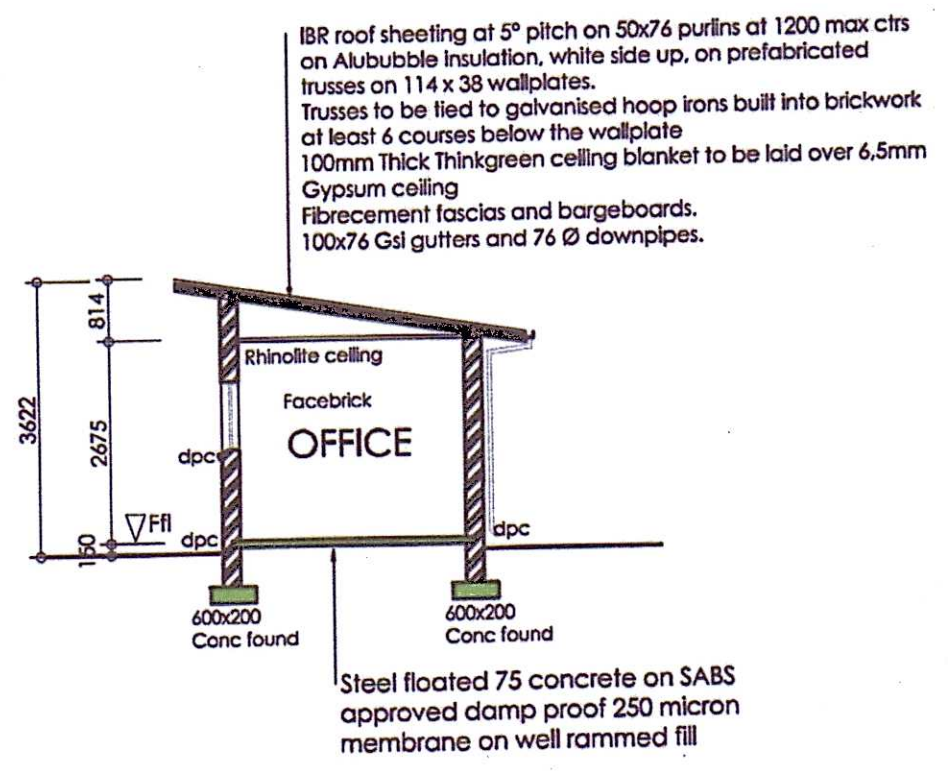
WATER LEGEND

SYMBOL	DESCRIPTION
—	15 Ø COLD WATER PIPE
—	15 Ø LAGGED HOT WATER PIPE
•	RISER PIPE (PLAN VIEW)
•	DROPPER PIPE (PLAN VIEW)
⊕	TAP EXTERNAL
⊕	STORAGE WATER HEATER (DOMESTIC)
⊕	SOLAR HEATER
⊕	HEATER PUMP
⊕	GAS FISH THROUGH GEYSER

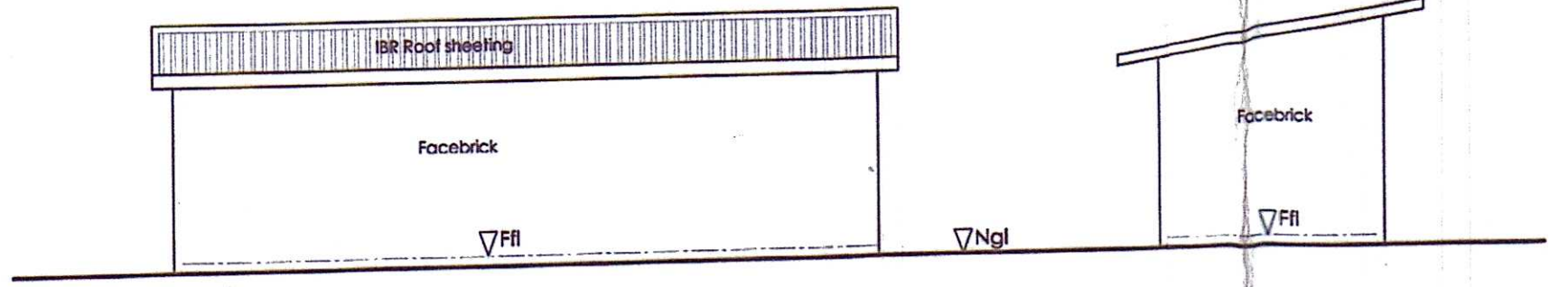
WINDOW SCHEDULE

Window number	WT1	WT2
Window specification	Steel	Steel
Catalogue number	NC2	NC1
Quantity	3 No	1 No
Glass	Single clear	Single clear

Glazing to comply with SANS 10400
Certificate of compliance to be supplied to local authority on completion

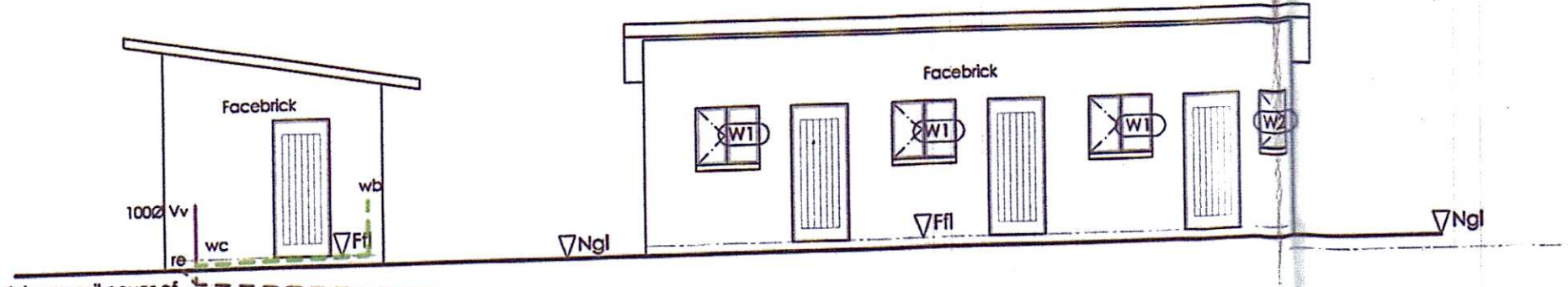


SECTION A-A
Scale 1:100



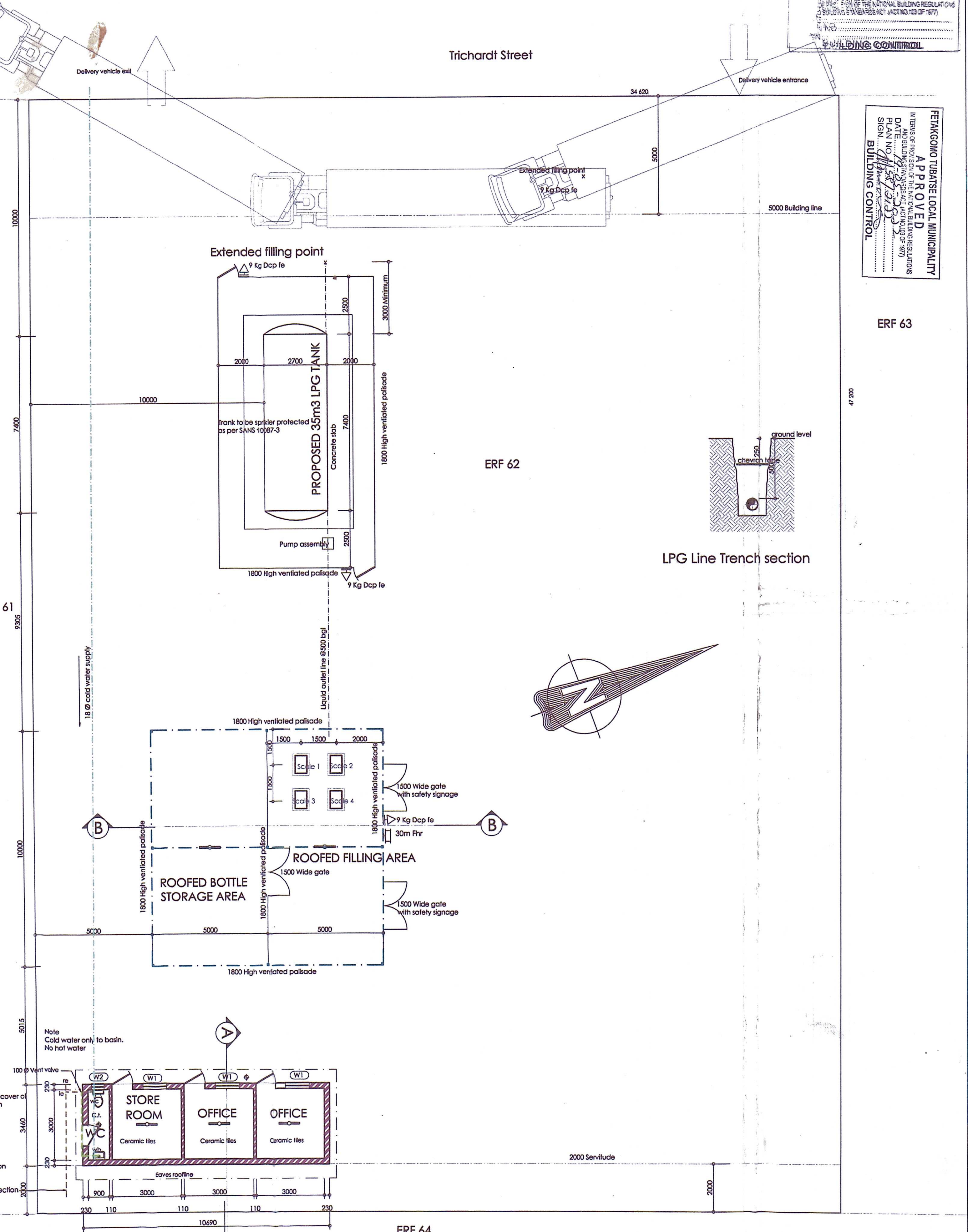
EAST ELEVATION
Scale 1:100

NORTH ELEVATION
Scale 1:100



SOUTH ELEVATION
Scale 1:100

WEST ELEVATION
Scale 1:100



SITE PLAN
Scale 1:100

APPROVED
DATE: 12/12/2013
SIGNATURE: [Signature]
BUILDING CONTROL

FETAKOANO TUBATSE LOCAL MUNICIPALITY
APPROVED
DATE: 12/12/2013
SIGNATURE: [Signature]
BUILDING CONTROL

NOTES

GENERAL:
All building work is to comply with SANS 10400
All dimensions and levels are to be checked on site before work commences. Any discrepancies are to be reported to Alan Gover or the client immediately.
Figured dimensions are to take precedence over scaled dimensions.

FOUNDATIONS:
All foundations to be min 600 x 200mm 20 Mpa concrete
Minimum ground cover over top of concrete 300mm

FLOORS:
Height of floor minimum 150 mm above natural ground floor.
Minimum thickness of floor slab to be 75 mm 20 Mpa concrete on SABS approved damp course on compacted hardcore filling in layers of 150 mm

BRICKWORK:
Brickwork to be built into the first four courses on foundations and above the floor slab, every fourth course thereafter and the top four courses below wallplate or concrete slab

DAMP PROOFING:
DPC required at slab level under all walls and under all window cills.

PLUMBING:
100 Ø PVC soil pipes at 1:60 minimum and 1:5 maximum fall.
Reseal traps to all waste fittings.
Roading eyes are required at the highest point of all lines and at all changes of direction greater than 45°.
Inspection eyes are required at all junctions.
No junctions permitted under buildings.
Drains passing under new buildings to be enclosed in 300 x 300 concrete
Minimum cover over drains 300mm

CEILING:
6.5 mm Rhinoboard nailed to 38 x 38 bracking at 500 max ctrs.
Baffle cover strips and 75mm gypsum comices.

STAIRS:
Treads minimum width 250 mm
Risers maximum height 200 mm

BALUSTRADING:
Handrail 50mm Ø at 1 000 above flt
Balusters at 100 max centres

NOTE!
Any deviation from the plan in any way, especially regarding energy efficiency, may result in the Certificate of Occupancy not being issued. If in doubt, contact Alan Gover 082 335 4959, email agover@mweb.co.za

NOTE!
This drawing and design is the property of Alan Gover and is intended solely for the use of the person or company to whom it is issued. In no event or circumstance shall it be copied or loaned without the express permission of Alan Gover

COVERAGE SCHEDULE

OFFICES	37 m ²
BOTTLES	100 m ²
TOTAL	137 m ²
STAND	1634 m ²
COVERAGE	8,4%

OWNERS SIGNATURE
[Signature]

ALANGOVER BUILDING DESIGN

Client: Red Gas
Proposed LPG tank and cylinder storage and filling area
Erf number: 62
Suburb: Ohrigstad

Architectural Technologist
SACAP registration: T 0367
Cell: 082 335 4959
Email: agover@mweb.co.za

Client: Red Gas
Proposed LPG tank and cylinder storage and filling area
Erf number: 62
Suburb: Ohrigstad

Plan, Sections, Elevations, Energy Efficiency & Site plan

Design	A.G.	Plan no.	Sheet	Rev
Drawn	A.G.	22-06	1	0
Checked	A.G.			

GENERAL NOTICE PLACED AT THE ENTRANCE:
Business certificate of registration:
RED GAS REFILL STATION,
Reg: 2019/297589/07

Address :
ON ERF 62, TRICHARD ROAD,
OHRIGSTAD

Contact Person In case of emergency:
Owner: Elphas 065 802 4575
Office: 072 472 8199
Email: redgasipg@outlook.com
No. 9 First Road, Vulcania, Brakpan, 1554,
South Africa

Name (substance identification): LPG,
LIQUIFIED PETROLEUM GAS (L.P.G.)
Storage type: Bulk Capacity 35 000L
(LPG)Above-Ground Storage vessels.
Statement: Installation to be tested as per

Number of People/Workers:.....

Site Safety Officer:.....

First Aid teams:.....

Emergency Evacuation drills dates:.....2Times a
year:.....

Control Room Exist and Alarm system are
provided

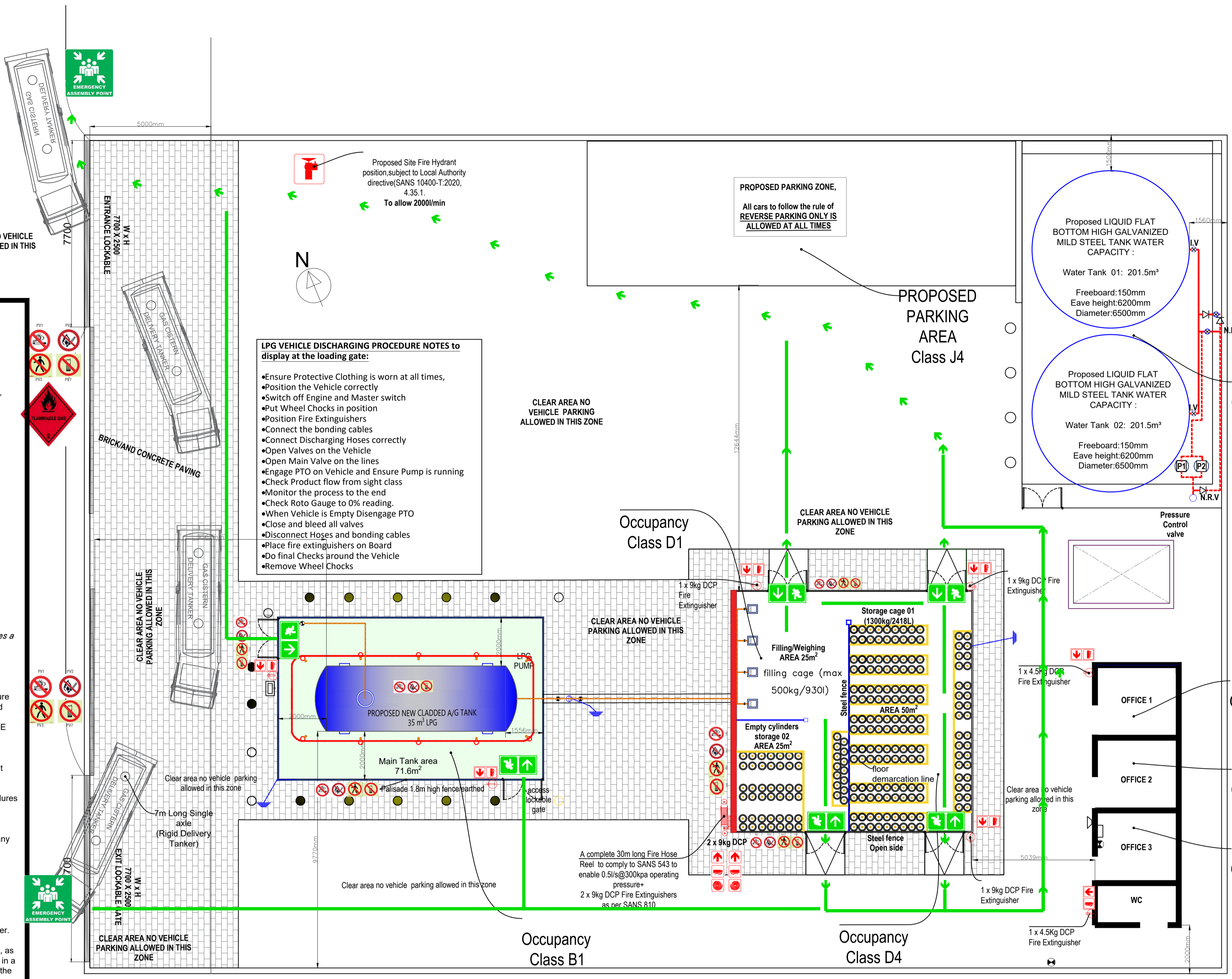
Requirements of the Vessels Under Pressure
Regulations of the Occupational Health and
Safety Act, 1993 (Act No. 85 of 1993).
Hazard identification: HIGHLY FLAMMABLE
CLASS 2
LPG flash point: -104°C
Cylinders can explode if involved in a fire.
LPG can cause cold burns to the skin and it
can act as an asphyxiant at high
concentrations.
Safety measures and safe-handling procedures to
follow. (See fire notes).
Accidental release measures.
No person may without the authority of the
owner or person in charge, enter or allow any
other person to enter the premise.

ALL TO BE PLACED IN A YELLOW

A comprehensive service record of all
firefighting equipment and any other
appropriate service installations should be
ready upon request by the designated officer.

An EEP (Emergency Evacuation Plan) box, as
described in Annexure IV shall be installed in a
prominent position at the main entrance of the
premises.

Site Fire Plan Scale:1:100



LPG VEHICLE DISCHARGING PROCEDURE NOTES to display at the loading gate:

- Ensure Protective Clothing is worn at all times,
- Position the Vehicle correctly
- Switch off Engine and Master switch
- Put Wheel Chocks in position
- Position Fire Extinguishers
- Connect the bonding cables
- Connect Discharging Hoses correctly
- Open Valves on the Vehicle
- Open Main Valve on the lines
- Engage PTO on Vehicle and Ensure Pump is running
- Check Product flow from sight glass
- Monitor the process to the end
- Check Roto Gauge to 0% reading,
- When Vehicle is Empty Disengage PTO
- Close and bleed all valves
- Disconnect Hoses and bonding cables
- Place fire extinguishers on Board
- Do final Checks around the Vehicle
- Remove Wheel Chocks

SYMBOLIC SAFETY SIGNS
PV1, PV2, PV3, PV7

GENERAL FIRE PROTECTION NOTES:

EMERGENCY ACTIONS

- If possible shut off the source of spillage.
- evacuate area. post notices "NO NAKED LIGHTS - NO SMOKING".
- Prevent liquid or Vapour from entering sewers and work pits.
- Keep cylinders or Bulk Vessels Cool by spraying with water if exposed to fire.
- If tanker has overturned, do not attempt to right or move it.

Contact:
1) RedGas Refilling:(Elphas): 065 802 4575 / 072 472 8199
2) Tubatse Fire Department, Burgersfort: 013 231 8962
3) EMS Groblersdal, Tel: 013 262 7300 / 0800330022

PROTECTIVE CLOTHING

- Self contained breathing apparatus. safety gloves and shoes, or boots, should be worn when handling containers.

ENVIRONMENTAL PRECAUTIONS.

- Vaporized liquefied petroleum gas is heavier than air and could form pockets of oxygen-deficient Atmosphere in low lying areas.

FIRE FIGHTING EQUIPMENT

- Provision to fire fighting to be according to the National Building Regulations.
- Extinguisher to be provided at the Entrance of the storage enclosure,
- A 230mm wall at boundary wall is 4 hours rated

SPECIFIC HAZARDS

- The rupturing of cylinders or bulk containers due to excessive exposure to fire could result in a BLIVE (boiling liquid expanding vapour explosion), with disastrous effects. as the flammability limits in the air for the main constituents of liquefied petroleum gas vary between approximately 2 and 11% by Vol, extreme care must be taken when handling leaks.

FIRE PLAN/ ESCAPE ROUTE

LEGEND:

- EXIT (01-05)
- EXIT (06-10)
- EXIT (11-15)
- EXIT (16-20)
- EXIT (21-25)
- EXIT (26-30)
- EXIT (31-35)
- EXIT (36-40)
- EXIT (41-45)
- EXIT (46-50)
- EXIT (51-55)
- EXIT (56-60)
- EXIT (61-65)
- EXIT (66-70)
- EXIT (71-75)
- EXIT (76-80)
- EXIT (81-85)
- EXIT (86-90)
- EXIT (91-95)
- EXIT (96-100)

GENERAL FIRE PROTECTION NOTES:

- All work must comply to the National Building Regulations and Building Standards Act No. 103 of 1977
- All bulk must be done according to OHS Act 85 of 1993 and any regulations made under the Act, SANS 10087 part 3, and the provision of NBR and building standards Acts 1977.
- Standard application to fire installation referred to SANS 10400-T:2020
- All sizes and safety distances to be checked on site and to be in compliance with SANS 10087-Part 1, Edition 6, 2013
- The full installation of the LPG must comply with the following standards:
- SANS 10087 Part 3 & 7 and emergency services Bylaws at all times
- ISO 7225, Gas cylinders - precautionary labels.
- SANS 1186-1, Symbolic safety signs - Part 1: Standard Signs and general requirements.
- SANS 10006, Color marking and identification of gas cylinders and anaesthetic apparatus.
- SANS 10019 (SABS 019), Transportable metal containers for compressed gas - basic design, manufacture, use and maintenance.
- SANS 10142-1, The wiring of premises - Part 1: low-voltage installations.
- SANS 10228, The identification and classification of dangerous goods for transport.
- SANS 10263-0, The warehousing of dangerous goods - general requirements.
- SANS 10400 (SABS 0400), The application of the national building regulations.
- All safety distances must comply with SANS 10087
- An area of at least 3m around the LPG Tank.
- Filling and storage cages must be kept clear of combustible materials
- 9kg DCP Fire Extinguishers must be supplied and installed in the full respect to SANS 810, and its position to be well indicated
- This installation is subject to Local Authority Sekhukhune District Municipality Emergency Management Services Fire Safety Division approval and Registration
- All mandatory fire equipment to be present and maintained
- Area around bottle plant to be kept clearly of flammable materials
- All electrical work to comply with SANS 10108
- Gas facility should be kept locked and only authorized competent person will be given access to it
- No drain is allowed within 2m
- No electrical equipment is allowed within 5m from the facility
- All building work and safety distances to comply with SANS 10400
- All safety and warning notices to be displayed as per SANS 1186
- Only qualified person is allow to load or discharge the bottles from or to the storage

CONCRETE SPECIFICATION

- All foundation and slab to be casted in virgin ground and be inspected by the Civil Engineer, 30-35MPa higher concrete slab to be used for the tank and 21-29MPa for the storage area.
- Top foundation to be at least 300mm below NGL unless other indicated by drawing.
- Drainage of water used for fire protection and firefighting purposes must be controlled. Water-sealed interceptors shall be fitted, where necessary, to prevent LPG entering the storm water drains and sewers

CAPACITY ON SITE:

- 35 m³ ABOVE-GROUND "CLADDED" LPG TANK,
- LPG CYLINDER FILLING CAGE (Max 500kg/930L),
- AND STORAGE CAGE (1300kg/2418L)

FIRE FIGHTING MEASURES FOR GAS INSTALLATION

- Extinguish media
- Do not extinguish fire unless the leakage can be stopped.
- Do not use water jet.
- Use dry chemical, CO₂ or Foam.

REGD GAS REFILL STATION
REGD GAS

Reg: 2019/297589/07

CLIENT NAME:
CLIENT SIGNATURE:

RED GAS LPG REFILL STATION
redgasipg@outlook.com
065 802 4575 / 072 472 8199
No. 9 First Road, Vulcania, Brakpan, 1554, South Africa
elphas@thole@live.com

CONSULTANT:

J E C M A D I
Consulting Engineers

19, Duvenhage Road, Kempton X5
Po Box: 3821, Halfway House
Tel: 011 394 0767 / Cell: 0730554050
Email: info@jecmadi.co.za
www.jecmadi.co.za

PROJECT NAME AND ADDRESS: ON ERF 62, TRICHARD ROAD, OHRIGSTAD

PROPOSED NEW 35 m³ ABOVE GROUND "CLADDED" LPG TANK, LPG CYLINDER FILLING CAGE (Max 500kg/930L), AND STORAGE CAGE (1300kg/2418L)

PROJECT TITLE: PROPOSED SITE FIRE PLAN

Date: 18-August 2022 Design /Dwg.T. Nsenga
Paper size: A1 Scale: 1:100 Rev: B Signature:.....
Drawing No: JCM-022-FP-045-001
Drawing Issued for: COUNCIL SUBMISSION

GENERAL FIRE NOTICE TO PLACE AT THE ENTRANCE:

For storage vessels of capacity exceeding 9 000 L, a soil investigation to determine the expected overall and differential settlements shall be carried out before installation. Differential settlement between the two ends shall not exceed 0.4 % of the length of the storage vessel. The storage vessel shall be placed on a slope of 1,0 % with the drain point at the lower end to facilitate drainage of the vessel.

Above-ground storage vessels and all pipework, including coating materials and their application shall be corrosion protected. These readings shall be reviewed by a competent person and shall be done to the test requirements of the Vessels Under Pressure Regulations of the Occupational Health and Safety Act, 1993 (Act No. 85 of 1993).

There shall be acceptable drainage to deal with water used for fire protection and firefighting purposes. Water-sealed interceptors shall be fitted, where necessary, to prevent LPG entering the stormwater drains and sewers




Google Site View of ERF 62, Trichard Road, Ohrigstad. (NTS)

APPENDIX C: MHI REPORT

DRAFT

TITLE PAGE

Company name	Redgas	
Contact persons at the company	Elphas Sithole	
Contact details	elphassithole@live.com Cell 061 549 1680	
Facility or installation name and physical address	Redgas Trichardt Street; Ohrigstad	
Geographic location of the installation	S 24.749834 E 30.562102	
Type of risk assessment	Existing installation; 5-year review	
	Proposed / new installation	X
	Existing, modified installation	
Date of site survey	5 August 2022	
Date of risk assessment	5 August 2022 – 7 August 2022	
Date of report	7 August 2022	
Risk assessor	Dr Alfonso Niemand Nature & Business Alliance Africa (Pty) Ltd 	
Contact details of risk assessor	25 Hanepoot Crescent Protea Heights; Brackenfell Tel 083 225 4426 alfonso@yebo.co.za	
Report reference number	MHI-655/22	
Classification of site	MHI	



Nature & Business Alliance Africa (Pty) Ltd
MHI Risk Assessors



MHI-0004

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MHI Risk Assessment 655 for Redgas Ohrigstad 7 Aug 2022
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CONTROL PAGE

Date of last revision of this report	7 August 2022
Names of persons present during MHI site survey	Unoccupied site Site layout plan
Reference numbers for previous risk assessments of the installation	None. New development.
National Chief Inspector of Department of Employment and Labour	Dumisa.Manana@labour.gov.za
Provincial Chief Inspector of Department of Employment and Labour	Phaswane.Tladi@labour.gov.za
Emergency Services of local authority	sekinfo@sekhukhune.co.za

SANAS INDEMNITY

Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

TABLE OF CONTENTS

Section	Subject	Page No
-	Executive summary	4
-	Table of Appendices	10
-	Acronyms and definitions	11
1.	Introduction	15
2.	Descriptions	19
3.	Hazard identification	25
4.	Hazard analysis	27
5.	Consequence analysis	31
6.	Frequency analysis	82
7.	Risk calculations	88
8.	Conclusions	97
9.	Emergency response data	103
10.	Proof of competency	105
11.	References and bibliography	110
12.	Appendices	112

EXECUTIVE SUMMARY

- Redgas requested a quantitative assessment of the MHI risks associated with its proposed bulk LPG storage and cylinder filling facilities in Trichardt Street, Erf 62 in Orighstad, Sekhukhune Municipality. Nature & Business Alliance Africa (Pty) Ltd has been appointed for this purpose.

The identification of different hazardous installations or materials within the premises are given in the table below:

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

Conclusions

1) Summary of the acceptability of the risks

Frequency, deaths/person/year		Site assessment
<u>Public</u>		
Intolerable	>1.0 E-4	
Tolerable	1.0 E-4 to 1.0 E-6	X
Broadly acceptable	<1.0 E-6	
<u>Employees</u>		
Intolerable	>1.0 E-3	
Tolerable	1.0 E-3 to 1.0 E-5	X
Broadly acceptable	<1.0 E-5	
<u>Graph of ALARP</u>		
Intolerable		
Tolerable with mitigation (ALARP)		
Acceptably low		X

2) General

The Occupational Health and Safety Act (Act 85 of 1993) defines a major hazard installation as “an installation-

where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident”.

The Explanatory Notes on the Major Hazard Installation Regulations issued in April 2005 by the Chief Directorate of Occupational Health and Safety of the Department of Employment and Labour explains the following:

“What is important here is to know that there are two reasons that can determine when an installation is a major hazard installation (MHI). The first reason is when there is more than the prescribed quantity of a substance. The quantities and type of substances are prescribed in the General Machinery Regulation 8 and its Schedule A, on notifiable substances. The second reason is where substances are produced, used, handled, or stored in such a form and quantity that it has the potential to cause a major incident. The important issue is the potential of an incident and not whether the incident is a major incident or not. The potential will be determined by the risk assessment.

A major incident means an occurrence of catastrophic proportions, resulting from the use of plant or machinery, or from activities at a workplace. It is impossible to put a specific value to “catastrophic” because it will always differ from person to person and from place to place. However, when the outcome of a risk assessment indicates that there is a possibility that the public will be involved in an incident, then the incident can be seen as catastrophic”.

3) Classification of the facility

The facility is classified as a major hazard installation, because a major incident at the site will impact members of the public outside the boundaries of the premises.

4) Temporary installations

The LPG delivery road tankers are classified as an MHI while it is on the site.

5) Hazardous installations identified within the premises

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters	-	35 000 liters every 2 weeks	35 000 liters

MHI Risk Assessment 655 for Redgas Ohrigstad 7 Aug 2022

Draft Copy Not for Submission to Authorities

				Aboveground			
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

6) Hazardous scenarios analysed

A total of 26 hazard scenarios were identified and analysed in this report.

7) Maximum extent of the 1% consequence-based lethality effect zone from major hazards (refer to Table 7.1)

The probit value for thermal radiation exposure from an LPG BLEVE or jet fire confirms that 1% fatalities could occur at a thermal radiation flux of 12.5 kW/m². This thermal radiation flux corresponds with an impact distance of 327 meters.

The probit value for overpressure exposure from an LPG VCE confirms that 1% fatalities could occur at an overpressure of 2 psi at a safe separation distance of 240 meters.

8) Level of risk posed by the facility to various populations

There are no developing conflicts for this site at the time of the risk assessment. The site is surrounded by commercial, agricultural and industrial developments. These developments will be affected by a BLEVE on either the LPG storage tank or the LPG delivery road tanker. The medium-density residential area 220 meters from the site would be impacted in case of a major incident at the site.

9) Suggestions for risk reduction including preventative and mitigative measures

- a) The site layout plan, approved by the local fire department, must be available on site.
- b) No cellular telephones may be used at the LPG storage tank or road tanker.
- c) An emergency management plan must be compiled for the site and signed by the owner or operator of the installation. The plan must contain an emergency evacuation procedure aimed at workers and visitors. It must be updated at least annually in collaboration with the emergency services of the local municipality.
- d) The emergency plan must be updated when personnel changes or contact details occurs, in accordance with the guidelines given in this report.
- e) Operating procedures for the site must be kept up to date to include preventative measures against the uncontrolled release of the following hazardous substances:
 - LPG from the delivery road tanker.
 - LPG from a storage tank.

- e) The LPG delivery road tankers must not reverse on site unless a watchman is available all the time.
- f) The LPG road tankers must be inspected when it comes onto the site, for possible overheated tyres, smell of heated rubber, product leaks, overheated clutch or other defects that can place the site at risk of fire.
- g) Customer and staff parking bays must be located in an area where public vehicles will not cause obstruction to emergency vehicles.

10) Technical uncertainties

- The meteorological conditions for Polokwane weather station have been taken as applicable to the site.
- Wind direction is highly variable, not limited to a specific vector coordination, and may change at any time.
- Population density was taken from the Statistics SA 2011 census and could have changed since then.

11) Sensitivities

- Development around the site will change continuously as new opportunities for land use arise. These future developments may change the population densities around the site.

12) Organisational requirements

- a) The site layout plan, approved by the local fire department, must be kept on site.
- b) The national Chief Inspector of the Department of Employment and Labour must be notified about the MHI status of the site.
- c) The provincial Chief Inspector of the Department of Employment and Labour must be notified about the MHI status of the site.
- d) The local Fire Department must be notified about the MHI status of the site.

e) A permanent warning sign must be installed at the entrance to the site, as follows:



e) The outcome of the risk assessment must be brought to the attention of all the employees at the site.

f) A Maintenance Plan must be compiled and kept up to date for all the hazardous equipment used on the facility. The Plan must contain at least the following:

- List of all equipment and facilities on the facility.
- Maintenance frequency.
- Particulars of maintenance activities that must be performed on the listed equipment.
- Responsible person.

g) All hazardous equipment and facilities on the facility must be inspected on a regular basis by means of an Inspection Register. The Register must contain at least the following:

- List of all equipment and facilities on the facility.
- Equipment items that must be inspected.
- Facilities that must be inspected.
- Areas that must be inspected.
- Inspection findings.
- Responsible person who carried out the inspection.

h) All authorised operators must be trained in the application of the operating procedures applicable to their jobs.

i) All operating personnel at the facility must be made aware and kept aware of the dangers involving LPG.

j) The facility must remain under safety and security access control for 24 hours per day. If a security guard is employed, he/she must comply with the following requirements:

- The guard must be trained in the potential major incidents that could occur at the site as well as the emergency procedure that must be followed.
- The guard must be linked via SMS or cellular phone with a responsible standby person at the site.
- The guard must be able to contact the local Fire Department immediately.

k) The Emergency Management Plan and Emergency Evacuation Procedure must be tested at least once every 12 months by means of mock emergencies. The local emergency services must be invited to participate in these tests.

l) Prior to any construction work on site, the local office of the Department of Employment and Labour must be notified in writing, in accordance with the Construction Regulations of the Department of Employment and Labour.

m) No modifications may be made to the facilities on site unless an MHI risk assessment has been done beforehand.

n) Train all staff in emergency preparedness for an LPG leak, in collaboration with the local fire department.

13) Biophysical and socio-economic environmental concerns

- a) Pollution of the air in case of an LPG leak.
- b) Soil and water pollution in case of a petrol or diesel spillage.
- c) Water effluent from the deluge system may contain oils and grease that will end up in the stormwater run-off system and will pollute soil and surface water systems.
- d) Frequent venting of LPG would scare birdlife away from the site and surrounding habitat.
- e) Noise levels at the site may be disturbing to neighbouring businesses.
- f) A fire on site may spread to adjacent grass lands and residential areas may and destroy indigenous vegetation.

14) Impact on residential and high-population units

- Residential units within 627 meters from the site would be impacted in case of a major incident on the LPG storage tank or delivery road tanker.
- Manufacturing, commercial and retail units around the site would be impacted in case of a major incident on the LPG storage tank or delivery road tanker.

15) Land zoning

The owner/operator of the MHI must first ensure that the site is zoned for industrial use.

TABLE OF APPENDICES

Appendix 1	Raw data collected on site during the site survey
Appendix 2	Case study
Appendix 3	Table of notifiable substances; General Machinery Regulations
Appendix 4	Site emergency response plan
Appendix 5	Meteorological conditions
Appendix 6	Safety data sheets (SDS)
Appendix 7	Inspection protocol
Appendix 8	Societal and individual risk criteria
Appendix 9	Selected failure data from BEVI and HSE

TABLE OF ACRONYMS AND DEFINITIONS

AG	Aboveground
AIChE	American Institute of Chemical Engineers, USA
AIHA	American Industrial Hygiene Association
ALARP	As low as reasonably practicable
ALOHA	Areal Locations of Hazardous Atmospheres
Baseline risk assessment	A quantitative assessment of the safety risks associated with a particular major hazard installation, irrespective of the organisational mitigation measures implemented at the installation.
BEVI	Netherlands: <i>Besluit externe veiligheid inrichtingen</i> (Decree on safety of devices)
BLEVE	Boiling liquid expanding vapour explosion
BP	Boiling point
CASRN	Chemical abstracts service registry number
CCPS	Centre for Chemical Process Safety, USA
CCTV	Closed circuit television
CFD	Computational fluid dynamics
d/p/yr	Deaths per person per year (individual risk measure)
EIA	Environmental impact assessment
EPA	Environmental Protection Agency, USA
ERPG-1	<p>values estimate the concentrations at which most people will begin to experience health effects if they are exposed to a hazardous airborne chemical for 1 hour. Sensitive members of the public—such as old, sick, or very young people—are not covered by these guidelines and they may experience adverse effects at concentrations below the values. A chemical may have up to three ERPG values, each of which corresponds to a specific tier of health effects. It is developed by the American Industrial Hygiene Association is used by the US National Oceanic and Atmospheric Administration</p> <p>ERPG-1 is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without</p>

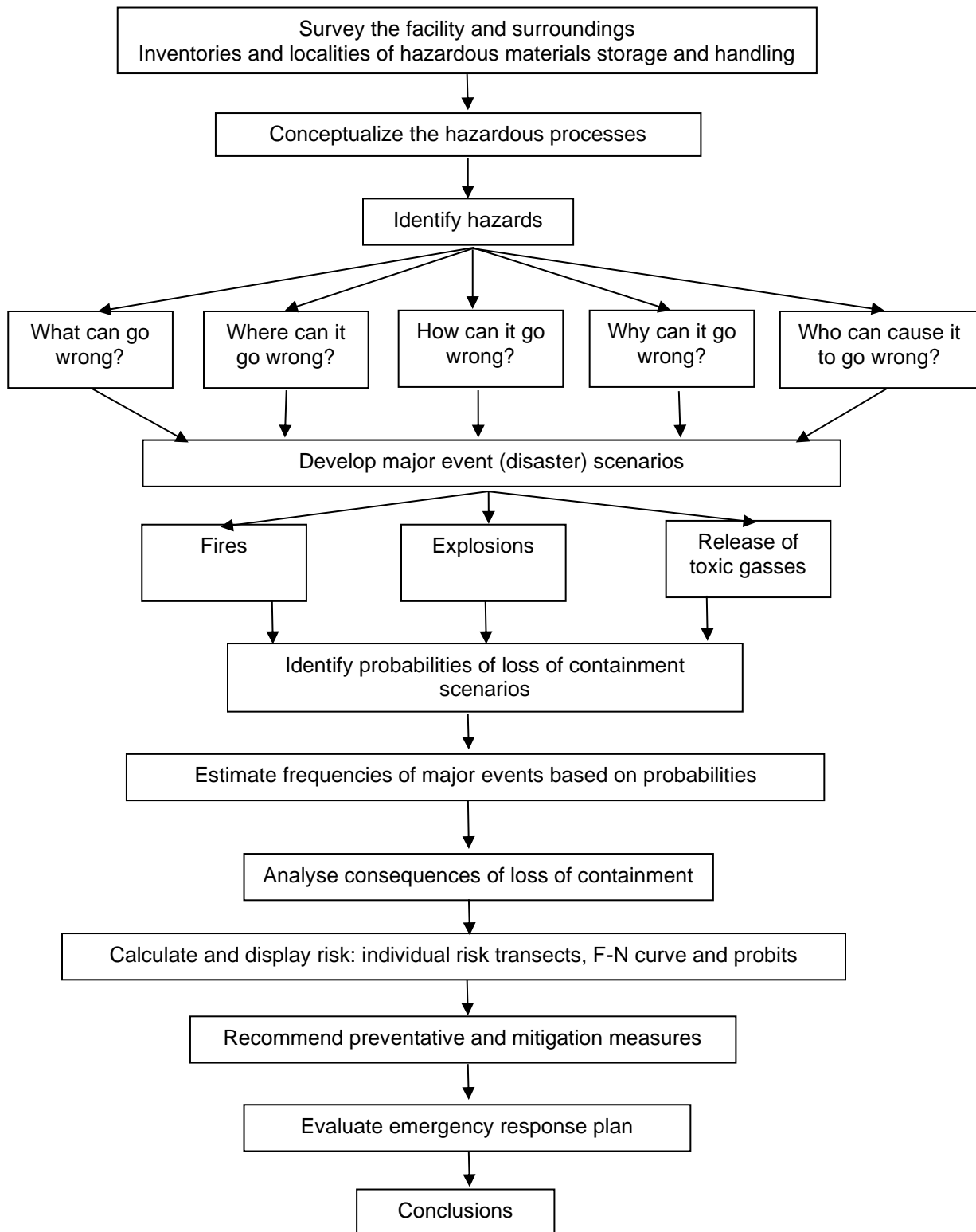
	experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odor.
ERPG-2	ERPG-2 is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.
ERPG-3	ERPG-3 is the most serious maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.
Event	An occurrence (a condition or situation) that is caused by a fault and that can trigger a major incident. This is best explained by means of an example: A leak in a storage tank that contains a flammable liquid is an event. The leak was caused by corrosion (the fault). If the leaking liquid is set alight, a fire will start, which would be a major incident, because it can cause injury or death due to thermal radiation or an explosion.
FMECA	Failure mode effect and criticality analysis
FP	Flash point
HAZAN	Hazard analysis
Hazardous equipment or facility	Equipment, facility, or machinery, that can create an occurrence (incident), which can be fatal, disastrous, or pose a definite threat to the health and lives of employees and members of the public.
HAZID	Hazard identification
Human impact	The effect that a major incident could have on human beings, whether they are present inside the facility or whether they are present beyond the facility boundaries within the surrounding community, including minor injury, major injury and fatality and the destructive effect on assets.
Diesel	Heavy fuel oil or heavy furnace oil
IBC	Intermediate bulk container
ERPG	Immediately dangerous to life or health. It is defined by the US National Institute for Occupational Safety and Health as exposure to airborne contaminants that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from such an environment.

IZ	Inner zone
LFO	Light fuel oil
LOC	Loss of containment
LOPA	Layer of protection analysis
LPG	Liquefied petroleum gas
Major incident	An occurrence of catastrophic proportions, resulting from the use of facility or machinery, or from activities at a workplace. A “catastrophic occurrence” is interpreted [28] as an occurrence (incident), which can be fatal, disastrous, of definite threat to the health and lives of employees and members of the public. It is important to note that human lives (injury, fatal or not) as well as assets (damage) are included in this definition.
MHI	Major hazard installation
MOP	Mean operating pressure
MZ	Middle zone
NIOSH	US National Institute for Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration, USA
OHS Act	Occupational Health and Safety Act, 1993 (Act 85 of 1993)
OZ	Outer zone
PAC	Protective action criteria. These are essential components for planning and response to uncontrolled releases of hazardous chemicals. These criteria, combined with estimates of exposure, provide the information necessary to evaluate chemical release events for the purpose of taking appropriate protective actions to save lives. PAC values are inter alia based on the exposure limit values.
PADHI	Planning advice for developments near hazardous installations
Probit function	Mathematical probability unit function. The probit function is a statistical analysis method based on a binary response, such as death or no death, because of a specified threatening major incident. It is used, inter alia, for the modelling of major incidents

	that can cause human fatalities and is usually based on a linear probability regression estimate (probit) equation.
PRV	Pressure relieve valve
PSM	Process safety management
QRA	Quantitative risk assessment
Residual risk assessment	A quantitative assessment of the safety risks associated with a particular major hazard installation, after successful implementation of all organisational mitigation measures, assuming that these measures are infallible.
SANAS	South African National Accreditation System
SCBA	Self-contained breathing apparatus
SLOD	Significant likelihood of death
SLOT	Specified level of toxicity
TNT	Trinitrotoluene
UG	Underground
UK HSE	United Kingdom's Health and Safety Executive
VCE	Vapour cloud explosion
Zones	Zones in this report refer to the various circular safety distances from a major hazard installation and are classified as inner zone, middle zone, and outer zone. These zone classifications are used by the local authority to advise against or don't advise against a particular new development that is planned near an existing major hazard installation.

1 Introduction

1) The following quantitative risk assessment algorithm was followed:

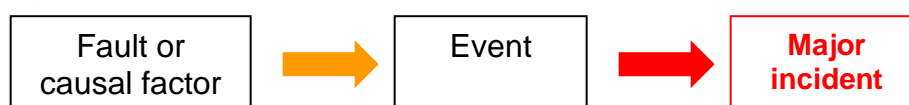


- 2) This risk assessment focuses on the requirements of the Major Hazard Installation Regulations R.692 of 30 July 2001 issued in terms of the Occupational Health and Safety Act (Act No 85 of 1993) and SABS Standard SANS 1461:2018 Edition 1.
- 3) The risk assessment does not address the following aspects:
 - The storage and use of radioactive materials. The National Nuclear Regulatory Act (Act No 47 of 1999) governs this aspect.
 - The environmental impacts that the facility, or part of it, could have on the biophysical and socio-economic environment. The National Environmental Management Act, 1998 (Act No 107 of 1998) and the related EIA regulations govern this aspect.
 - Future development of residential, commercial, industrial, or recreational areas around the site.
 - Future modifications that may be made to the pipeline and related equipment.
- 4) Scope of the risk assessment: This major hazard installation risk assessment has been conducted against the requirements of the following legal prescriptions:
 - The Major Hazard Installation (MHI) Regulations of 2001 under the Occupational Health and Safety Act, 1993 (Act 85 of 1993).
 - South African Bureau of Standards 1461:2018 Edition 1, Major Hazard installation – Risk Assessments.
 - The following hazardous materials are included in this risk assessment:
- 5) Legal aspects:
 - a) Nature & Business Alliance Africa (Pty) Ltd conducts its risk assessments in accordance with a quality manual that complies with the requirements of the ISO/IEC-17020 Standards for Various Bodies Performing Inspections. Nature & Business Alliance Africa (Pty) Ltd is accredited by the South African National Accreditation System (SANAS) as a Type A Major Hazard Risk Installation Inspection Body (accreditation number MHI-0004).
 - b) Nature & Business Alliance Africa (Pty) Ltd is registered by the Department of Employment and Labour as an Approved Inspection Authority (AIA) for toxic, flammable, and explosive substances (registration number MHI-0002).
 - c) This risk assessment specifically pertains to the facilities assessed in this report. Modifications or alterations made to the site, equipment, facilities or operating procedures and parameters after completion of this risk assessment are not covered by the assessment outcomes and are explicitly excluded. Nature & Business Alliance Africa (Pty) Ltd will not be liable for damage to any assets, injury to any persons or the death of any person as a direct result of the activities of the client or the client's subcontractors, before, during and after the requested risk assessment has been conducted.

- d) The risk assessment conducted by Nature & Business Alliance Africa (Pty) Ltd and the related findings are based on the circumstances, external factors and conditions that prevailed at the time when the study was conducted.
- e) The risk assessment, related reports and all recommendations must not be interpreted as automatic safeguards against an incident that could lead to damage, injury or death and Nature & Business Alliance Africa (Pty) Ltd does not accept liability for such damage, injury or death.
- f) Nature & Business Alliance Africa (Pty) Ltd retain copyright of this report. No part of the report may be copied or reproduced in any format without written approval from the author. If any part of the report is to be used for other work by another party, clear reference must be made to Nature & Business Alliance Africa (Pty) Ltd as the owner and copyright holder of the report.
- g) It is declared that Nature & Business Alliance Africa (Pty) Ltd did not allow any form of external influencing of this assessment results, conclusions and recommendations, including undue time constraints imposed on the author, bribery, incentives offered to personnel and alterations made to this report. The submission of any draft report to the client does not grant the client the opportunity or the right to alter the findings, conclusions, or recommendations in its favour in any way, without sound substantiation.
- h) Nature & Business Alliance Africa (Pty) Ltd and Alfonso Niemand (the author) in particular, declare that the organization and its personnel are not related to the client or to its employees or contractors for this assignment. It is declared that the risk assessment report and the findings are unbiased and was not influenced by any commercial, financial, or other pressures imposed on the organization or the author.
- i) All information disclosed to us by the client or its contractors, are treated as confidential. The information contained in this study report will also be treated as confidential and will not be disclosed by the author to any party other than the client.
- j) This report is valid for a period of 5 years, in accordance with the Major Hazard Installation Regulations, 2001.

6) Methodologies used:

- a) Causal analysis and international failure data (BEVI and AIChE) were applied to determine the frequency of an event (fault) that could eventually lead to a major incident.
- b) An event-tree analysis method was applied to determine the potential major incidents that could be the end result of the event, with its frequency. The logic is explained as follows:



- c) The frequency of occurrence of a major incident was calculated, based on analysis of international historical data for similar incidents. Similar data does not exist for South African industry.
- d) The toxicity, flammability and explosivity potential of liquid and gas releases were evaluated by means of internationally accepted mathematical modeling techniques [1, 2, 3 and 18].
- e) Toxic releases were modeled by means of the ALOHA mathematical dispersion model [3] of the Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) of the USA.
- f) Heat radiation flux caused by a fire was simulated by means of the equations proposed by *Mudan* and *Groce* [1, p243].
- g) The overpressure blast effects of vapour cloud explosions and solid explosions were simulated by means of the trinitrotoluene (TNT) equivalency methods described by *Baker et al*, *Decker*, *Lees* and *Stull* [1, p174].
- h) Meteorological tendencies at the site were taken into consideration.
- i) Individual and societal risks were assessed, based on the frequencies of major incidents, minimum safety distances and the predicted number of potential fatalities.
- j) The occurrence and effect of a boiling liquid expanding vapour explosion (BLEVE) was modeled based on work done by the Centre for Chemical Process Safety of the American Institute of Chemical Engineers.
- k) The frequency of occurrence of a major incident was calculated based on analysis of international historical data for similar incidents in Europe and the USA. Similar data does not exist for South African industry.

2 Descriptions

1) Company's main activities and products

Redgas proposes to install a bulk LPG tank of 35 000 liters aboveground in Orighstad. The LPG product is used to fill cylinders at a filling platform.

2) Land zoning

IMPORTANT: It is the responsibility of the owner/operator of this site to confirm the zoning classification of the site with the local authority. It falls outside the scope of this report.

3) Non-technical process description

- Redgas receives LPG from road tankers (capacity 45 000 liters) and stores it in one aboveground tank.
- Road tankers deliver on average 17 000 liters per week to the site. LPG is used to fill cylinders.

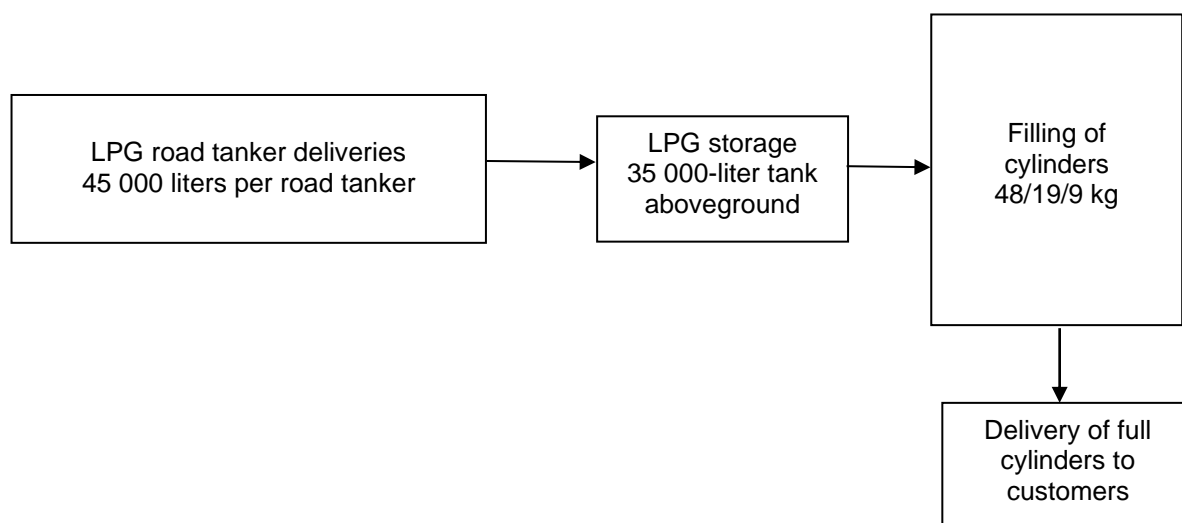


Figure 2.1: Conceptual process description

4) Number of employees on site

The maximum total number of employees, contractors and visitors on site are as follows:

- Dayshift: 4 comprising employees and contractors in peak time.
- Nightshift: 1 security guard.
- Work hours: 06:00 – 18:00.

5) Hazardous materials inventory on site

Table 2.1: Hazardous material inventory

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg



Figure 2.1: Aerial view of the site

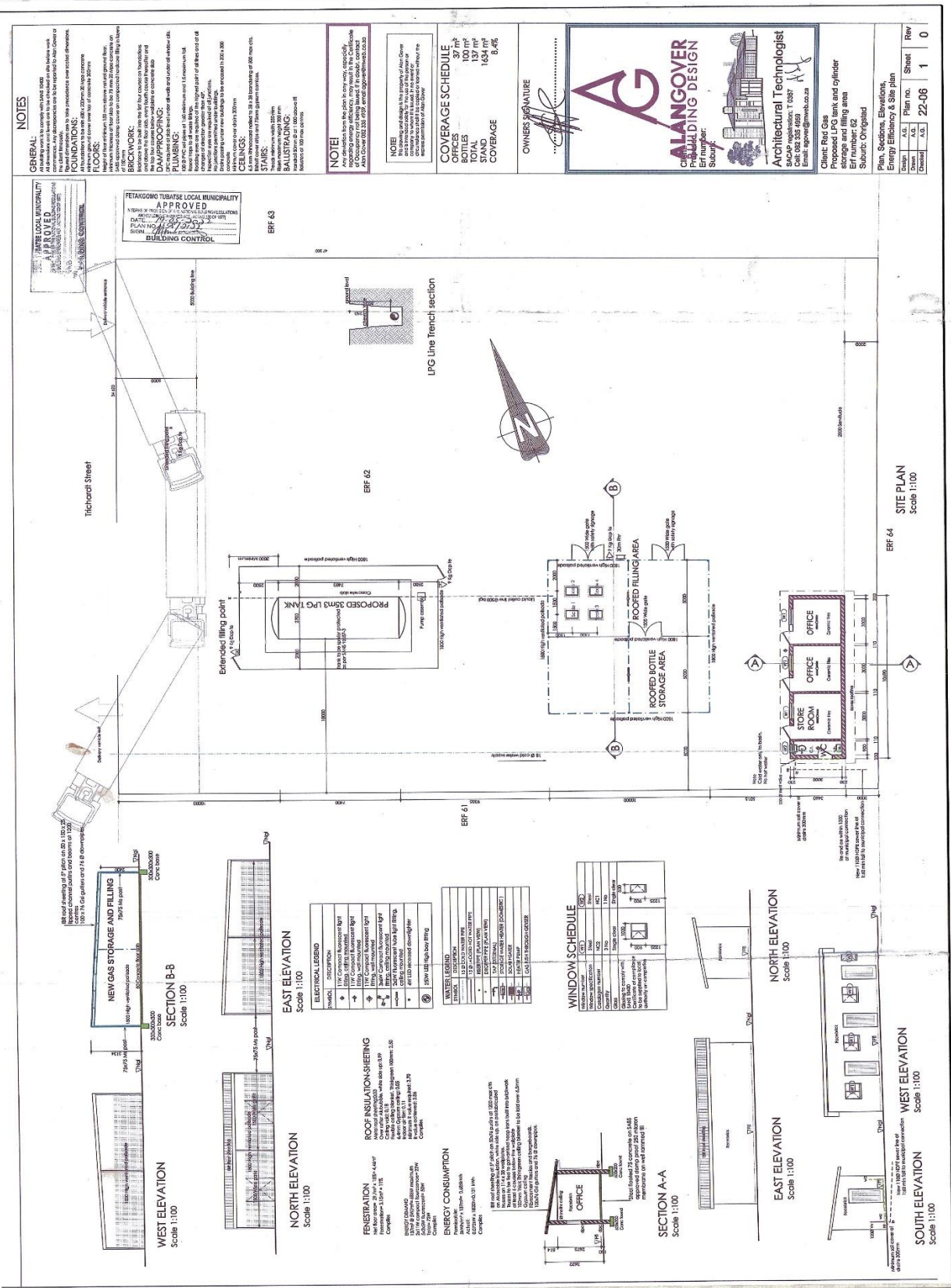


Figure 2.2: Site layout plan

Details of neighbouring facilities including other hazardous installations in the vicinity, sources of additional risk (for example, flight paths, natural hazards) and vulnerable developments/sensitive receptors



No	Description	Distance, m
1	Shed. Vacant stand.	55
2	Two sports fields.	100
3	Residential. medium density.	225
4	Agricultural crops. Shed.	45

Figure 2.3: Aerial view of adjacent facilities

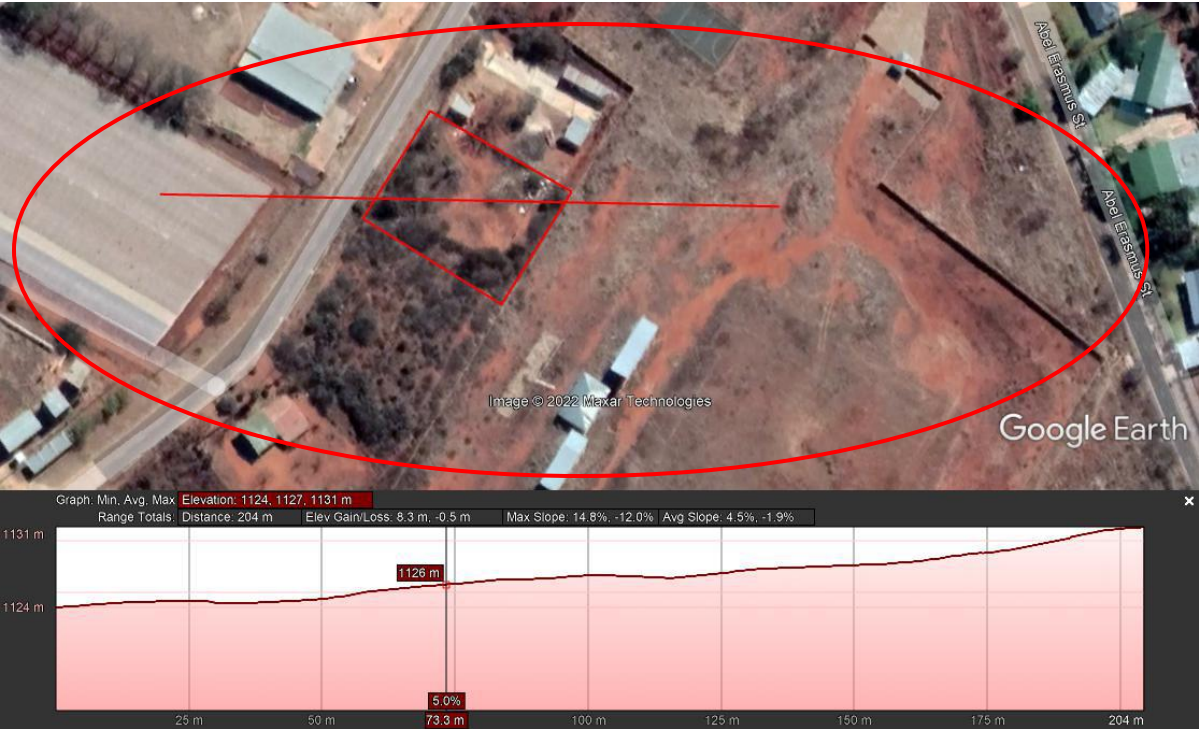
6) Relevant local meteorology

SA Weather station	Wind direction toxic cloud	Wind speed m/s	Wind calm %	Precipitation mm	Cloud cover %	Ambient temperature °C
Polokwane	NE	11	39	500	10	18-20

Lightning: 3 to 4 strike per square kilometer (10^6 m²) per year.

7) Relevant topography of the area (red ovals indicate qualitatively where heavy gas and smoke may settle during wind-still times; not to scale)

Elevation from East (R) to West (L)



Elevation from North (L) to South (R)

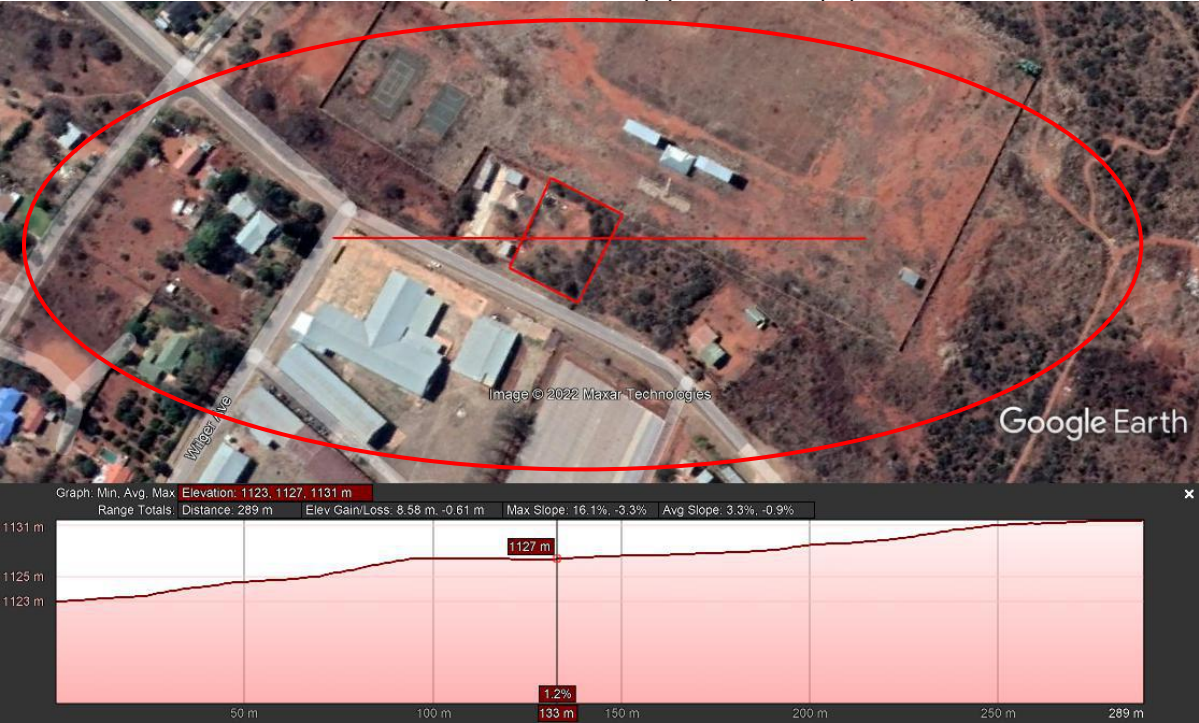


Figure 2.4: Topography of the site

3 Hazard identification

- 1) Inventory of hazardous materials on site: (Name, UN/CASRN number, inventories, through-put (or batches) and maximum release quantities, SANS 10228 category)

Table 3.1: Hazardous material inventory

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

- 2) The relevant physical, chemical, and toxicological characteristics of the materials, mixtures, reactions; both under normal and foreseeable abnormal conditions

Table 3.2: Characteristics of the hazardous materials

Item	Name	Characteristics
1	LPG	<ul style="list-style-type: none"> • Jet fire • BLEVE on road tanker only; not storage tank • VCE

- 3) Key reactions especially any exothermic reactions or reactive chemicals

None.

- 4) License restrictions (for example, flammables)

The bulk storage and use of LPG on the premises is notifiable to the local emergency services who must issue a certificate for it.

5. Significant accidents and incidents that have occurred at the installation with lessons learned and measures implemented to prevent re-occurrence

None recorded.

6. Major accidents and incidents at related facilities or with related materials (case study)

Refer to Appendix 2.

7. Containment systems for analysis (major equipment considering control systems and blocking systems)

- The LPG storage tank is cladded to prevent a BLEVE.
- The LPG storage tank is equipped with an overpressure relief valve.
- The LPG storage tank is equipped with an emergency shut-off valve.

8. Description of safety systems, equipment and devices used for prevention and mitigation of major incidents

- The site is under security surveillance for 24 hours per day.
- An emergency response plan will be available.
- Flammable materials such as wood are not stored near the LPG tank.
- Fire water is available from municipal supply at 4 barg.
- Safe operating procedures must be compiled for all operations on site.
- All employees on site must be trained in their jobs.
- All employees on site must be trained in the execution of the emergency response plan.
- A break-away valve is fitted on the LPG road tanker hoses.
- The site is covered by CCTV system linked to a central control room.
- LPG cylinder valves are sealed with steam, not with an electric shrinking tool.

4 Hazard analysis

1. Minimum scenarios to be modelled for each containment system

The minimum scenarios to be identified and modelled are listed in Table 4.1 below, in accordance with SANS 1461:

Table 4.1: Mandatory minimum scenarios to be modelled

Equipment type	Scenario
A Fixed storage or processing units classified as pressure vessels (for example, reactors, storage spheres) and pressurized transport units (for example, pressurized road tankers, cylinders)	1) Catastrophic rupture with instantaneous failure (including a boiling liquid expanding vapour explosion (BLEVE where applicable). 2) Entire contents released in 10 min or large hole in the processing unit (a large hole is typically the size of the largest appurtenance on the processing unit). 3) Small hole in vessel (leak typically 10 mm diameter). 4) Pressure safety valve release (if applicable).
B Fixed storage or processing units at atmospheric pressure or lower (for example, tank, blending vessels) and atmospheric transport units (for example, standard road tankers, intermediate bulk containers (IBCs))	1) Catastrophic rupture (with bund overtopping if necessary). 2) Entire contents released in 10 min or large hole in the processing unit (a large hole is typically the size of the largest appurtenance on the processing unit). 3) Small hole in vessel (leak typically 10 mm diameter). 4) Overfilling (if applicable).
C Pipe, hose, arm (onsite pipelines)	1) Pipeline, hose, arm full bore rupture. 2) Small hole in pipeline, hose, arm (typically a leak with effective diameter of 10 % to 50 % of the pipeline diameter).
D Pipe (cross country pipelines) (refer also to Clause 7 of this standard)	1) Pipeline full bore rupture. 2) Small hole in pipeline (leak as in accordance with Clause 5).
NOTE If the scenarios given in this table are not in the risk assessment, justification for its exclusion should be provided in the assessment report.	

2. The hazard scenarios applicable to the site

The hazard scenarios applicable to this site are shown in Table 4.2.

Table 4.2: Hazard scenarios at the site

1	BLEVE on tank; 37,5 kW/m ²	Thermal
2	BLEVE on tank; 12,5 kW/m ²	Thermal
3	LPG tank VCE on LPG storage tank; full release; 5 psi	Overpressure
4	LPG tank VCE on LPG storage tank; full release; 2 psi	Overpressure
5	LPG tank VCE from 50-mm hole LPG; 5psi	Overpressure
6	LPG tank VCE from 50-mm hole LPG; 2psi	Overpressure
7	LPG tank VCE from 10-mm hole LPG; 5psi	Overpressure
8	LPG tank VCE from 10-mm hole LPG; 2psi	Overpressure
9	LPG road tanker BLEVE; 37,5 kW/m ²	Thermal
10	LPG road tanker BLEVE ; 12,5 kW/m ²	Thermal
11	LPG road tanker VCE; full release; 5 psi	Overpressure
12	LPG road tanker VCE; full release; 2 psi	Overpressure
13	LPG road tanker VCE from 50-mm hole LPG; 5psi	Overpressure
14	LPG road tanker VCE from 50-mm hole LPG; 2psi	Overpressure
15	LPG road tanker VCE from 10-mm hole LPG; 5psi	Overpressure
16	LPG road tanker VCE from 10-mm hole LPG; 2psi	Overpressure
17	LPG tank and pipeline jet fire; 50-mm; 37,5 kW/m ²	Thermal
18	LPG tank and pipeline jet fire; 50-mm; 12,5 kW/m ²	Thermal
19	LPG tank and pipeline jet fire; 10-mm; 37,5 kW/m ²	Thermal
20	LPG tank and pipeline jet fire; 10-mm; 12,5 kW/m ²	Thermal
21	LPG tank and pipeline jet fire; 25-mm (50%); 37,5 kW/m ²	Thermal
22	LPG tank and pipeline jet fire; 25-mm (50%); 12,5 kW/m ²	Thermal
23	LPG tank and pipeline jet fire; 0,5-mm (1%); 37,5 kW/m ²	Thermal
24	LPG tank and pipeline jet fire; 0,5-mm (1%); 12,5 kW/m ²	Thermal
25	LPG cylinder BLEVE; 48 kg; 37,5 kW/m ²	Thermal
26	LPG cylinder BLEVE; 48 kg; 12,5 kW/m ²	Thermal

3. Hazard scenarios modelled in this assessment

The hazard scenarios that were modelled and analysed in this assessment are shown in Table 4.3.

Table 4.3: Hazard scenarios modelled in this assessment

1	BLEVE on tank; 37,5 kW/m ²
2	BLEVE on tank; 12,5 kW/m ²
3	LPG tank VCE on LPG storage tank; full release; 5 psi
4	LPG tank VCE on LPG storage tank; full release; 2 psi
5	LPG tank VCE from 50-mm hole LPG; 5psi
6	LPG tank VCE from 50-mm hole LPG; 2psi
7	LPG tank VCE from 10-mm hole LPG; 5psi
8	LPG tank VCE from 10-mm hole LPG; 2psi
9	LPG road tanker BLEVE; 37,5 kW/m ²
10	LPG road tanker BLEVE ; 12,5 kW/m ²
11	LPG road tanker VCE; full release; 5 psi
12	LPG road tanker VCE; full release; 2 psi
13	LPG road tanker VCE from 50-mm hole LPG; 5psi
14	LPG road tanker VCE from 50-mm hole LPG; 2psi
15	LPG road tanker VCE from 10-mm hole LPG; 5psi
16	LPG road tanker VCE from 10-mm hole LPG; 2psi
17	LPG tank and pipeline jet fire; 50-mm; 37,5 kW/m ²
18	LPG tank and pipeline jet fire; 50-mm; 12,5 kW/m ²
19	LPG tank and pipeline jet fire; 10-mm; 37,5 kW/m ²
20	LPG tank and pipeline jet fire; 10-mm; 12,5 kW/m ²
21	LPG tank and pipeline jet fire; 25-mm (50%); 37,5 kW/m ²
22	LPG tank and pipeline jet fire; 25-mm (50%); 12,5 kW/m ²
23	LPG tank and pipeline jet fire; 0,5-mm (1%); 37,5 kW/m ²
24	LPG tank and pipeline jet fire; 0,5-mm (1%); 12,5 kW/m ²
25	LPG cylinder BLEVE; 48 kg: 37,5 kW/m ²
26	LPG cylinder BLEVE; 48 kg: 12,5 kW/m ²

4) Description of specific postulated causes for the various major hazard scenarios or groups of scenarios

- LPG storage tank

- Mechanical damage to the tank or pipe work.
- Workers not trained in the operation of the tank, pump, valves, and filler pipe.
- Poor maintenance of the tank such as corrosion protection, flange integrity, valve integrity, pump and seal and pipe integrity.
- Degradation of the tank from internal and external corrosion and negligence with regard to tanker inspections.

- Human error with regard to maintenance or operation.
- Operation of equipment beyond design parameters such as overfilling of the tank.

- LPG road tanker
 - Road tanker or horse on fire when it enters the site, due to overheated clutch or brakes.
 - Mechanical damage to the tanker or pipe work.
 - Workers not trained in the operation of the delivery tanker, pump, valves, and filler pipe.
 - Poor maintenance of the tanker such as corrosion protection, flange integrity, valve integrity, pump and seal and pipe integrity.
 - Degradation of the tanker from internal and external corrosion and negligence with regard to tanker inspections.
 - Human error with regard to maintenance or operation.
 - Operation of equipment beyond design parameters such as overfilling of the road tanker at the supply depot.
 - Road tanker collisions on site with other vehicles or stationary objects.

- LPG cylinders
 - Damage to cylinder valve.
 - Corrosion on cylinder, internal or external.
 - Cylinders not inspected when they come on site.
 - Cylinders bumping against one another to create sparks.

5 Consequence analysis

1) Relevant key process data for each major hazard scenario

Refer to the raw data in Annexure 1 and the model inputs below.

2) Indication of scenarios for consequence analysis and those included in the calculation of risk

<i>Data transfer from iPad to report</i>	<i>Checked</i>
<i>Data transfer from report to software</i>	<i>Checked</i>

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

SA Weather station	Wind direction toxic cloud	Wind speed m/s	Wind calm %	Precipitation mm	Cloud cover %	Ambient temperature °C
Polokwane	NE	11	39	500	10	18-20

a) BLEVE on tank; 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 18.9 tons

Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 150 meters

Burn Duration: 10 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 164 meters --- (37.5 kW/(sq m))

Orange: 302 meters --- (12.5 kW/(sq m))



b) BLEVE on tank; 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 18.9 tons Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 150 meters

Burn Duration: 10 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 164 meters --- (37.5 kW/(sq m))

Orange: 302 meters --- (12.5 kW/(sq m))



c) LPG tank VCE on LPG storage tank; full release; 5 psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 18.9 tons Tank is 100% full

Circular Opening Diameter: 100 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 1 minute

Max Average Sustained Release Rate: 286 kilograms/sec

(averaged over a minute or more)

Total Amount Released: 17,146 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

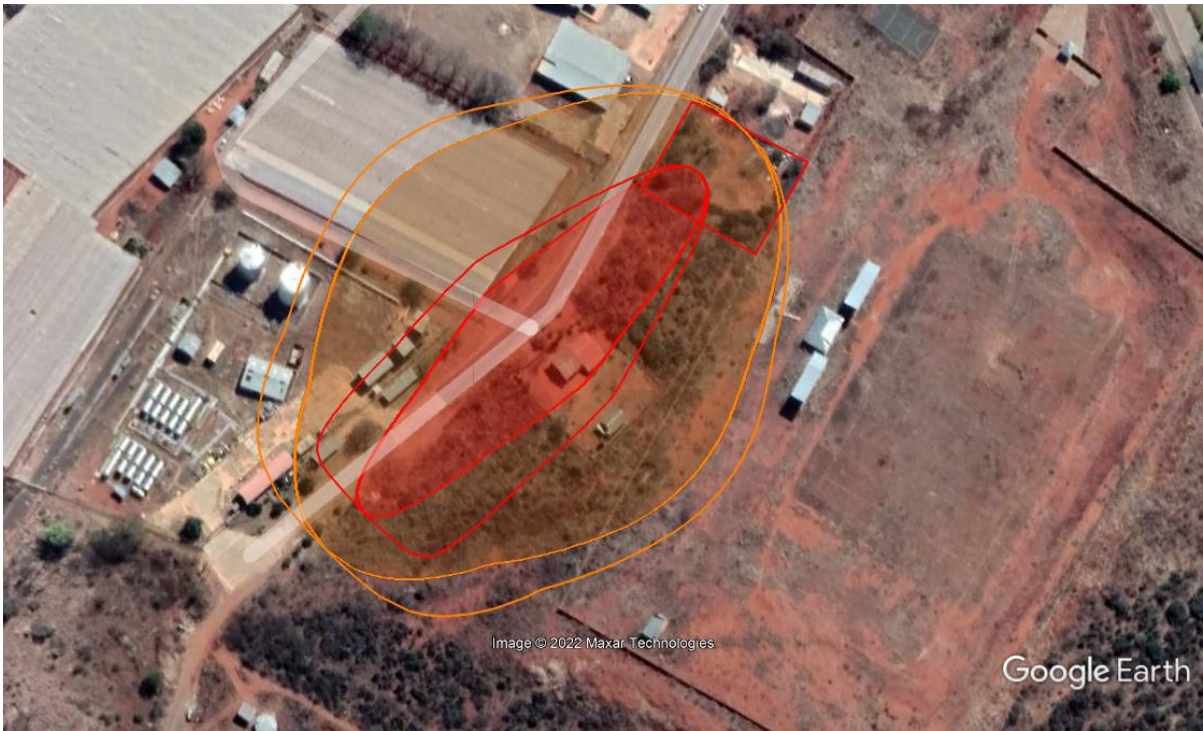
Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 190 meters --- (5 psi)

Orange: 212 meters --- (2 psi)



d) LPG tank VCE on LPG storage tank; full release; 2 psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 18.9 tons Tank is 100% full

Circular Opening Diameter: 100 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 1 minute

Max Average Sustained Release Rate: 286 kilograms/sec

(averaged over a minute or more)

Total Amount Released: 17,146 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

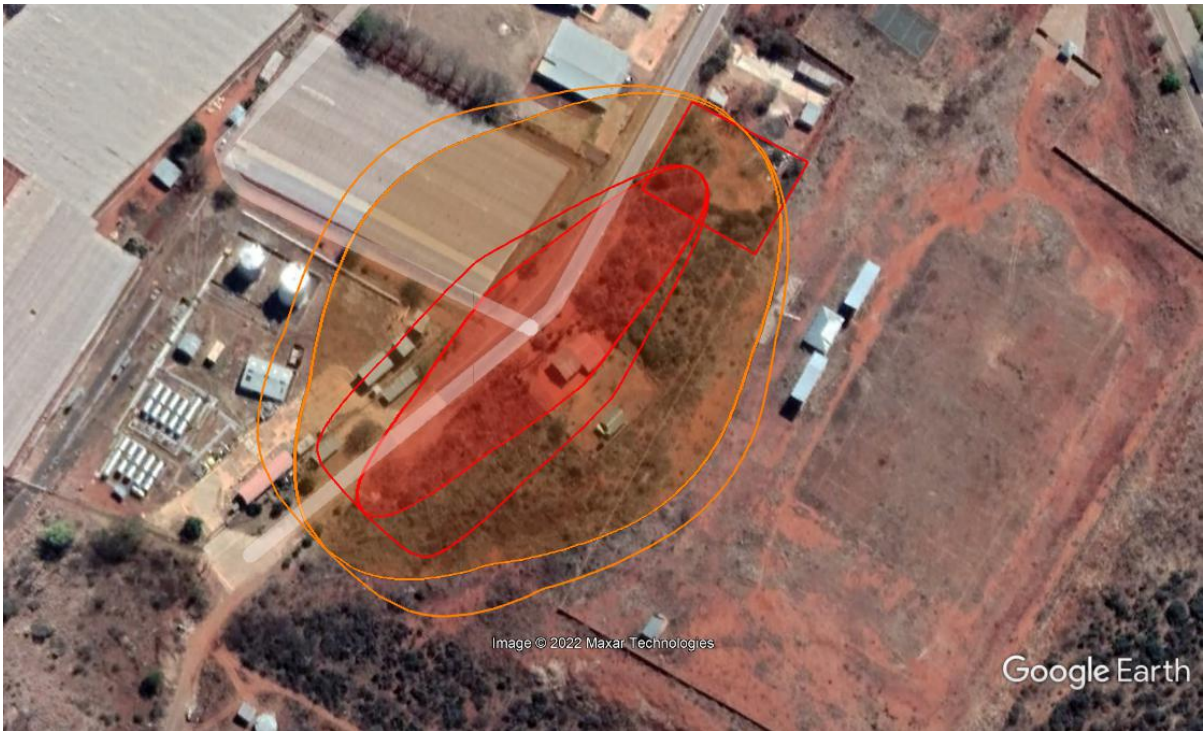
Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 190 meters --- (5 psi)

Orange: 212 meters --- (2 psi)



e) LPG tank VCE from 50-mm hole LPG; 5psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 17,187 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 9 minutes

Max Average Sustained Release Rate: 2,090 kilograms/min

(averaged over a minute or more)

Total Amount Released: 17,186 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 48 meters --- (5 psi)

Orange: 64 meters --- (2 psi)



f) LPG tank VCE from 50-mm hole LPG; 2psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 17,187 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 9 minutes

Max Average Sustained Release Rate: 2,090 kilograms/min

(averaged over a minute or more)

Total Amount Released: 17,186 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 48 meters --- (5 psi)

Orange: 64 meters --- (2 psi)



g) LPG tank VCE from 10-mm hole LPG; 5psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 17,187 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 84.3 kilograms/min

(averaged over a minute or more)

Total Amount Released: 5,013 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 11 meters --- (5 psi)

Orange: 17 meters --- (2 psi)



h) LPG tank VCE from 10-mm hole LPG; 2psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 7.13 meters

Tank Volume: 35000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 17,187 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 84.3 kilograms/min

(averaged over a minute or more)

Total Amount Released: 5,013 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 11 meters --- (5 psi)

Orange: 17 meters --- (2 psi)



i) LPG road tanker BLEVE; 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 163 meters

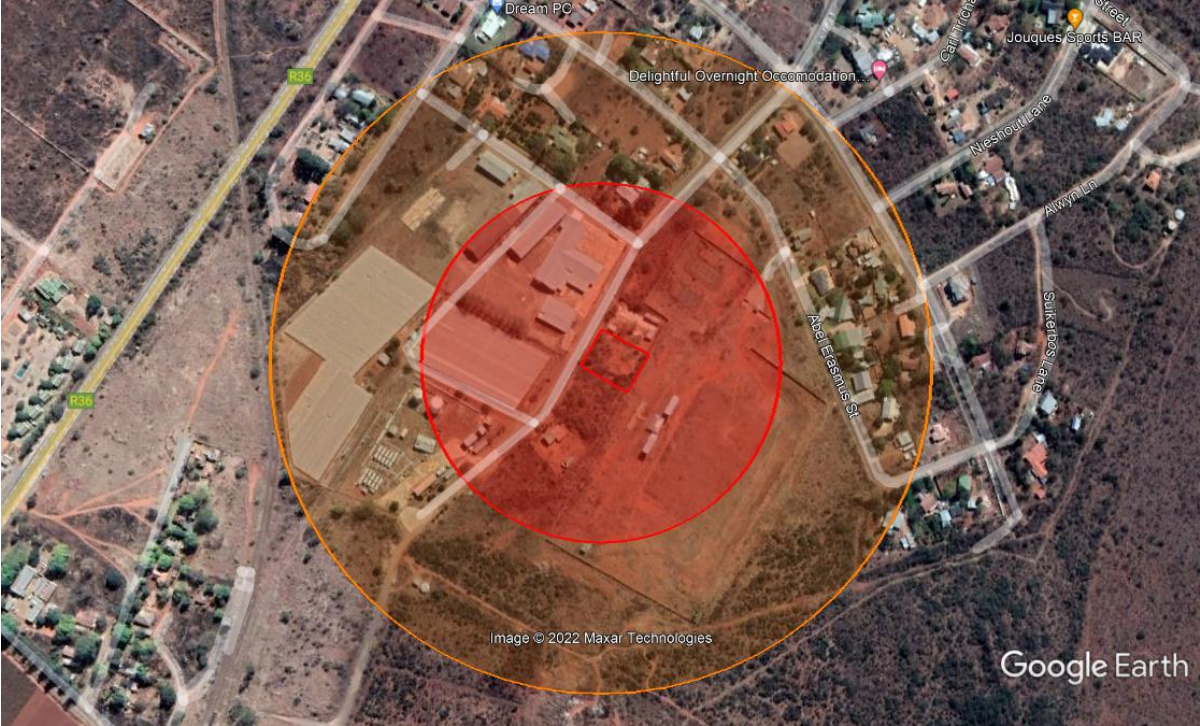
Burn Duration: 11 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 178 meters --- (37.5 kW/(sq m))

Orange: 327 meters --- (12.5 kW/(sq m))



j) LPG road tanker BLEVE ; 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

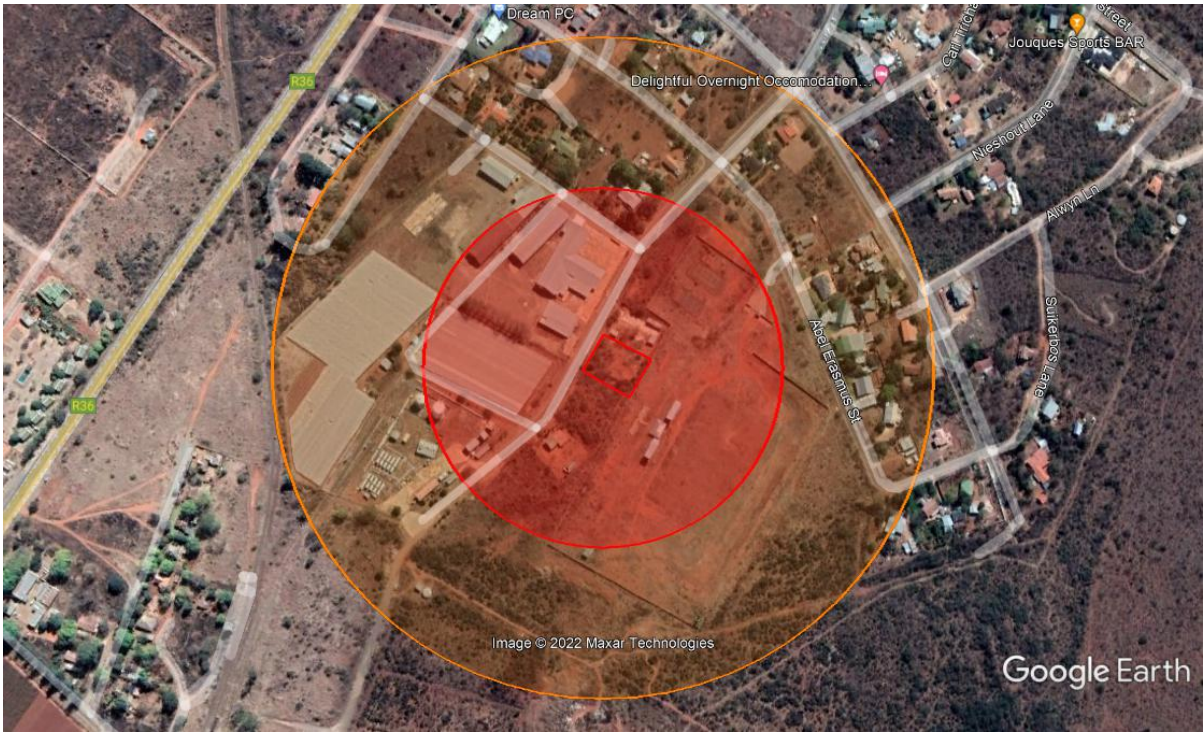
Fireball Diameter: 163 meters Burn Duration: 11 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 178 meters --- (37.5 kW/(sq m))

Orange: 327 meters --- (12.5 kW/(sq m))



k) LPG road tanker VCE; full release; 5 psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 meters

Opening is 10 centimeters from tank bottom

Release Duration: 1 minute

Max Average Sustained Release Rate: 368 kilograms/sec

(averaged over a minute or more)

Total Amount Released: 22,097 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

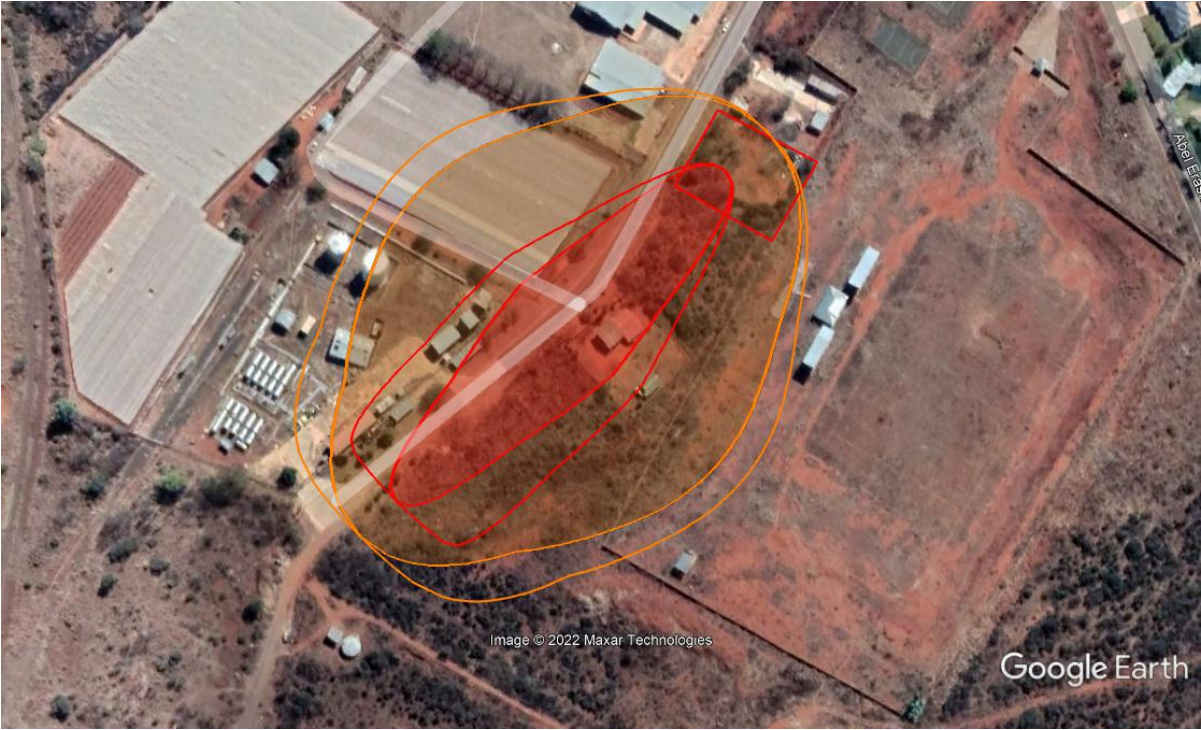
Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 216 meters --- (5 psi)

Orange: 240 meters --- (2 psi)



I) LPG road tanker VCE; full release; 2 psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 meters

Opening is 10 centimeters from tank bottom

Release Duration: 1 minute

Max Average Sustained Release Rate: 368 kilograms/sec

(averaged over a minute or more)

Total Amount Released: 22,097 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 216 meters --- (5 psi)

Orange: 240 meters --- (2 psi)



m) LPG road tanker VCE from 50-mm hole LPG; 5psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 12 minutes

Max Average Sustained Release Rate: 2,090 kilograms/min

(averaged over a minute or more)

Total Amount Released: 22,097 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 45 meters --- (5 psi)

Orange: 64 meters --- (2 psi)



n) LPG road tanker VCE from 50-mm hole LPG; 2psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: 12 minutes

Max Average Sustained Release Rate: 2,090 kilograms/min

(averaged over a minute or more)

Total Amount Released: 22,097 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

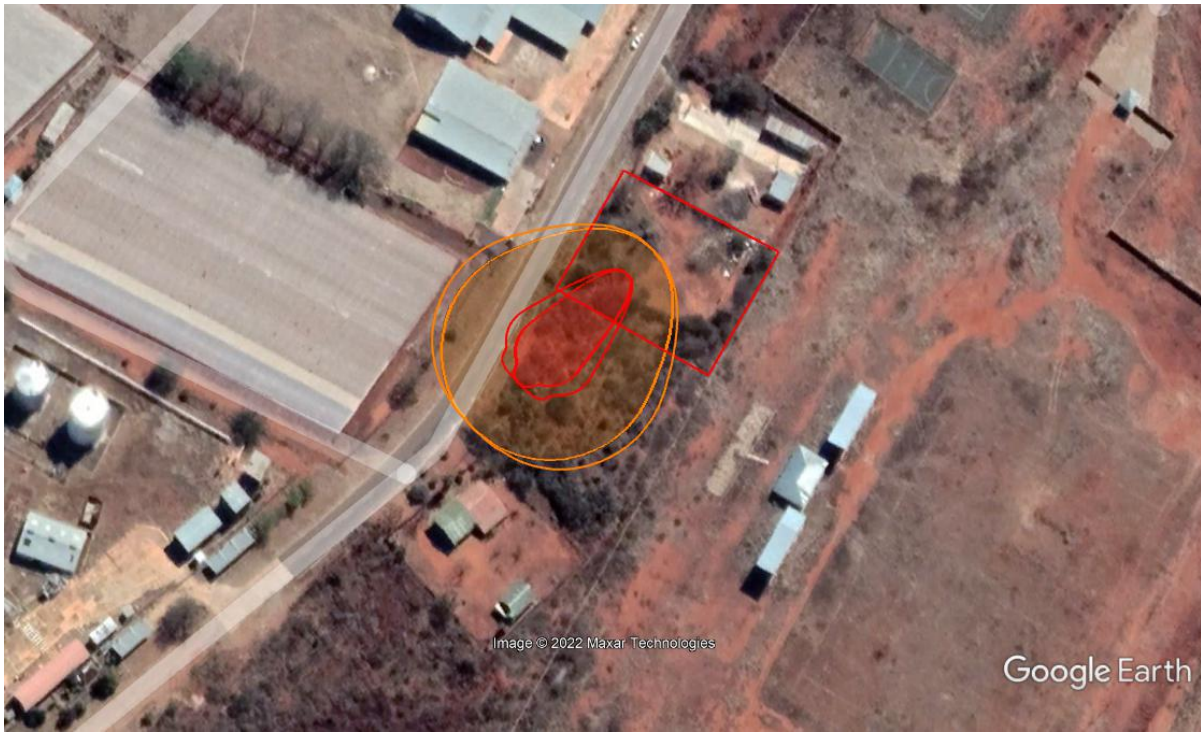
Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 45 meters --- (5 psi)

Orange: 64 meters --- (2 psi)



o) LPG road tanker VCE from 10-mm hole LPG; 5psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 84.4 kilograms/min

(averaged over a minute or more)

Total Amount Released: 5,027 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 11 meters --- (5 psi)

Orange: 17 meters --- (2 psi)



p) LPG road tanker VCE from 10-mm hole LPG; 2psi

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical escaping from tank (not burning)

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Release Duration: ALOHA limited the duration to 1 hour

Max Average Sustained Release Rate: 84.4 kilograms/min

(averaged over a minute or more)

Total Amount Released: 5,027 kilograms

Note: The chemical escaped as a mixture of gas and aerosol (two phase flow).

THREAT ZONE:

Threat Modeled: Overpressure (blast force) from vapor cloud explosion

Type of Ignition: ignited by spark or flame

Level of Congestion: congested

Model Run: Heavy Gas

Red : 11 meters --- (5 psi)

Orange: 17 meters --- (2 psi)



q) LPG tank and pipeline jet fire; 50-mm; 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 30 meters

Burn Duration: 12 minutes

Max Burn Rate: 2,110 kilograms/min

Total Amount Burned: 22,097 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 25 meters --- (37.5 kW/(sq m))

Orange: 46 meters --- (12.5 kW/(sq m))



r) LPG tank and pipeline jet fire; 50-mm; 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 30 meters

Burn Duration: 12 minutes

Max Burn Rate: 2,110 kilograms/min

Total Amount Burned: 22,097 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 25 meters --- (37.5 kW/(sq m))

Orange: 46 meters --- (12.5 kW/(sq m))



s) LPG tank and pipeline jet fire; 10-mm; 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 6 meters

Burn Duration: ALOHA limited the duration to 1 hour

Max Burn Rate: 84.5 kilograms/min

Total Amount Burned: 5,027 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 10 meters --- (37.5 kW/(sq m))

Orange: 11 meters --- (12.5 kW/(sq m))



t) LPG tank and pipeline jet fire; 10-mm; 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 1 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 6 meters

Burn Duration: ALOHA limited the duration to 1 hour

Max Burn Rate: 84.5 kilograms/min

Total Amount Burned: 5,027 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 10 meters --- (37.5 kW/(sq m))

Orange: 11 meters --- (12.5 kW/(sq m))



u) LPG tank and pipeline jet fire; 25-mm (50%); 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 2.5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 15 meters

Burn Duration: 48 minutes

Max Burn Rate: 528 kilograms/min

Total Amount Burned: 22,097 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 15 meters --- (37.5 kW/(sq m))

Orange: 24 meters --- (12.5 kW/(sq m))



v) LPG tank and pipeline jet fire; 25-mm (50%); 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 2.5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 15 meters

Burn Duration: 48 minutes

Max Burn Rate: 528 kilograms/min

Total Amount Burned: 22,097 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : 15 meters --- (37.5 kW/(sq m))

Orange: 24 meters --- (12.5 kW/(sq m))



w) LPG tank and pipeline jet fire; 0,5-mm (1%); 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min): 33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 0.5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 3 meters

Burn Duration: ALOHA limited the duration to 1 hour

Max Burn Rate: 21.1 kilograms/min

Total Amount Burned: 1,265 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : less than 10 meters(10.9 yards) --- (37.5 kW/(sq m))

Orange: less than 10 meters(10.9 yards) --- (12.5 kW/(sq m))

x) LPG tank and pipeline jet fire; 0,5-mm (1%); 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

Leak from hole in horizontal cylindrical tank

Flammable chemical is burning as it escapes from tank

Tank Diameter: 2.5 meters

Tank Length: 9.17 meters

Tank Volume: 45000 liters

Tank contains liquid

Internal Temperature: 25° C

Chemical Mass in Tank: 22,097 kilograms

Tank is 100% full

Circular Opening Diameter: 0.5 centimeters

Opening is 10 centimeters from tank bottom

Max Flame Length: 3 meters

Burn Duration: ALOHA limited the duration to 1 hour

Max Burn Rate: 21.1 kilograms/min

Total Amount Burned: 1,265 kilograms

Note: The chemical escaped from the tank and burned as a jet fire.

THREAT ZONE:

Threat Modeled: Thermal radiation from jet fire

Red : less than 10 meters(10.9 yards) --- (37.5 kW/(sq m))

Orange: less than 10 meters(10.9 yards) --- (12.5 kW/(sq m))

y) LPG cylinder BLEVE; 48 kg: 37,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 0.3 meters

Tank Length: 1.24 meters

Tank Volume: 88 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 43.2 kilograms

Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 20 meters

Burn Duration: 2 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 25 meters --- (37.5 kW/(sq m))

Orange: 45 meters --- (12.5 kW/(sq m))



z) LPG cylinder BLEVE; 48 kg: 12,5 kW/m²

CHEMICAL DATA:

Chemical Name: PROPANE

CAS Number: 74-98-6

Molecular Weight: 44.10 g/mol

AEGL-1 (60 min): 5500 ppm AEGL-2 (60 min): 17000 ppm AEGL-3 (60 min):
33000 ppm

IDLH: 2100 ppm LEL: 21000 ppm UEL: 95000 ppm

Ambient Boiling Point: -46.1° C

Vapor Pressure at Ambient Temperature: greater than 1 atm

Ambient Saturation Concentration: 1,000,000 ppm or 100.0%

ATMOSPHERIC DATA: (MANUAL INPUT OF DATA)

Wind: 11 meters/second from NE at 3 meters

Ground Roughness: urban or forest Cloud Cover: 5 tenths

Air Temperature: 25° C

Stability Class: D

No Inversion Height

Relative Humidity: 50%

SOURCE STRENGTH:

BLEVE of flammable liquid in horizontal cylindrical tank

Tank Diameter: 0.3 meters

Tank Length: 1.24 meters

Tank Volume: 88 liters

Tank contains liquid

Internal Storage Temperature: 25° C

Chemical Mass in Tank: 43.2 kilograms

Tank is 100% full

Percentage of Tank Mass in Fireball: 100%

Fireball Diameter: 20 meters

Burn Duration: 2 seconds

THREAT ZONE:

Threat Modeled: Thermal radiation from fireball

Red : 25 meters --- (37.5 kW/(sq m))

Orange: 45 meters --- (12.5 kW/(sq m))



6 Frequency analysis

1) Postulated causes of a hazardous material leak (Source: Lee's Publications)

LPG storage tank

- Mechanical damage to the tank or pipe work.
- Workers not trained in the operation of the tank, pump, valves, and filler pipe.
- Poor maintenance of the tank such as corrosion protection, flange integrity, valve integrity, pump and seal and pipe integrity.
- Degradation of the tank from internal and external corrosion and negligence with regard to tanker inspections.
- Human error with regard to maintenance or operation.
- Operation of equipment beyond design parameters such as overfilling of the tank.

LPG road tanker

- Road tanker or horse on fire when it enters the site, due to overheated clutch or brakes.
- Mechanical damage to the tanker or pipe work.
- Workers not trained in the operation of the delivery tanker, pump, valves, and filler pipe.
- Poor maintenance of the tanker such as corrosion protection, flange integrity, valve integrity, pump and seal and pipe integrity.
- Degradation of the tanker from internal and external corrosion and negligence with regard to tanker inspections.
- Human error with regard to maintenance or operation.
- Operation of equipment beyond design parameters such as overfilling of the road tanker at the supply depot.
- Road tanker collisions on site with other vehicles or stationary objects.
- Broken delivery hose.

LPG cylinders

- Broken valve.
- Leaking cylinder.

2) Failure data used in this assessment for equipment and systems

Table 6.1: Failure data from BEVI and HSE

Installation component	Failure frequency, per year
Manual valve	1.0 E-4
Excess flow valve	1.3 E-2
Aboveground pipeline, <75 mm diameter, rupture	1.0 E-6
Aboveground pipeline, <75 mm diameter, 50-mm hole	5.0 E-6
Gas road tankers (pressurized; LPG) full release	5.0 E-7
LPG cylinders, catastrophic (HSE)	(1.0 E-6)*2N where N = total number of cylinders on site
LPG storage tank aboveground	9.7 E-7
Human error	3.0 E-3

3) Postulated cause-event analysis for this specific site

Equipment/system component	Failure frequency Per year	Cumulative failure frequency Per year	Loss of containment equipment
Manual valve	1.0 E-4	1.83 E-2	LPG storage tank
Excess flow valve	1.3 E-2		
Aboveground pipeline, <75 mm diameter, rupture	1.0 E-6		LPG road tanker
Aboveground pipeline, <75 mm diameter, 50-mm hole	5.0 E-6		
Gas road tankers (pressurized; LPG) full release	5.0 E-7		All gas cylinders
LPG cylinders, catastrophic (HSE)	2.4 E-4		
LPG storage tank aboveground	9.7 E-7		
Human error	3.0 E-3		
Failure of incident prevention systems	1.0 E-3		
Failure of risk mitigation systems	1.0 E-3		

Figure 6.1: Cause-event analysis (Source: Lee's Publications)

- 4) Information to determine the final frequency of each failure scenario included in the calculation of risk

Refer to the following cause and event trees.

Causal factors		Event tree						
Equipment/system component		Equipment/Facility	Initiating event	Immediate ignition	Delayed ignition	Cylinder cooling	Cloud within LEL	Major incident
		LPG cylinder filling platform						
Manual valve	1,00E-04							
Aboveground pipeline rupture <75 mm	1,00E-06	1,00E-06			Yes 0,5		Yes 0,0001	1,29E-09 VCE
LPG cylinder	5,00E-06						No 0,9999	2,53E-03 Air pollution
Human error	3,00E-03	1,00E+03		No 0,99				
Failure of leak prevention systems	1,00E-03							
Failure of mitigation measures	1,00E-03	5,11E-03	5,11E-03		No 0,5			1,29E-05 Air pollution
						Yes 0,9		2,35E-07 Flash/jet fire
				Yes 0,01				
Cumulative failure frequency, per year	5,11E-03					No 0,1		2,61E-08 BLEVE
	<i>Frequency, per year</i>		<i>Frequency, per year</i>		<i>Probability</i>			

7. Risk calculations

1) Location specific societal and individual risk levels:

Table 7.1: Summary of risks

Colour Code	
1×10^{-3} d/p/y	blue
1×10^{-4} d/p/y	red
1×10^{-5} d/p/y	orange
1×10^{-6} d/p/y	yellow
1 or 3×10^{-7} d/p/y	green

Company name		Redgas	Ohrigstad					
Public population density		5	Persons/km ²	Statistics SA 2011 Census				
Public population density		0,000005	Persons/m ²					
Workers on site		4	Workers total, including contractors, peak					
Surface area of site			m ²					
Worker density on site:			Workers/m ²					
Fraction of site within maximum impact radius		100%						

Scenario No	Major incident	Consequence	Input data CCPS/ALOH A		Impact radius m	N Fraction in 45 degree sector, %	N	Individual risk contours		
			Frequency per yr Historic	Frequency per yr For site				Radius m	Freq, per yr	Risk, d/p/yr
1	BLEVE on tank; 37,5 kW/m ²	Thermal	4,94E-06	4,94E-06	164	100	0	327	1,81E-06	1,81E-06
2	BLEVE on tank; 12,5 kW/m ²	Thermal	4,94E-06	4,94E-06	302	100	1	302	4,94E-06	6,75E-06
3	LPG tank VCE on LPG storage tank; full release; 5 psi	Overpressure	2,00E-06	2,00E-06	190	100	1	240	1,81E-06	8,56E-06
4	LPG tank VCE on LPG storage tank; full release; 2 psi	Overpressure	2,00E-06	2,00E-06	212	100	1	216	1,81E-06	1,04E-05
5	LPG tank VCE from 50-mm hole LPG; 5psi	Overpressure	2,00E-06	2,00E-06	48	100	0	212	2,00E-06	1,24E-05

6	LPG tank VCE from 50-mm hole LPG; 2psi	Overpressure	2,00E-06	2,00E-06	64	100	0	190	2,00E-06	1,44E-05
7	LPG tank VCE from 10-mm hole LPG; 5psi	Overpressure	2,00E-06	2,00E-06	11	100	0	178	1,81E-06	1,62E-05
8	LPG tank VCE from 10-mm hole LPG; 2psi	Overpressure	2,00E-06	2,00E-06	17	100	0	164	4,94E-06	2,11E-05
9	LPG road tanker BLEVE; 37,5 kW/m2	Thermal	1,81E-06	1,81E-06	178	100	0	64	2,00E-06	2,31E-05
10	LPG road tanker BLEVE ; 12,5 kW/m2	Thermal	1,81E-06	1,81E-06	327	100	2	64	1,81E-06	2,49E-05
11	LPG road tanker VCE; full release; 5 psi	Overpressure	1,81E-06	1,81E-06	216	100	1	48	2,00E-06	2,69E-05
12	LPG road tanker VCE; full release; 2 psi	Overpressure	1,81E-06	1,81E-06	240	100	1	46	1,81E-08	2,69E-05
13	LPG road tanker VCE from 50-mm hole LPG; 5psi	Overpressure	1,81E-06	1,81E-06	45	100	0	45	1,81E-06	2,88E-05
14	LPG road tanker VCE from 50-mm hole LPG; 2psi	Overpressure	1,81E-06	1,81E-06	64	100	0	45	2,61E-08	2,88E-05
15	LPG road tanker VCE from 10-mm hole LPG; 5psi	Overpressure	1,81E-05	1,81E-05	11	100	0	25	1,81E-08	2,88E-05
16	LPG road tanker VCE from 10-mm hole LPG; 2psi	Overpressure	1,81E-05	1,81E-05	17	100	0	25	2,61E-08	2,88E-05
17	LPG tank and pipeline jet fire; 50-mm; 37,5 kW/m2	Thermal	1,81E-08	1,81E-08	25	100	0	24	1,81E-08	2,88E-05
18	LPG tank and pipeline jet fire; 50-mm; 12,5 kW/m2	Thermal	1,81E-08	1,81E-08	46	100	0	17	2,00E-06	3,08E-05
19	LPG tank and pipeline jet fire; 10-mm; 37,5 kW/m2	Thermal	1,81E-08	1,81E-08	10	100	0	17	1,81E-05	4,89E-05
20	LPG tank and pipeline jet fire; 10-mm; 12,5 kW/m2	Thermal	1,81E-08	1,81E-08	11	100	0	15	1,81E-08	4,90E-05
21	LPG tank and pipeline jet fire; 25-mm (50%); 37,5 kW/m2	Thermal	1,81E-08	1,81E-08	15	100	0	11	2,00E-06	5,10E-05
22	LPG tank and pipeline jet fire; 25-mm (50%); 12,5 kW/m2	Thermal	1,81E-08	1,81E-08	24	100	0	11	1,81E-05	6,91E-05
23	LPG tank and pipeline jet fire; 0,5-mm (1%); 37,5 kW/m2	Thermal	1,81E-08	1,81E-08	9	100	0	11	1,81E-08	6,91E-05
24	LPG tank and pipeline jet fire; 0,5-mm (1%); 12,5 kW/m2	Thermal	1,81E-08	1,81E-08	9	100	0	10	1,81E-08	6,91E-05
25	LPG cylinder BLEVE; 48 kg; 37,5 kW/m2	Thermal	2,61E-08	2,61E-08	25	100	0	9	1,81E-08	6,91E-05
26	LPG cylinder BLEVE; 48 kg; 12,5 kW/m2	Thermal	2,61E-08	2,61E-08	45	100	0	9	1,81E-08	6,91E-05
Individual risk, d/p/yr				6,91E-05						

2) Risk levels and ranking at key locations

The risk rankings for the site are as follows:

- First priority: Prevent a BLEVE on the LPG storage tank.
- Second priority: Prevent VCE on the LPG storage tank.

3) Societal risks- F-N curve (including on-site populations)

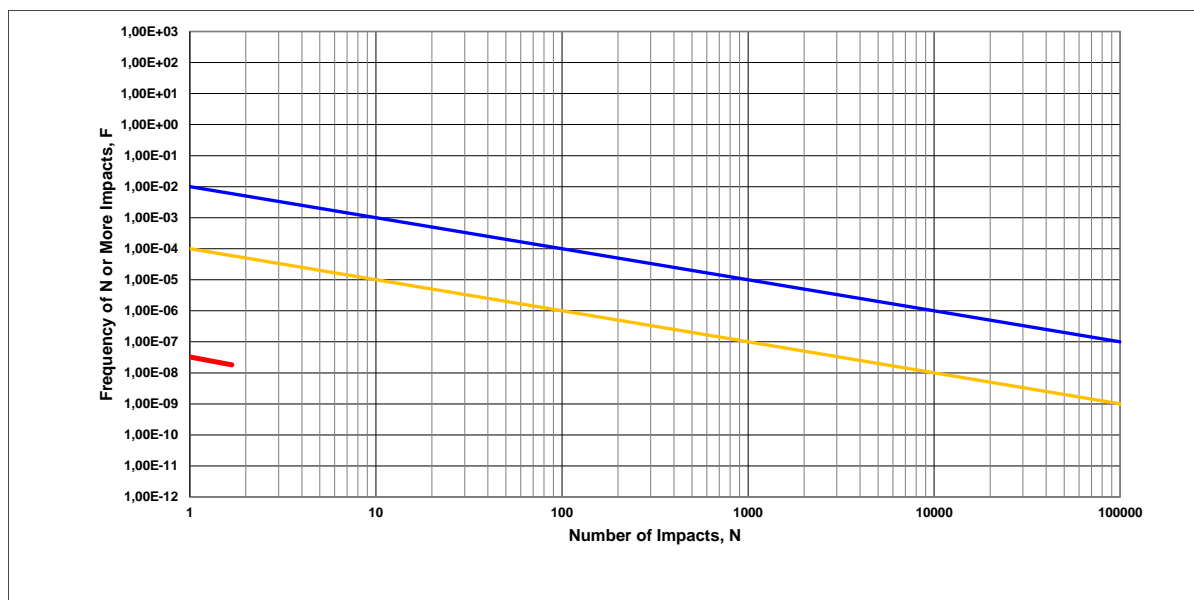


Figure 7.1: FN Curve for societal risk

Site graph



Intolerably high line



Tolerable with ALARP between blue and orange lines

Acceptably low line



4) Individual risk transect

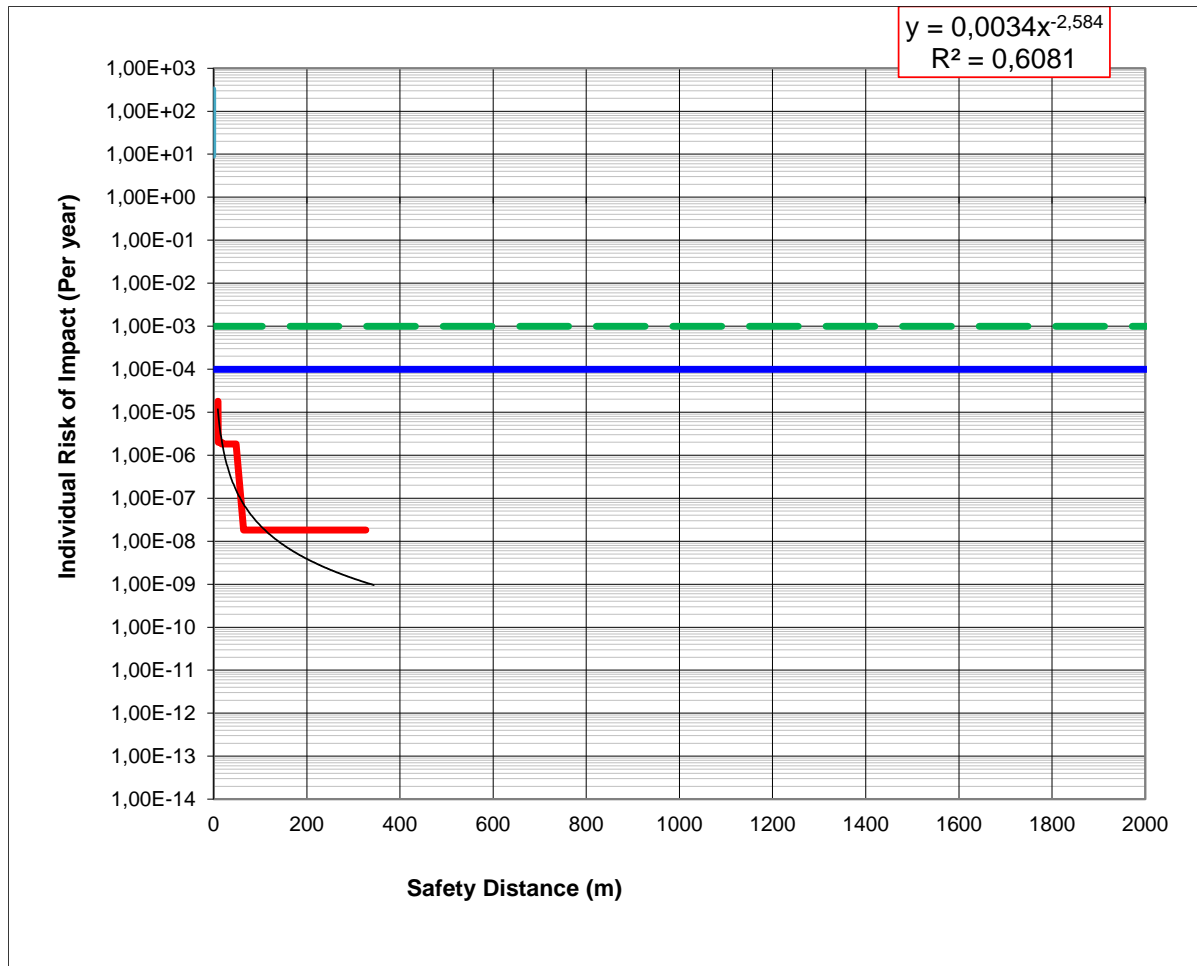
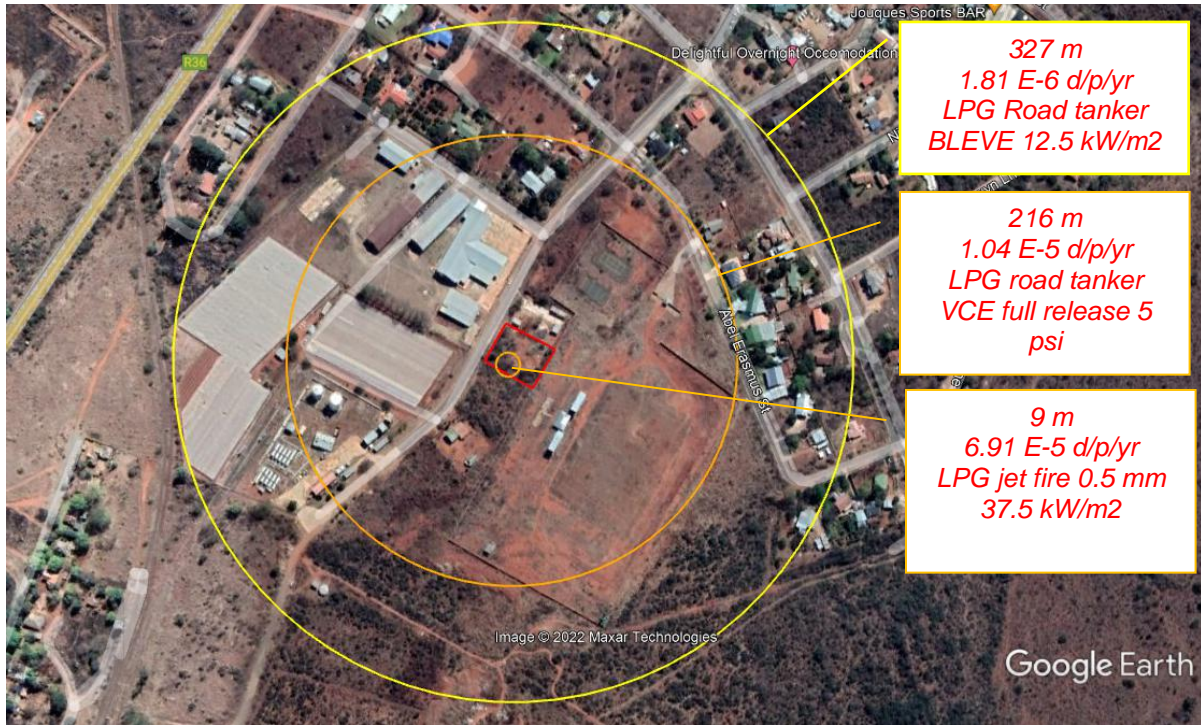


Figure 7.2: Individual risk transect

- Site graph —
- Tolerable for public - - -
- Tolerable for employees —

5) Individual risk contours



Colour Code	
1 × 10 ⁻³ d/p/y	blue
1 × 10 ⁻⁴ d/p/y	red
1 × 10 ⁻⁵ d/p/y	orange
1 × 10 ⁻⁶ d/p/y	yellow
1 or 3 × 10 ⁻⁷ d/p/y	green

Figure 7.2: Individual risk contours

6) Probit functions for the estimation of the number of fatalities

Table 7.2. Calculation of probit value for thermal radiation flux

Cross-correlation 2.35: Thermal Flux Estimate				CCPS/AICh E
Input Data:				
Exposure time:	<i>t</i>	44,4	seconds	Cannot exceed 98.7
Percent Fatalities:	% fatal	1	%	Insert any value from 1 to 100%
Calculated Results:				
Thermal Flux Estimate for:				
Significant injury threshold:		6,97	kW/m**2	<i>Interpolated from Mudan (1984) Figure 2.95; P269</i> METHOD 1
Percent Fatalities:	1	12,52	kW/m**2	
	50	28,46	kW/m**2	
	100	43,20	kW/m**2	
Extra interpolation tables for EXCEL:				
	1	12,52		
	50	28,46		
Interpolated Flux for Specified Percent: 12,52 kW/m**2				
Thermal Flux Estimate Based on Eisenberg Fatality Probit:				METHOD 2
Probit:		2,67		<i>Calculated from Eisenberg (1975); P269</i>
Thermal Flux:	<i>I</i>	10,00	kW/m**2	

The probit value for thermal radiation exposure confirms that 1% fatalities could occur at a thermal radiation flux of 12.5 kW/m².

Table 7.3. Calculation of probit value for overpressure

Cross-correlation 2.32: Dose-Response Correlation via Probits		Overpressure								
Input Data:		Equation 2.3.7 Page 269	1 psi = 6903,8 N/m**2							
Percentage Affected	Probit	Peak Overpressure (N/m**2)	Peak Overpressure (psi)	N/m**2 LN(Overpressure)	Calculated Probit	Table for interpolation by EXCEL:		Calculated Percentage		
1	2,67	13807	2,00	9,53	2,66	2,65	2,7	0,9 4	1,0 7	0,97
10	3,72	19300	2,80	9,87	3,34	3,30	3,35	4,4 6	4,9 5	4,84
50	5,00	34490	5,00	10,45	4,52	4,50	4,55	30, 85	32, 64	31,41
90	6,28	84300	12,23	11,34	6,33	6,30	6,35	90, 32	91, 15	90,76
Calculated Results:										
Regression Output from Spreadsheet follows:										
SUMMARY OUTPUT										
<i>Regression Statistics</i>										
Multiple R	0,98164									
R Square	0,96362									
Adjusted R Square	0,94543									
Standard Error	0,36558									
Observations	4									

The probit value for overpressure exposure confirms that 1% fatalities could occur at 2 psi if the vapour cloud is above its LEL.

7) Assessment of the risks

- The cumulative individual safety risks for the site is 6.91 E-5 d/p/yr.
- Individual risk at the site is tolerable for the public.
- Individual risk at the site is tolerable for employees.
- Societal safety risks on this site are acceptably low provided ALARP mitigation measures are implemented.

The risk assessment is summarized in Table 7.3.

Table 7.3: Summary of risk judgement at the site

Frequency, deaths/person/year			Site assessment
<u>Public</u>			
Intolerable	>1.0 E-4		
Tolerable	1.0 E-4 to 1.0 E-6		X
Broadly acceptable	<1.0 E-6		
<u>Employees</u>			
Intolerable	>1.0 E-3		
Tolerable	1.0 E-3 to 1.0 E-5		X
Broadly acceptable	<1.0 E-5		
Graph of ALARP			
Intolerable			
Tolerable with mitigation (ALARP)			
Acceptably low			X

8) Possible domino effects

Trigger	Impact receptor
Shrapnel from BLEVE on LPG road tanker	Mound of LPG storage tank

9) Suggested land-use planning restricted development distance from the risk zones

There are no developing conflicts for this site at the time of the risk assessment. The suggested land-use planning restricted development distances and risk zones are as follows:

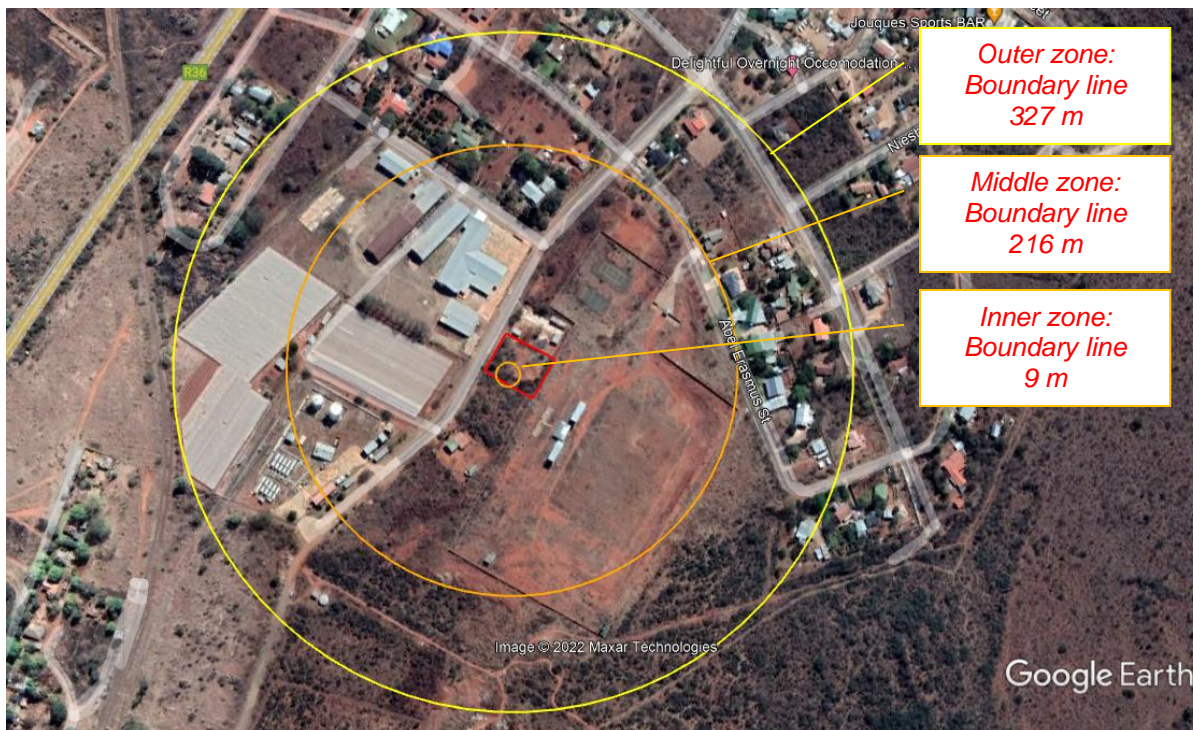


Figure 8.1: Land-use planning zones

Key to figure 8.1

Red: Inner zone > 10 chances of a major incident per million per annum (1.0 E-5 per year).

Orange: Middle zone > 1 chance of a major incident per million per annum (1.0 E-6 per year).

Yellow: Outer zone > 0.3 chances of a major incident per million per annum (3.0 E-7 per year).

8 Conclusions

1) Summary of the acceptability of the risks

Frequency, deaths/person/year			Site assessment
<u>Public</u>			
Intolerable	>1.0 E-4		
Tolerable	1.0 E-4 to 1.0 E-6		X
Broadly acceptable	<1.0 E-6		
<u>Employees</u>			
Intolerable	>1.0 E-3		
Tolerable	1.0 E-3 to 1.0 E-5		X
Broadly acceptable	<1.0 E-5		
Graph of ALARP			
Intolerable			
Tolerable with mitigation (ALARP)			
Acceptably low			X

2) General

The Occupational Health and Safety Act (Act 85 of 1993) defines a major hazard installation as “*an installation- where more than the prescribed quantity of any substance is or may be kept, whether permanently or temporarily; or where any substance is produced, used, handled or stored in such a form and quantity that it has the potential to cause a major incident*”.

The Explanatory Notes on the Major Hazard Installation Regulations issued in April 2005 by the Chief Directorate of Occupational Health and Safety of the Department of Employment and Labour explains the following:

“*What is important here is to know that there are two reasons that can determine when an installation is a major hazard installation (MHI). The first reason is when there is more than the prescribed quantity of a substance. The quantities and type of substances are prescribed in the General Machinery Regulation 8 and its Schedule A, on notifiable substances. The second reason is where substances are produced, used, handled, or stored in such a form and quantity that it has the potential to cause a major incident. The important issue is the potential of an incident and not whether the incident is a major incident or not. The potential will be determined by the risk assessment.*”

A major incident means an occurrence of catastrophic proportions, resulting from the use of plant or machinery, or from activities at a workplace. It is impossible to put a specific value to “catastrophic” because it will always differ from person to person and from place to place. However, when the outcome of a risk assessment indicates that there is a possibility that the public will be involved in an incident, then the incident can be seen as catastrophic”.

3) Classification of the facility

The facility is classified as a major hazard installation, because a major incident at the site will impact members of the public outside the boundaries of the premises.

4) Temporary installations

The LPG delivery road tankers are classified as an MHI while it is on the site.

5) Hazardous installations identified within the premises

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

6) Hazardous scenarios analysed

A total of 26 hazard scenarios were identified and analysed in this report.

7) Maximum extent of the 1% consequence-based lethality effect zone from major hazards (refer to Table 7.1)

The probit value for thermal radiation exposure from an LPG BLEVE or jet fire confirms that 1% fatalities could occur at a thermal radiation flux of 12.5 kW/m². This thermal radiation flux corresponds with an impact distance of 327 meters.

The probit value for overpressure exposure from an LPG VCE confirms that 1% fatalities could occur at an overpressure of 2 psi at a safe separation distance of 240 meters.

8) Level of risk posed by the facility to various populations

There are no developing conflicts for this site at the time of the risk assessment. The site is surrounded by commercial, agricultural and industrial developments. These developments will be affected by a BLEVE on either the LPG storage

tank or the LPG delivery road tanker. The medium-density residential area 220 meters from the site would be impacted in case of a major incident at the site.

9) Suggestions for risk reduction including preventative and mitigative measures

- a) The site layout plan, approved by the local fire department, must be available on site.
- b) No cellular telephones may be used at the LPG storage tank or road tanker.
- c) An emergency management plan must be compiled for the site and signed by the owner or operator of the installation. The plan must contain an emergency evacuation procedure aimed at workers and visitors. It must be updated at least annually in collaboration with the emergency services of the local municipality.
- d) The emergency plan must be updated when personnel changes or contact details occurs, in accordance with the guidelines given in this report.
- e) Operating procedures for the site must be kept up to date to include preventative measures against the uncontrolled release of the following hazardous substances:
 - LPG from the delivery road tanker.
 - LPG from a storage tank.
- h) The LPG delivery road tankers must not reverse on site unless a watchman is available all the time.
- i) The LPG road tankers must be inspected when it comes onto the site, for possible overheated tyres, smell of heated rubber, product leaks, overheated clutch or other defects that can place the site at risk of fire.
- j) Customer and staff parking bays must be located in an area where public vehicles will not cause obstruction to emergency vehicles.

10) Technical uncertainties

- The meteorological conditions for Polokwane weather station have been taken as applicable to the site.
- Wind direction is highly variable, not limited to a specific vector coordination, and may change at any time.
- Population density was taken from the Statistics SA 2011 census and could have changed since then.

11) Sensitivities

- Development around the site will change continuously as new opportunities for land use arise. These future developments may change the population densities around the site.

12) Organisational requirements

- a) The site layout plan, approved by the local fire department, must be kept on site.
- b) The national Chief Inspector of the Department of Employment and Labour must be notified about the MHI status of the site.
- c) The provincial Chief Inspector of the Department of Employment and Labour must be notified about the MHI status of the site.
- d) The local Fire Department must be notified about the MHI status of the site.
- e) A permanent warning sign must be installed at the entrance to the site, as follows:



- f) The outcome of the risk assessment must be brought to the attention of all the employees at the site.
- g) A Maintenance Plan must be compiled and kept up to date for all the hazardous equipment used on the facility. The Plan must contain at least the following:
 - List of all equipment and facilities on the facility.
 - Maintenance frequency.
 - Particulars of maintenance activities that must be performed on the listed equipment.
 - Responsible person.
- h) All hazardous equipment and facilities on the facility must be inspected on a regular basis by means of an Inspection Register. The Register must contain at least the following:
 - List of all equipment and facilities on the facility.
 - Equipment items that must be inspected.
 - Facilities that must be inspected.
 - Areas that must be inspected.
 - Inspection findings.
 - Responsible person who carried out the inspection.
- i) All authorised operators must be trained in the application of the operating procedures applicable to their jobs.

- j) All operating personnel at the facility must be made aware and kept aware of the dangers involving LPG.
- k) The facility must remain under safety and security access control for 24 hours per day. If a security guard is employed, he/she must comply with the following requirements:
- The guard must be trained in the potential major incidents that could occur at the site as well as the emergency procedure that must be followed.
 - The guard must be linked via SMS or cellular phone with a responsible standby person at the site.
 - The guard must be able to contact the local Fire Department immediately.
- l) The Emergency Management Plan and Emergency Evacuation Procedure must be tested at least once every 12 months by means of mock emergencies. The local emergency services must be invited to participate in these tests.
- m) Prior to any construction work on site, the local office of the Department of Employment and Labour must be notified in writing, in accordance with the Construction Regulations of the Department of Employment and Labour.
- n) No modifications may be made to the facilities on site unless an MHI risk assessment has been done beforehand.
- o) Train all staff in emergency preparedness for an LPG leak, in collaboration with the local fire department.

14) Biophysical and socio-economic environmental concerns

- a) Pollution of the air in case of an LPG leak.
- b) Soil and water pollution in case of a petrol or diesel spillage.
- c) Water effluent from the deluge system may contain oils and grease that will end up in the stormwater run-off system and will pollute soil and surface water systems.
- d) Frequent venting of LPG would scare birdlife away from the site and surrounding habitat.
- e) Noise levels at the site may be disturbing to neighbouring businesses.
- f) A fire on site may spread to adjacent grass lands and residential areas may and destroy indigenous vegetation.

16) Impact on residential and high-population units

- Residential units within 627 meters from the site would be impacted in case of a major incident on the LPG storage tank or delivery road tanker.
- Manufacturing, commercial and retail units around the site would be impacted in case of a major incident on the LPG storage tank or delivery road tanker.

17) Land zoning

The owner/operator of the MHI must first ensure that the site is zoned for industrial use.

9 Emergency response data

The on-site emergency response plan was not available at the time of the assessment.

A General Requirements	Is it contained in the Plan?
The name of the specific site for which the Emergency Plan is applicable, must appear on the Plan.	
The Plan must be signed by the CEO of the site.	
The Plan must have a date of compilation	
A clear indication must be given when and how the Plan will be revised.	
Various categories of emergency situations must be defined.	
The Plan must consider all potential natural or man-made emergencies that could disrupt the operation of the MHI facility.	
The Plan must consider all potential internal sources of emergencies that could disrupt the operation of the MHI facility.	
The Plan must consider the impact of all internal and external emergencies on the operation of the MHI facility.	
Response actions must be tailored to the specific MHI facility.	
The Plan must contain a list of key personnel with their responsibilities and contact information.	
The Plan must contain a list of local emergency responders with their contact information.	
The Plan must contain the names, titles, departments, and contact numbers of individuals who can be contacted for additional information or an explanation of duties and responsibilities applicable to the Plan.	
The Plan must outline how rescue operations will be performed.	
The Plan must outline how medical assistance will be provided.	
The Plan must state how and where personal information on employees can be obtained in an emergency.	
The Plan must state how affected members of the public will be contacted, who the contact persons are and their contact numbers.	
B Evacuation Procedure	
The Plan must identify the conditions under which an evacuation of people would be necessary.	
The procedure must make provision for the evacuation of employees on site as well as affected members of the public.	
The Plan must outline a clear chain of command and designate a specific person with a standby authorized to order an evacuation or operational shutdown.	
The Plan must address the types of actions expected from different employees for the various categories of emergencies.	
The Plan must identify who will stay behind to shut down critical operations during an evacuation.	
The Plan must show specific evacuation routes for employees and these must be posted at the MHI facility where they are easily accessible to all employees.	

A General Requirements	Is it contained in the Plan?
The Plan must show specific evacuation routes for members of the public and these must be easily accessible to the public.	
The Plan must prescribe procedures for assisting people during an evacuation, people with disabilities or those who cannot speak English or read.	
The Plan must show one or more assembly areas where employees will gather.	
The Plan must include a method of accounting for all employees.	
The Plan must explain how visitors will be assisted and accounted for during an evacuation.	
C Reporting of an Emergency Condition	
The Plan must outline the method of reporting fires and other emergencies to the local emergency services.	
The Plan must outline the method of alerting employees, including disabled employees, to evacuate from the MHI site or to take other action.	
D Employee Training and Drills	
The Plan must state how and when employees will be trained with regard to the types of emergencies that may occur, their responsibilities and the actions that they must take.	
The Plan must state how and when retraining of employees will take place.	
The Plan must state how often drills will take place. These drills must involve all employees at the MHI site as well as affected members of the public.	
E Management of the News Media	
The Plan must indicate the person whose responsibility it will be to provide information about the emergency to the news media.	
The Plan must state clear channels for the approval of media releases to journalists.	

10 Proof of competency

Alfonso Niemand is the author of this report.

In terms of the ISO/IEC-17020 standards he has been appointed as Technical Manager of Nature & Business Alliance Africa (Pty) Ltd.

Alfonso holds the following qualifications:

- *Baccalaureus Scientiae (BSc), University of South Africa.*
- *Master's Degree in Business Leadership (MBL), University of South Africa.*
- *PhD, University of the Free State.*
- *Certificate course in the Integration of Safety, Health, Environmental, Risk and Quality Management Systems, University of Potchefstroom, South Africa.*
- *Certificate course in Environmental Management, University of Pretoria, South Africa.*
- *Certificate courses as Safety and Health Representative, Occupational Health and Safety Services and Advantage ACT.*
- *Certificate course in Health and Safety Incident Investigation, Advantage ACT.*
- *Training in Aloha and Cameo software applications for risk incident consequence modelling, University of California, Davis Campus, USA.*

Alfonso Niemand holds the following memberships:

- *International Association for Impact Assessment (IAIA).*
- *South African Right of Way Association (SARWA).*
- *South African Association for Professional Managers (SAAPM, registration 9/2/99)*
- *South African Council for Natural Scientific Professions (SACNASP, registration 200026/04).*
- *SA Institute of Occupational Safety and Health (SAIOSH).*
- *Disaster Management Institute of South Africa (DMISA).*
- *Southern Africa Society for Disaster Reduction (SASDiR).*
- *International Society for Integrated Disaster Risk Management (IDRiM).*

Alfonso Niemand has 40 years' experience in the petrochemical and construction industries in South Africa. He worked with the Environmental Protection Agency of the United States in 1981 for the environmental, safety and health mapping of an oil-from-coal facility in South Africa.



CERTIFICATE OF ACCREDITATION

In terms of section 22(2)(b) of the Accreditation for Conformity Assessment, Calibration and Good Laboratory Practice Act, 2006 (Act 19 of 2006), read with sections 23(1), (2) and (3) of the said Act, I hereby certify that: -

NATURE & BUSINESS ALLIANCE AFRICA (PTY) LTD

Co. Reg. No.: 2003/020335/07

ROODEPOORT

Accreditation Number: **MHI0004**

is a South African National Accreditation System Accredited Inspection Body to undertake **TYPE A** inspection provided that all SANAS conditions and requirements are complied with

This certificate is valid as per the scope as stated in the accompanying scope of accreditation, Annexure "A", bearing the above accreditation number for

THE ASSESSMENT OF RISK ON MAJOR HAZARD INSTALLATIONS

The facility is accredited in accordance with the recognised International Standard

ISO/IEC 17020:2012 AND SANS 1461:2018

The accreditation demonstrates technical competency for a defined scope and the operation of a management system

While this certificate remains valid, the Accredited Facility named above is authorised to use the relevant SANAS accreditation symbol to issue facility reports and/or certificates

Mr T Baleni

Acting Chief Executive Officer

Effective Date: 08 August 2021

Certificate Expires: 07 August 2025

This certificate does not on its own confer authority to act as an Approved Inspection Authority as contemplated in the Major Hazard Installation Regulations. Approval to inspect within the regulatory domain is granted by the Department of Employment and Labour.



ANNEXURE A

SCOPE OF ACCREDITATION

Accreditation Number: MHI0004

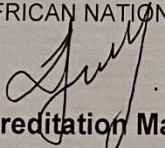
TYPE A

Permanent Address: Nature & Business Alliance Africa (Pty) Ltd 13 Sedona Complex 386 Flora Haase Street Amorosa Roodepoort 1735 Tel: (011) 958-2132 Cell: 083 225-4426 E-mail: alfonso@vebo.co.za		Postal Address: P O Box 1753 Strubens Valley 1735 Issue No.: 13 Date of issue: 08 August 2021 Expiry date: 07 August 2025
Nominated Representative: Dr A Niemand	Technical Manager: Dr A Niemand	Technical Signatory: Dr A Niemand
Quality Manager: Dr A Niemand		
Field of Inspection	Service Rendered	Codes and Regulations
Regulatory: The supply of services as an Inspection Authority for Major Hazard Risk Installation as defined in the Major Hazard Risk Installation Regulations, Government Notice No. R 692 of 30 July 2001	Major Hazard Installation Risk Assessments for the following material categories: 1) Explosive chemicals 2) Gases: i) Flammable Gases ii) Non-flammable, non-toxic gases (asphyxiants) iii) Toxic gases 3) Flammable liquids 4) Flammable solids, substances liable to spontaneous combustion, substances that on contact with water release flammable gases 5) Oxidizing substances and organic peroxides 6) Toxic liquids and solids	MHI regulation par. 5 (5) (b) i) Frequency/Probability Analysis ii) Consequence Modelling iii) Hazard Identification and Analysis iv) Emergency planning reviews SANS 31000 SANS 31010 Guidelines for Chemical Process Quantitative Risk Analysis of the Centre for Chemical Process Safety (CCPS), American Institute of Chemical Engineers Areal Locations of Hazardous Atmospheres (ALOHA) Computer Programme developed by the US Environmental Protection Agency (EPA), US National Oceanic and Atmospheric Administration (NOAA), US Chemical Emergency Preparedness and Prevention Office (CEPPO) and US Hazardous Materials Response Division (HMRD)

Original date of accreditation: 08 August 2005

Page 1 of 1

ISSUED BY THE SOUTH AFRICAN NATIONAL ACCREDITATION SYSTEM


 Accreditation Manager



labour

Department:
Labour
REPUBLIC OF SOUTH AFRICA

National Department of Labour
Republic of South Africa

APPROVED INSPECTION AUTHORITY

Registered in accordance with the provisions of the Occupational Health and Safety Act, Act 85 of 1993, as amended and the Major Hazard Installation Regulations.

This is to certify that:

NATURE & BUSINESS ALLIANCE AFRICA (PTY) LTD

has been temporary registered by the Department of Labour as an Approved Inspection Authority: Type A, to conduct Major Hazard Installation Risk Assessment, in terms of Regulation 5(5)(a), of the Major Hazard Installation Regulations.

CONDITIONS OF REGISTRATION:

- o The AIA must at all time comply with the requirements of the Occupational Health and Safety Act, Act 85 of 1993, as amended.
- o This registration certificate is not transferable.
- o This registration will lapse if there is a name change of the AIA or change in ownership.


CHIEF INSPECTOR

Valid from: **08 August 2021**
Expires: **31 August 2022**
Certificate Number: **CI MHI 0002**





herewith certifies that

Alfonso Niemand

Registration Number: 002914

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)

in the following field(s) of practice (Schedule 1 of the Act)

Environmental Science (Professional Natural Scientist)

Effective **25 November 2004**

Expires **31 March 2023**



A handwritten signature in black ink, appearing to read 'Botha', written over a horizontal line.

Chairperson

A handwritten signature in black ink, appearing to read 'Alfonso Niemand', written over a horizontal line.

Chief Executive Officer



To verify this certificate scan this code

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Revalidation MHI risk assessment for the Sasol Gas natural gas transmission pipeline network. 3 June 2021.

12 Appendices

Appendix 1: Raw data

Redgas Ohrigstad MHI Survey 5 Aug 22

Elphas Sithole

Trichardt Street Erf 62

Inventory:

LPG bulk tank 35000 liters

LPG road tanker temporary 45000 liters

Cylinder filling 9/19/48 kg total 2800 kg storage

Four scales

Tank Will be cladded

Used standard inspection protocol

Pipeline from tank to platform about 40 meters 25 mm

A Niemand

AIA

T1	Name	UN No CAS No	SANS 10228 Class	Inventory	Bund surface area, m ²	Throughput	Release quantity
1	LPG tank storage tank	1075 68476-85-7	2.1	One tank of 35 000 liters Aboveground	-	35 000 liters every 2 weeks	35 000 liters
2	LPG road tanker	1075 68476-85-7	2.1	45 000 liters	-	45 000 liters every two weeks	45 000 liters 24 750 kg
3	LPG cylinders	1075 68476-85-7	2.1	2 000 cylinders of 48/19/9 kg maximum	-	500 cylinders per day	48 kg

Appendix 2: Case study

LPG Tank Truck road accident and subsequent BLEVE

7. Driver of the said LPG Bulk TT immediately advised nearby houses and shops to vacate stating that fire can take place any movement. Local residents alerted State Electricity Board who put off the grid power supply immediately. The LPG continued to leak for about 20 minutes and huge LPG vapour cloud formed at the sites. Subsequently, the LPG vapour cloud caught fire –



source of ignition is yet to be established. Thereafter, 3 explosions took place consecutively. BLEVE conditions existed and BLEVE probably took place. The front dish end of the bullet with 1/3rd of the



cylindrical shell of the bullet flew away almost 400 mtrs. in a green field. The rest of the Bullet plates were rendered flat. With these three explosions, the rear wheel and the front wheel of the LPG Bulk TT also flew away in different directions of the road. All the nearby houses and shops were damaged due to fire

and explosion. On the date of investigation, 20 people were reported to have died and 17 people were still admitted with burn injury in hospitals. People who were inside the house were saved but those who came out from the house and running along the wind direction got burnt badly. Fire Brigade reached the spot but could not approach the vehicle before the explosion took place. The driver was arrested by police at a later date. The tank lorry was not accompanied by helper at the time of accident.

8. As per available record, driver was having valid license duly indorsed by RTO for carrying hazardous good however the validity of hazardous goods of the driving license was expired. As per concerned OMC record, the empty TT entered the loading location along with the driver & helper but the LPG Bulk TT was found to be running without helper on road when the incident took place.
9. As per available record of loading OMC, the said driver loaded the same TT three times ex the loading location prior to this accident but he was going with the said TT to the concerned stretch of road for the first time. As per the check list issued by the involved OMCs, validity of endorsement in the driving license for carrying hazardous goods was valid but the copy of the document provided to the investigation team indicated that the same expired long back.

Action by the Investigation team covered the following:-

1. Survey of the stretch of road travelled by LPG Bulk TT.
2. Visit to the accident spot, interaction with the eye witnesses, collection of photographs and analysis of the tank truck conditions.
3. Interaction with RTO officials (enroute from loading location to the accident spot) & TT crew members of other bulk LPG Tank lorry (available enroute).

LPG Tank Truck road accident and subsequent BLEVE

4. Interaction of the officials of the loading location, collection of documents and study of prevailing system followed by the OMCs concerned for Bulk TT Loading assistance.
5. Root cause analysis and framing recommendations remedial measure

10. Root cause of the accident:-

1. Historically the place where the accident took place is an accident prone Zone. No speed limit is defined while approaching to that spot from either side of the road. No caution board, divider signal, curve signal, speed barrier are provided on the either side of the road. No pedestrian zebra crossing signal is painted on the road. While approaching from loading location side, this was the first divider put on the road without any signal.
2. Restriction on TT movement in Highway during day time imposed by local State Govt imposed fatigue related hardship/inconvenience on the drivers forcing them to drive only during night time.
3. Although loading location routinely ensured presence of both TT crew members during TT loading within the location premises but there was little or no control on ensuring presence of both the members for TT on road.
4. LPG tank lorry valve manifold got damaged due to high impact resulting in uncontrolled leakage of LPG.

Recommendation:-

1. Proper signage's to be displayed on the both side of the highway cautioning driver and pedestrian about the traffic rule and road conditions. A physical Speed barrier / rumble strip needs to be provided before such accident prone zones.
2. OMC to represent for review of the current restriction imposed by the state government and relaxation to be made for movement of POL & LPG tank trucks on the highway during day time to minimize night driving fatigue to the driver.
3. Law enforcing agency of the state government should implement MV Act in true spirit without any deviation ensuring 2 member crew in heavy vehicles at all the time as stipulated in the explosive license issued to the TT.
4. OMC to device a mechanism to put in control measures to implement transport tender conditions w.r.t safety conditions even outside the terminal while on transit and strict action should be taken in case of violation.

LPG Tank Truck road accident and subsequent BLEVE

5. Design changes in the manifold of LPG Tank lorry to ensure:
 - a. Adequate protection to the manifold to ensure that in case of accident minimum damage to the manifold / valves takes place thus preventing the leakage during such emergency.
 - b. In-case of major damage to the manifold - suitable design changes in the Excess Flow Check Valve (EFCV) to prevent uncontrolled leak to the external. This may also include the review in material of construction of the EFCV to increase its strength and avoid its consequent damage which at present is brass – a weak link between the LPG valves and the Tank Truck shell.
 - c. Industry to implement of VTS and AVS on all LPG TTs in line with such features in POL TTs.
 - d. Online driver safety records along with personal details like driving license, validity, hazardous validity, address, Telephone No. to be maintained by OMC for easy identification.

See also valuable information on BLEVEs for firefighters at:

<https://www.firerescue1.com/firefighter-training/articles/what-firefighters-need-to-know-about-bleves-EwLDAJRkaiifadR/>

Appendix 3: Schedule A of the General Machinery Regulations of 1988

United Nations Organisation Identification Number	Substance	Notifiable Quantity in Tonnage
1001	Acetylene (dissolved)	2
1005	Ammonia (anhydrous, liquified and solutions containing over 50% ammonia)	20
1010	Butadiene	25
1031	Carbon disulphide	20
1017	Chlorine	10
1154	Diethylamine	20
1155	Diethyl Ether	20
1033	Dimethyl Ether	20
1032	Dimethylamine (anhydrous)	20
1220	Dimethylamine (solution)	20
1035	Ethane (compressed)	15
1961	Ethane (refrigerated liquid)	15
1962	Ethylene (compressed)	15
1038	Ethylene (refrigerated liquid)	15
1036	Ethylamine	25
1040	Ethylene oxide	5
1050	Hydrogen Chloride (anhydrous)	10
1051	Hydrogen Cyanide (anhydrous)	10
1052	Hydrogen Fluoride (anhydrous)	10
1969	ISO-Butane	25
1055	ISO-Butylene (Isobutene)	25
1075	LPG (Liquid Petroleum Gas)	25
1971	Methane (compressed)	15
1011	n-Butane	25
1012	n-Butylene (Butene)	25
1076	Phosgene	2
1978	Propane	25
1077	Propylene	25
1079	Sulphur Dioxide (liquified)	15
1829	Sulphur Trioxide (liquified)	15
1083	Trimethylamine (anhydrous)	25
1086	Vinyl Chloride	25

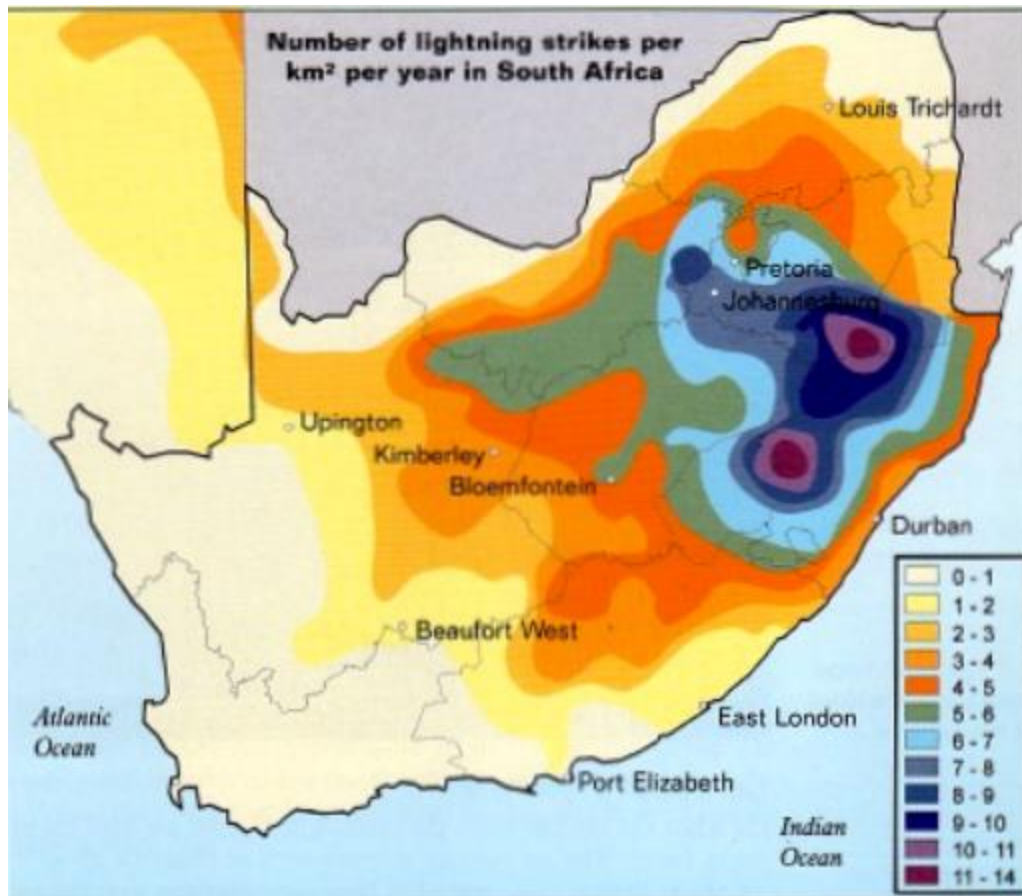
Appendix 4: Site Emergency Response Plan

The emergency response plan was not available at the time of the assessment.

Appendix 5: Average meteorological conditions for South Africa

SA Weather station	Wind direction toxic cloud	Wind speed m/s	Wind calm %	Precipitation mm	Cloud cover %	Ambient temperature °C
Alexander Bay	S	11	28	<100	50	18-20
Bethlehem	E	10	15	700	10	14-16
Bloemfontein	N	10	20	700	20	16-18
Calvinia	W	10	3	150	5	16-18
Cape Town	S	11	25	500	50	16-18
De Aar	SE	11	3	150	5	14-16
Durban	NE	11	45	1 100	50	18-20
East London	SW	11	15	500	50	16-18
Ermedelo	E	6	0.3	700	5	14-16
George	SE	11	30	1 000	30	16-18
Graaff Reinet	S	11	12	300	5	16-18
Johannesburg	N	8	40	500	5	16-18
Kimberley	N	10	28	150	10	16-18
Ladysmith	E	11	15	300	40	14-16
Potlouw	NE	11	39	500	10	18-20
Port Elizabeth	SW	11	20	1 100	50	16-18
Port Shepstone	NE	6	28	700	20	18-20
Stellenbosch	E	11	3	500	50	16-18
Uitenhage	SW	10	26	150	5	18-20
Welkom	NE	10	1	500	5	14-16

Lightning incidence



Appendix 6: Safety data sheet

9/3/2019

Report | CAMEO Chemicals | NOAA



CAMEO Chemicals

[Print](#)

Chemical Datasheet

LIQUEFIED PETROLEUM GAS



Chemical Identifiers

CAS Number	UN/NA Number	DOT Hazard Label	USCG CHRIS Code
68476-85-7	1075	Flammable Gas	LPG
NIOSH Pocket Guide		International Chem Safety Card	
L.P.G.		none	

NFPA 704

data unavailable

General Description

A mixture of butane, isobutane, propane, propylene, butylenes and other hydrocarbons of low molecular weight that is refined from petroleum. Maintained as a liquid under pressure. Leaking vessels can release either the liquid, which quickly vaporizes, or the gaseous mixture. The gas is heavier than air-- a flame can flash back to the source of the leak very easily. Under prolonged exposure to heat the containers may rupture violently and rocket. Used as a fuel, an aerosol propellant, in cigarette lighters, and to make other chemicals.

Hazards

Reactivity Alerts

Highly Flammable

Air & Water Reactions

Highly flammable. No reaction with water.

Fire Hazard

Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

EXTREMELY FLAMMABLE. Will be easily ignited by heat, sparks or flames. Will form explosive mixtures with air. Vapors from liquefied gas are initially heavier than air and spread along ground. CAUTION: Hydrogen (UN1049), Deuterium (UN1957), Hydrogen, refrigerated liquid (UN1966) and Methane (UN1971) are lighter than air and will rise. Hydrogen and Deuterium fires are difficult to detect since they burn with an invisible flame. Use an alternate method of detection (thermal camera, broom handle, etc.) Vapors may travel to source of ignition and flash back. Cylinders exposed to fire may vent and release flammable gas through pressure relief devices. Containers may explode when heated. Ruptured cylinders may rocket. (ERG, 2016)

Health Hazard

Concentrations in air greater than 10%: cause dizziness in a few minutes, 1% concentrations give the same symptom in 10 min. High concentrations cause asphyxiation. (USCG, 1999)

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1/4

9/3/2019

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Reactivity Profile

Saturated aliphatic hydrocarbons, contained in LPG, may be incompatible with strong oxidizing agents like nitric acid. Charring may occur followed by ignition of unreacted hydrocarbon and other nearby combustibles. In other settings, mostly unreactive. Not affected by aqueous solutions of acids, alkalis, most oxidizing agents, and most reducing agents.

Belongs to the Following Reactive Group(s)

- Hydrocarbons, Aliphatic Saturated

Potentially Incompatible Absorbents

No information available.

Response Recommendations

Isolation and Evacuation

Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

As an immediate precautionary measure, isolate spill or leak area for at least 100 meters (330 feet) in all directions.

LARGE SPILL: Consider initial downwind evacuation for at least 800 meters (1/2 mile).

FIRE: If tank, rail car or tank truck is involved in a fire, ISOLATE for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions. In fires involving Liquefied Petroleum Gases (LPG) (UN1075); Butane, (UN1011); Butylene, (UN1012); Isobutylene, (UN1055); Propylene, (UN1077); Isobutane, (UN1969), and Propane, (UN1978), also refer to BLEVE - SAFETY PRECAUTIONS (ERG page 368). (ERG, 2016)

Firefighting

Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED. CAUTION: Hydrogen (UN1049), Deuterium (UN1957) and Hydrogen, refrigerated liquid (UN1966) burn with an invisible flame. Hydrogen and Methane mixture, compressed (UN2034) may burn with an invisible flame.

SMALL FIRE: Dry chemical or CO₂.

LARGE FIRE: Water spray or fog. Move containers from fire area if you can do it without risk.

FIRE INVOLVING TANKS: Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool containers with flooding quantities of water until well after fire is out. Do not direct water at source of leak or safety devices; icing may occur. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. (ERG, 2016)

Non-Fire Response

Excerpt from ERG Guide 115 [Gases - Flammable (Including Refrigerated Liquids)]:

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. If possible, turn leaking containers so that gas escapes rather than liquid. Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material. Do not direct water at spill or source of leak. Prevent spreading of vapors through sewers, ventilation systems and confined areas. Isolate area until gas has dispersed. CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning. (ERG, 2016)

Protective Clothing

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2/4

9/3/2019

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Skin: Wear appropriate personal protective clothing to prevent skin from becoming frozen from contact with the liquid or from contact with vessels containing the liquid.

Eyes: Wear appropriate eye protection to prevent eye contact with the liquid that could result in burns or tissue damage from frostbite.

Wash skin: No recommendation is made specifying the need for washing the substance from the skin (either immediately or at the end of the work shift).

Remove: Work clothing that becomes wet should be immediately removed due to its flammability hazard (i.e. for liquids with flash point < 100°F)

Change: No recommendation is made specifying the need for the worker to change clothing after the work shift.

Provide: Quick drench facilities and/or eyewash fountains should be provided within the immediate work area for emergency use where there is any possibility of exposure to liquids that are extremely cold or rapidly evaporating. (NIOSH, 2016)

DuPont Tychem® Suit Fabrics

No information available.

First Aid

Eye: If this chemical in liquid form contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical.

Skin: If this chemical in liquid form contacts the skin, immediately flush the contaminated skin with water. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water. Get medical attention promptly.

Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. (NIOSH, 2016)

Physical Properties

Chemical Formula: data unavailable

Flash Point: Propane: -156° F (cc); butane: -76° F (cc). (USCG, 1999)

Lower Explosive Limit (LEL): Propane: 2.2 %; butane: 1.8 % (USCG, 1999)

Upper Explosive Limit (UEL): Propane: 9.5 %; butane: 8.4 % (USCG, 1999)

Autoignition Temperature: Propane: 871° F; butane: 761° F (USCG, 1999)

Melting Point: data unavailable

Vapor Pressure: greater than 1 atm (NIOSH, 2016)

Vapor Density (Relative to Air): data unavailable

Specific Gravity: 0.51 to 0.58 at -58 ° F (USCG, 1999)

Boiling Point: greater than -40 ° F at 760 mm Hg (USCG, 1999)

Molecular Weight: greater than 44 (USCG, 1999)

Water Solubility: Insoluble (NIOSH, 2016)

Ionization Potential: 10.95 eV (NIOSH, 2016)

IDLH: 2000 ppm (NIOSH, 2016)

AEGLs (Acute Exposure Guideline Levels)

No AEGL information available.

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3/4

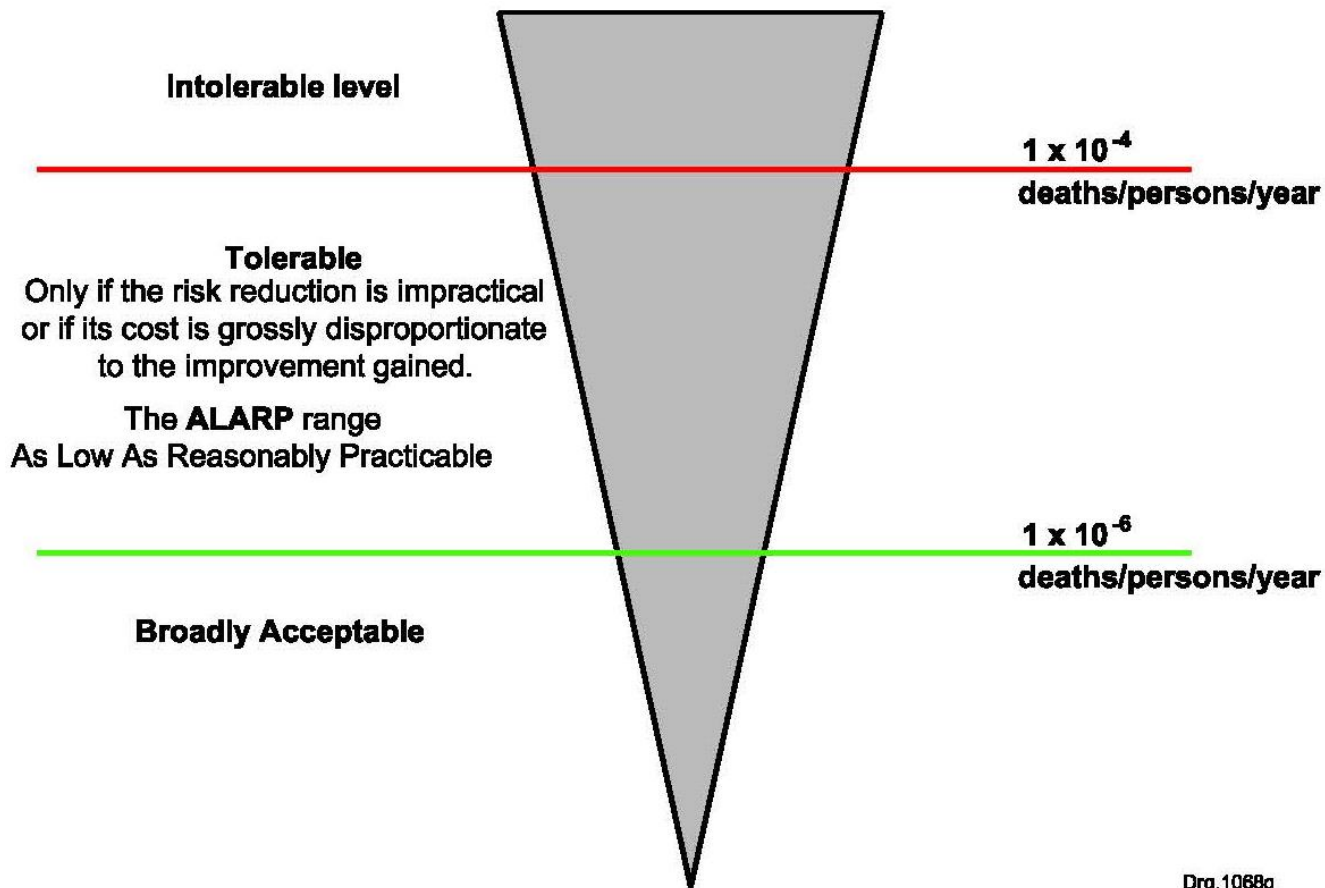
Appendix 7: Generic inspection protocol

Gas and liquid containment systems

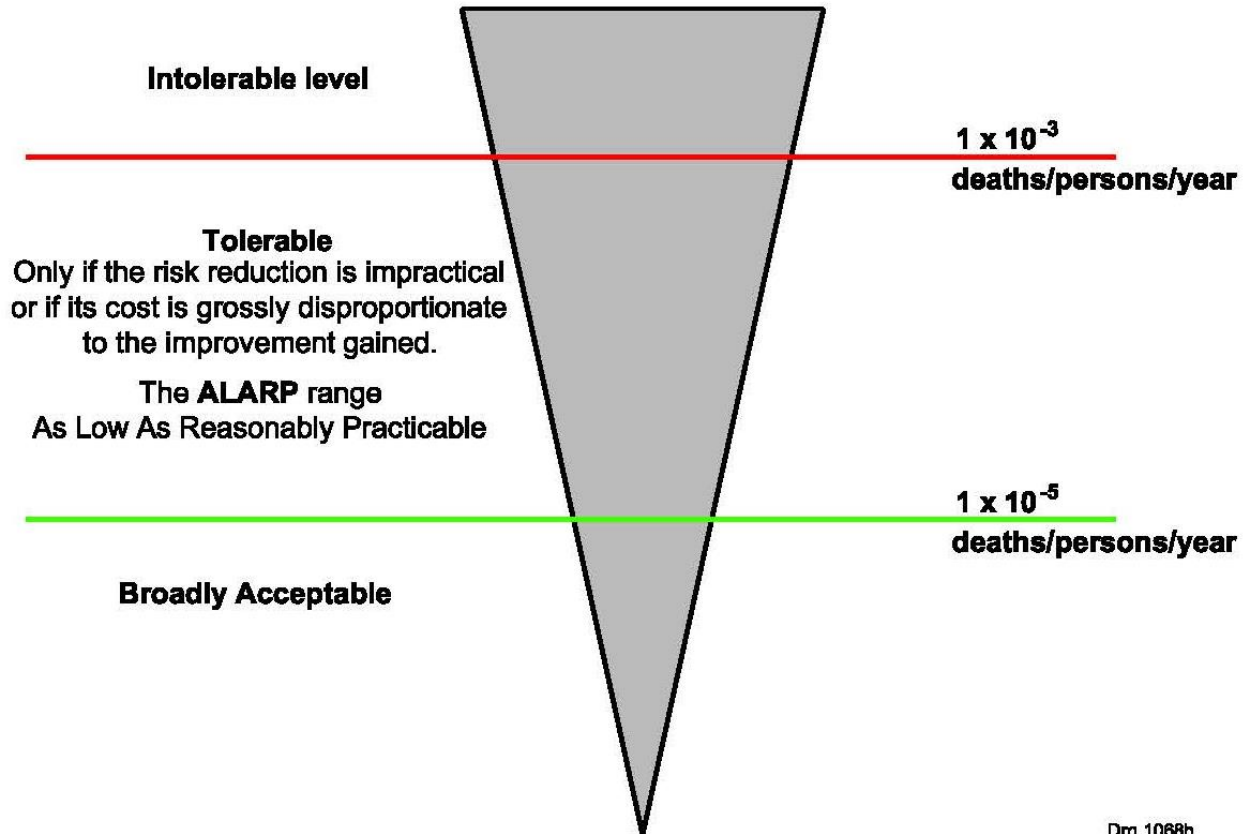
1. Pressure relief valve setting
2. Locality of emergency vent point to atmosphere
3. Flanges discharge side
4. Flanges intake side
5. Pipe nipples
6. Compressor oil drain points
7. Compressor lock-out procedure
8. Compressor shaft seals
9. Drive belts
10. Noticeable excessive vibration on compressor
11. Elbow connections on pipes
12. Valves on pipelines
13. Toxic gas detectors
14. Detectors set point
15. Detectors testing
16. Audio alarm
17. Strobe alarm
18. Alarm linked to security office
19. Emergency contacts external
20. Emergency contacts internal
21. Windsock fitted
22. Windsock condition
23. Compressor mountings
24. Toxic gas smell
25. Ventilation in engine room
26. Emergency switch for compressor shutdown
27. Length of reticulation piping
28. Pressure test certificates for receiver tank
29. Toxic gas replenishment mode
30. Availability of self-contained breathing apparatus
31. Availability of full-face cartridge masks
32. Availability of resistant chemical suits
33. Emergency shower
34. Notice outside engine room with Toxic gas inventory
35. Availability of water source for Toxic gas deluge
36. Classification of Toxic gas engine room: Zone 2
37. Flameproof and spark-proof electrical connections on compressors
38. Training of operators on engine room
39. Emergency training of staff
40. Identification of emergency assembly area
41. Identification of surrounding communities
42. Communication with neighbouring communities
43. Nameplate
44. Heat expansion relief valves on pipelines
45. Water drain valve

46. Intake flange
47. Outlet flange
48. Tank areolation valve
49. Tank areolation valve flanges
50. All Gaskets
51. Cylinder filling pump
52. Electrical connections
53. Area classification Zone 2
54. Tank mountings and plinth
55. Deluge system installed
56. Testing of deluge system
57. Scales
58. Filling platform LPG detectors
59. Flammables certificate
60. Road tanker connection
61. Road tanker filling coupling, dry
62. Road tanker no reverse
63. Isolation valves
64. Isolation valve flanges
65. Earth connections
66. Bund around liquid storage tank
67. Bund drain valve
68. Tank leaks
69. Tank overflow protection.
70. Alarm systems.
71. Deluge systems.
72. Maintenance schedule.
73. Internal inspection registers.

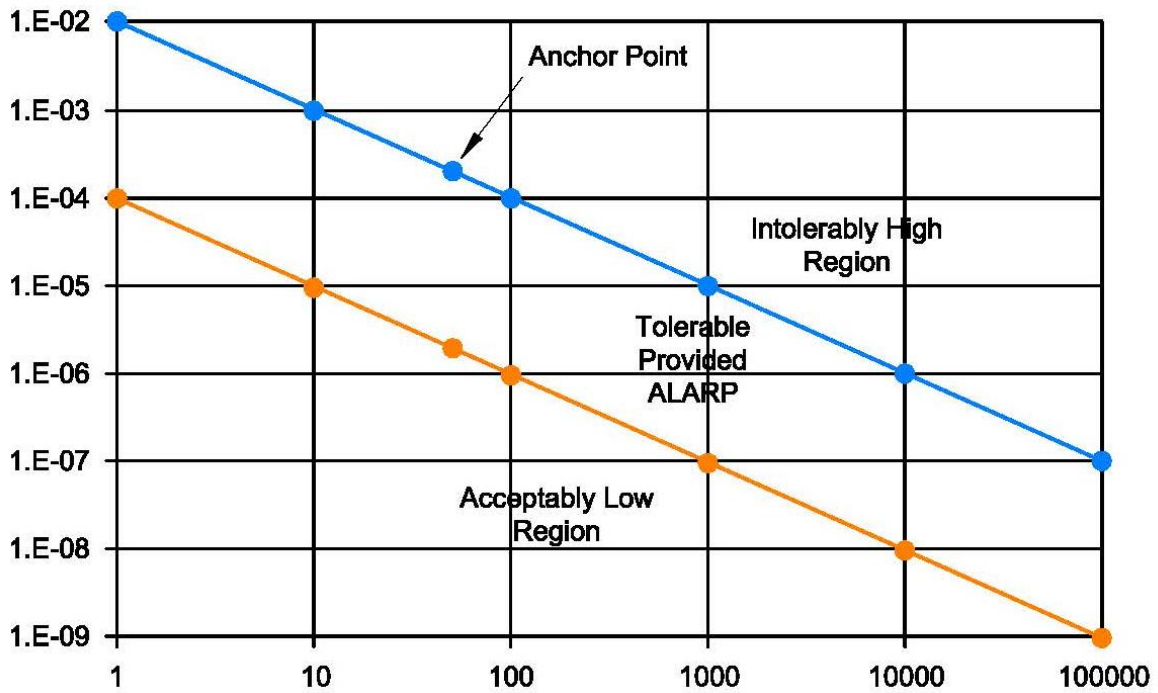
Appendix 8: Risk criteria



The public ALARP risk decision-making framework



The employee ALARP risk decision-making framework



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Societal risk F-N criteria graph used in decision-making

Appendix 9: Selected failure data from BEVI and HSE

Installation component	Failure frequency, per year
Manual valve	1.0 E-4
Remotely controlled shut-off valve	3.0 E-2
Automatic shut-off valve	1.0 E-2
Excess flow valve	1.3 E-2
Flammable warehouse fire	8.8 E-4
Underground LPG tank, instantaneous release	5.0 E-7
Underground storage tank for toxic materials	5.0 E-7
Underground pipeline, rupture	5.0 E-7
Underground pipeline, 20-mm hole	1.5 E-6
Aboveground pipeline, <75 mm diameter, rupture	1.0 E-6
Aboveground pipeline, 75-150 mm diameter, rupture	3.0 E-7
Aboveground pipeline, >150 mm diameter, rupture	1.0 E-7
Aboveground pipeline, <75 mm diameter, 50-mm hole	5.0 E-6
Aboveground pipeline, 75-150 mm diameter, 50-mm hole	2.0 E-6
Aboveground pipeline, >150 mm diameter, 50-mm hole	5.0 E-7
Reciprocating pumps and compressors	4.4 E-3
Heat exchangers	1.0 E-3
Gas road tankers (pressurized; LPG) full release	5.0 E-7
Road tankers with flammable liquid at atmospheric pressure, full release	4.5 E-9
LPG cylinders, catastrophic (HSE)	(1.0 E-6)*2N where N = total number of cylinders on site
LPG storage tank aboveground	9.7 E-7
Human error	3.0 E-3

APPENDIX D: ENVIRONMENTAL MANAGEMENT PLAN

DRAFT



**ENVIRONMENTAL MANAGEMENT PROGRAMME FOR
A LIQUIFIED PETROLEUM GAS REFILL STATION ON
ERF 62 OHRIGSTAD TOWNSHIP, FETAKGOMO-
TUBATSE LOCAL MUNICIPALITY**

ABBREVIATIONS

EMPr:	Environmental Management Programme
NEMA:	National Environmental Management Act
EIA:	Environmental Impact Assessment
I&APs:	Interested and Affected Parties
DEO:	Designated Environmental Officer
ECO:	Environmental Control Officer
SDC:	Safe Disposal Certificate
MSDS:	Material Safety Data Sheets
SANS:	South African National Standards
DWS:	Department of Water and Sanitation

Table of Contents

ABBREVIATIONS.....	1
1 INTRODUCTION.....	4
1.1 Purpose of the EMPr	4
1.2 Project Location	5
1.3 Environmental Assessment Practitioner (EAP)	6
1.3.1 Expertise of the EAP	6
2 DESCRIPTION OF THE ACTIVITY	7
2.1 Non-technical process description	8
2.2 Number of employees on site.....	8
2.3 Listed and specified activities	9
3 LEGISLATIVE FRAMEWORK	9
4 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS.....	11
4.1 Management Structure	11
4.2 Roles and Responsibilities.....	11
4.2.1 Redgas	11
4.2.2 Designated Environmental Officer	11
4.3 Emergency Preparedness	12
4.4 Checking and Corrective Action	13
4.4.1 Non-Compliance.....	13
4.4.2 Monitoring.....	13
5 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME	14
6 ASSESSMENT APPROACH TO ENVIRONMENTAL ISSUES	14
6.1 Operational Phase.....	15
6.2 Impacts from Decommissioning	19
7 EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT	21
7.1 PURPOSE.....	21
7.2 Emergency Response Plan.....	22
7.2.1 Fire and Explosion.....	22

7.3 PROCEDURE RESPONSIBILITY 25

LIST OF TABLES

Table 1: Site geographical coordinates..... 5
Table 2: Details of the EAP..... 6
Table 3: Hazardous installations identified within the premises..... 8
Table 4: Listed and specified activity 9
Table 5: Applicable legislation, policies and/or guidelines that or are relevant 9

LIST OF FIGURES

Figure 1: Project location 6
Figure 2: Conceptual process description 8

1 INTRODUCTION

The Bill of Rights – Chapter 2 of the Constitution Act No. 108 of 1996, includes an environmental right (Section 24) according to which, *“everyone has the right to an environment that is not harmful to their health or well-being and 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 the sustainable use of natural resources while promoting justifiable economic and social development”*. In addition, Section 28 of the National Environmental Management Act No 107 of 1998 (NEMA), requires, *“every person causing significant pollution or degradation of the environment, to take reasonable measures to prevent it from occurring, continuing or recurring”*. Therefore, in order to promote effective environmental management throughout the life-cycle of a project, it is important that management actions arising from Environmental Impact Assessments (EIAs) are clearly defined and translated into an Environmental Management Programme (EMPr) for the design, construction, operation and/or decommissioning phases of a project.

According to the Western Cape Department of Environmental Affairs and Development Planning (2005), an Environmental Management Programme (EMPr) can be defined as, *“an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced”*.

1.1 Purpose of the EMPr

The purpose of an EMPr is therefore to:-

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
 - Minimise the extent of environmental impacts and to manage environmental impacts and where possible, to improve the condition of the environment;
 - Prevent long-term or permanent environmental degradation.
 - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
 - Provide guidance regarding method statements which are required to be implemented to achieve environmental specifications;
 - Define the corrective actions which must be taken in the event of non-compliance with the specifications of the EMPr;
 - Describe all monitoring procedures required to identify impacts on the environment, and;

- Train employees and contractors with regard to environmental obligations.

1.2 Project Location

The development is located on Erf 62, Carl Thrichardt Street, Ohrigstad within Fetakgomo – Tubatse Local Municipality of Sekhukhune District. The site geographical coordinates are:

Table 1: Site geographical coordinates

Southings	24°44'59.33"
Eastings	30°33'44.05"

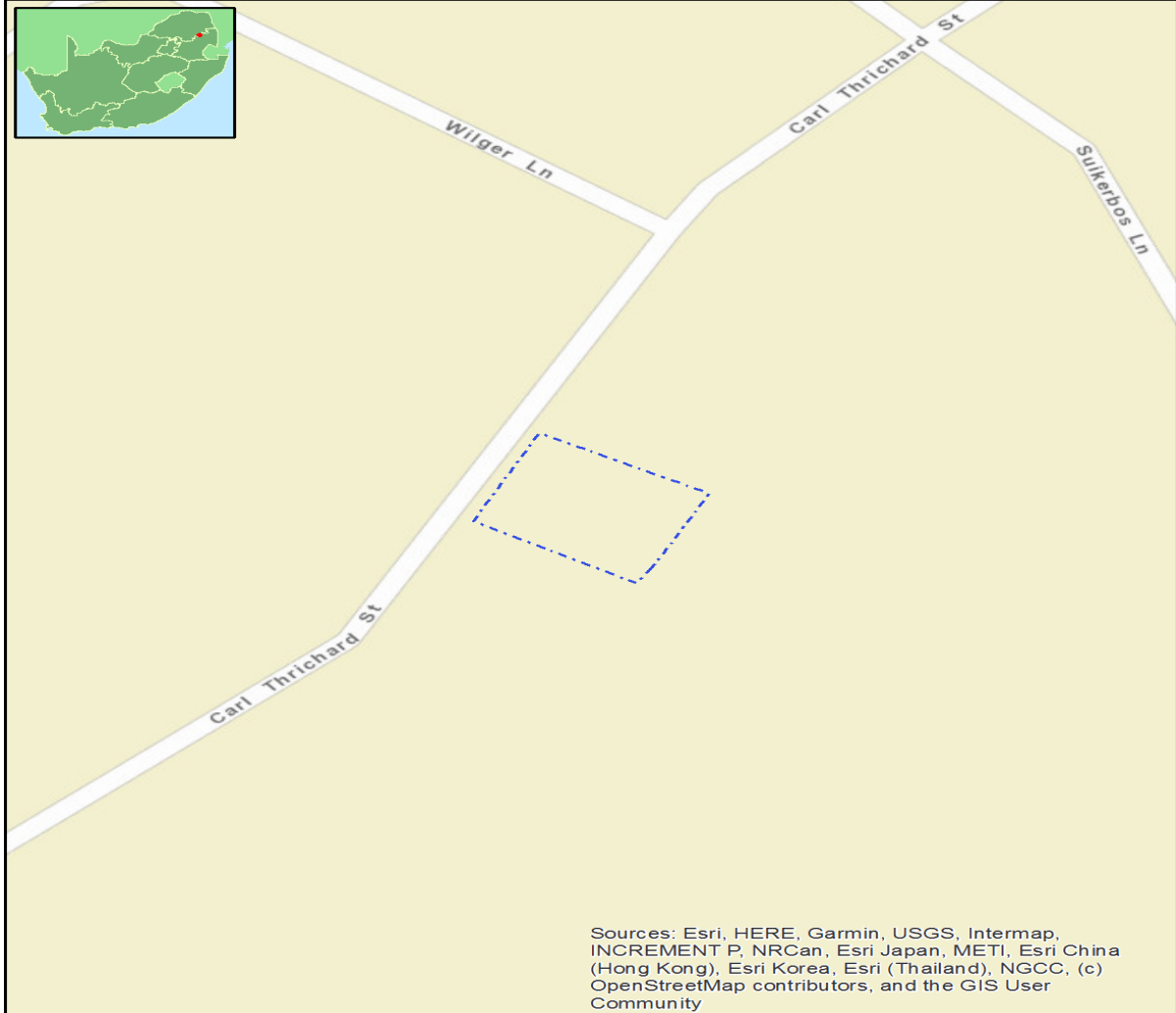




Figure 1: Project location

1.3 Environmental Assessment Practitioner (EAP)

GCC Sustainable Consulting Engineers (Pty) Ltd (henceforth, GCC Consulting) was appointed by Redgas as the Environmental Assessment Practitioner (EAP) to undertake the necessary Section 24G EA application processes required by the applicable legislation. In this regard, GCC Consulting has on behalf of Redgas, applied for the rectification of unlawful commencement of listed activities in terms of Section 24G of the NEMA, as amended, to the competent authority (CA), the Limpopo Department of Economic Development, Environment and Tourism (LEDET).

Table 2: Details of the EAP

Independent EAP	GCC Sustainable Consulting Engineers (Pty) Ltd
Responsible person	Gumisai Charles Chigurah
Address	51 Lloyd Road, Birchleigh North, Kempton Park. 1618
Email	charles@gccsustainableconsultingengineers.co.za
Professional affiliation	Environmental Assessment Practitioners Association of South Africa (EAPASA); registration number: 2019/727

1.3.1 Expertise of the EAP

Charles Chigurah holds an honours degree in Environmental Management from the Midlands State University in Zimbabwe. Postgraduate Diploma in Water Supply and Sanitation from the Institute of Water Supply, Sanitation and Development in Zimbabwe. He holds SAMTRAC and he

is currently finalizing his NEBOSH International Diploma in Occupational Safety and Health. He is a Senior SHE Consultant and a member of International Association of Impact Assessors (IAIA), South African Council for Natural Scientific Professions (SACNASP). Charles is a member of Institute of Waste Management in Southern Africa (IWMSA), and he is registered with the South African Council for Project and Construction Management Professions (SACPCMP) as a Construction Health and Safety Manager (CHSM). He has more than 9 years working experience in the field of Construction, Waste Management, Environmental Management and Environmental Management Systems (EMS) Implementation and Auditing and has published a paper in Geographical Information Systems (GIS) and Remote Sensing. He has worked on several municipality projects and herewith is selected few completed projects:

- a) Integrated Waste Management Plan for Nkonkobe Local Municipality
- b) Integrated Waste Management Plan for Tokologo Local Municipality
- c) Integrated Environmental Management Plan for Xhariep District Municipality
- d) Environmental Management Framework for Amajuba District Municipality
- e) Integrated Waste Management Plan for Tubatse-Fetakgomo Local Municipality

Apart from doing municipality projects, Charles has also managed more than fifty (50) Environmental Impact Assessment Projects both in Zimbabwe and South Africa. He has also worked as a Construction SHE Advisor and Consultant on a number of major construction projects across South Africa, among them include the construction of multi-storey buildings in Mpumalanga and Limpopo Provinces; the construction of gas pipelines for Sasol in Gauteng, the construction and upgrades of road networks in Limpopo Province as well the construction and upgrades of Bulk Water and Sewer Systems for Ekurhuleni Metropolitan Municipality and was also a Safety Advisor for Eskom Hendrina Power Station responsible for managing sub-contractor's safety officers.

2 DESCRIPTION OF THE ACTIVITY

Redgas proposes to install a bulk LPG tank of 35 000 litres aboveground in Ohrigstad. The LPG product is used to fill cylinders at a filling platform.

Table 3: Hazardous installations identified within the premises

Name	Inventory	Throughput	Release Quantity
LPG tank storage	One tank of 35 000 litres	35 000 litres every 2 weeks	35 000 litres
LPG road tank	45 000 litres	45 000 litres every 2 weeks	45 000 litres 24 750 kg
LPG cylinders	2 000 cylinders of 48/19/9 kgs maximum	500 cylinders per day	48 kg

2.1 Non-technical process description

Redgas will receive LPG from road tankers (capacity 45 000 litres) and store it in one aboveground tank. Road tankers will deliver on average 17 000 litres per week to the site. LPG is used to fill cylinders. For total quantity and inventory refer to Table 3.

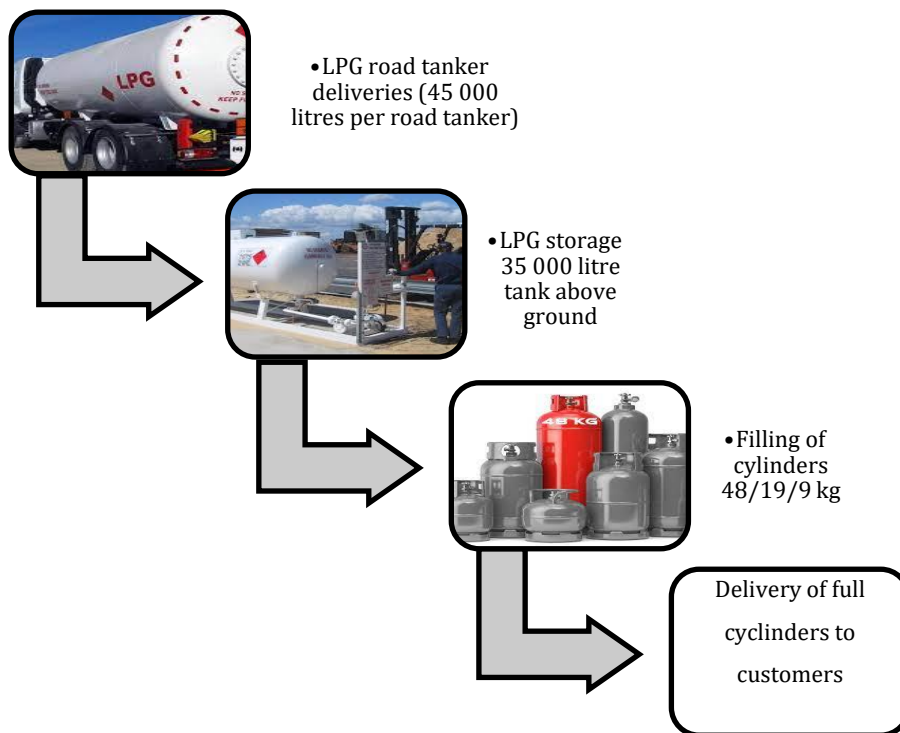


Figure 2: Conceptual process description

2.2 Number of employees on site

The maximum total number of employees, contractors and visitors on site are as follows:

- Dayshift: 4 comprising employees and contractors in peak time.

- Nightshift: 1 security guard.
- Work hours: 06:00 – 18:00.

2.3 Listed and specified activities

The listed and specified activity is provided in Table 4

Table 4: Listed and specified activity

Indicate the number and date of the relevant notice	Describe each listed activity as per project description
GNR 985, 08 December 2014 Activity 10	The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres

3 LEGISLATIVE FRAMEWORK

The following is a summary of the environmental legislation applicable to the proposed project.

Table 5: Applicable legislation, policies and/or guidelines that or are relevant

Applicable legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments considered	Project application and type (permit / licence / authorisation / comment)
The Constitution of South Africa, Act No. 108 of 1996	To guarantee that social and environmental management aspects are taken into account and put into practise, Redgas will need to abide by the Environmental Management Programme (EMPr) criteria. A public participation process (PPP) will be implemented in accordance with Section 24 of the Constitution because it is thought to be a crucial instrument for informing stakeholders of their rights and obligations with regard to the project.

Applicable legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments considered	Project application and type (permit / licence / authorisation / comment)
National Environmental Management Act, 1998 (Act No. 107 of 1998)	A 24G rectification process is undertaken to obtain authorisation for listed activities included within GNR 983, and GNR 985 of 2014 (as amended in 2017), that have commenced without the required environmental authorisation
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Threatened Terrestrial Ecosystems for South Africa, 2011 Limpopo Conservation Plan, 2013	Within the framework of the National Environmental Management Act of 1998, the Act provides for the management and conservation of South Africa's biodiversity, as well as the protection of species and ecosystems that require protection. The site falls within no natural remaining area in terms of Sekhukhune Bioregional Plan of 2019.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	In order to safeguard both human and environmental health, the National Environmental Management: Waste Act mandates measures for the management of waste and the prevention of pollution and ecological damage. The facilities must manage and dispose of all waste in compliance with this Act and any applicable bylaws, despite the fact that no waste management licence is necessary for operation of the facilities.
Limpopo Environmental Management Act, 2003 (Act No. 7 of 2003)	The Act addresses a wide range of issues, including protected areas, hunting, fishing, the preservation of native vegetation, etc. It also addresses the protection and conservation of the environment in the Limpopo Province.

Applicable legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments considered	Project application and type (permit / licence / authorisation / comment)
	Therefore, Redgas must abide by the Act and the rules established by the Limpopo Environmental Management Act, 2003.

4 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

4.1 Management Structure

The Contractor must compile an organogram illustrating the management structure for inclusion within the final EMPr. This organogram should depict the organisation structure of the Contractor and must contain supporting documentation to demonstrate the environmental responsibilities, accountability, and liability of the Contractor's employees. The Contractor should assign responsibilities for the following:

- Reporting structures.
- Actions to be taken to ensure compliance.
- Overall design, development, and implementation of the EMPr.
- Documenting the environmental policy and strategy.
- Implementing the EMPr in all stages/phases of the project.
- All the aspects which require action under the other core elements and sub-elements of the EMPr.

All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisation structure.

4.2 Roles and Responsibilities

4.2.1 Redgas

Redgas is the client and will therefore be the entity monitoring the implementation of the EMPr.

4.2.2 Designated Environmental Officer

Redgas shall appoint a nominated representative of the as the Environmental Officer (EO) for the site. The EO will be site-based and shall be the responsible person for implementing the EMPr.

The EO's duties will include, *inter alia*, the following:

- Ensuring that all the permits required in terms of the applicable legislation are still valid and complied with.

- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the manager.

4.3 Emergency Preparedness

Redgas shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts. Such activities may include, *inter alia*:

- Accidental discharges to stormwater.
- Accidental exposure of employees to hazardous substances.
- Accidental spillage of hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability, and liability.
- A list of key personnel.
- Details of emergency services applicable to the various areas along the route (e.g., the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.
- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

Redgas shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the National Environmental Management Act, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

4.4 Checking and Corrective Action

4.4.1 Non-Compliance

Non-compliance with the specifications of the EMPr and/or conditions of any environmental permits, both of which will be present on-site at all times, constitutes a breach of contract. Redgas is deemed not to have complied with the EMPr if:

- Environmental damage ensues due to negligence;
- Redgas shall act immediately when a notice of non-compliance is received and correct whatever was the cause for the issuing of the notice.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed therefore any avoidable non-compliance, dependant on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities.

4.4.2 Monitoring

A monitoring programme will be implemented for the duration of the operation phase of the project. This programme will include:

- **Performance Audits:** Annual inspection reports which are performance based compiled by the ECO. This must also incorporate monitoring of compliance issues as well as permits, licenses, the EMPr and all contract documentation's conditions.
- **Compliance Audits:** The auditor will initially undertake compliance audits quarterly. Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities as and when required.

The following will also assist with monitoring: -

Complaints Register

Redgas will ensure that a dedicated Complaints Register is kept on site at all times. The register will contain the details of the person who made the complaint, the nature of the complaint received, the date on which the complaint was made, and the response noted with the date and action taken.

Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident (within 24 hours). The following information must be provided:

- The location;

- The nature of the load; and
- The status at the site of the accident itself (i.e., whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

5 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

It is necessary for Redgas to make provisions as part of their budgets for the implementation of the EMPr. In terms of the NEMA an individual responsible for environmental damage must pay costs both to the environment and human health and the preventative measures to reduce or prevent additional pollution and/or environmental damage from occurring. This is referred to as the Polluter Pays Principle. Section 28 of the NEMA embodies the Polluter Pays Principle.

6 ASSESSMENT APPROACH TO ENVIRONMENTAL ISSUES

The assessment and description of identified environmental issues were conducted according to the structure and approach detailed below. The following is a brief description of how these impacts were identified and rated. The approach may be tailored and altered where required to deal adequately with the description and assessment of a specific impact.

6.1 Operational Phase

Aspect	Impact	Mitigation Measures	Responsibility
Surface and ground water pollution	Water may be contaminated from used materials such as, oil cans from vehicle and trucks, paints containers, oil leaks from trucks	<ul style="list-style-type: none"> • Develop a waste management strategy with strong emphasis on Reduce, Re-Use, Re-Cycle • Provide skip bins for hazardous waste such as oil cans • Introduce oil leak prevention such as drip trays under stationary vehicles etc. • All hydrocarbons must be stored on concrete banded areas 	Redgas
Air Quality	LPG is a clean fuel technology and itself shall not pose threat to the environment through emissions. However, emission from indirect sources such as trucks and vehicle exhaust may increase. The areas shall be paved, hence there shall be no aspects of dust pollution	<ul style="list-style-type: none"> • All stationary vehicles must be switched off • Ensure road worthiness and encourage trucks and vehicle are frequently serviced by owners 	Redgas
Noise	The operation of the LPG plant shall not produce noise. However, noise will produce from loading and delivery trucks	<ul style="list-style-type: none"> • Delivery trucks must be well serviced to prevent excessive noise • Stationary truck must have their engine switched off at all times 	Redgas
Flora	The operation of the project is not expected to impact flora. The remaining tress must be well kept, and trimmed to ensure good land scape	<ul style="list-style-type: none"> • Ensure good landscaping by trimming remaining trees 	Redgas

Aspect	Impact	Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> • Frequent watering of the remaining trees 	
Fauna	The operation of the project is not expected to impact on fauna, since the area shall be fenced off and animals shall not have access to the site	No killing of any type of animal is allowed	Redgas
Health	LP Gas is not known to cause health problems aside from cold burns to the skin and unconsciousness at high concentrations	<ul style="list-style-type: none"> • For cold burns, immediately flush the area with cold water. • If exposed to high concentration, switch off the gas transmission and go to an open area with sufficient air circulation 	Redgas
Safety	If leakage occurs, LPG vapours can collect on the ground and in drains or basements and if the gas meets a source of ignition it can burn. LPG cylinders can explode if involved within a fire.	<ul style="list-style-type: none"> • Avoid at all times any source of ignition material on the premises • Develop a fire safety policy with clear procedures and guidelines on how to react to LP gas fire • Staff must be properly trained on how to react and handle fire • There must be an automatic fire alarm system installed at the site 	Redgas

Aspect	Impact	Mitigation Measures	Responsibility
		<ul style="list-style-type: none"> • Firefighting equipment must be on site 24hours and regularly inspected to ensure that they are working • Emergency response numbers must be on clear and visible space • There must be clear hazard signage reading “NO OPEN FIRE” “NO SMOKING” and “SWITCH ENGINE OFF” • There must be drills to test staff on their readiness to fight fires • The site must be fenced off by a boundary wall (in case there is bush / veld fire outbreak) • Provide personnel with full protective clothing such as full- face air supplied or self- contained breathing apparatus, overalls, thermal insulated gloves, splash-proof goggles and non-sparking boots. 	
Air quality	<p>LPG is a clean fuel technology and itself shall not pose threat to the environment through emissions. However, emission from indirect sources such as trucks and vehicle exhaust may</p>	<ul style="list-style-type: none"> • All stationary vehicles must be switched off • Ensure road worthiness and encourage trucks and vehicle are frequently serviced by owners 	Redgas

Aspect	Impact	Mitigation Measures	Responsibility
	increase. The areas shall be paved, hence there shall be no aspects of dust pollution		
HIV/AIDS, Alcohol and Drug abuse	The employment opportunity to be created may cause behaviour change in a society. Truck driver are mostly compromised by risky sexual behaviour. South Africa has high prevalence of HIV/AIDS, and it is important to ensure that employees are sensitized about the pandemic	<ul style="list-style-type: none"> • Provide awareness to the employees / recyclers on the danger of alcohol and drug abuse • Provide condoms on site 	Redgas
Waste Management	The improper storage of waste and hydrocarbons could potentially result in the contamination of stormwater flows from the site during operation.	<ul style="list-style-type: none"> • All hazardous waste generated by the facility must be stored in an enclosed, banded purpose-built facility for collection by a registered waste contractor prior to safe disposal. Such disposal facilities must not be located within close proximity to adjacent industrial areas. • General waste from the site will be disposed of into the municipal waste stream 	Redgas
Employment	The project is expected to create permanent employment opportunities that will improve the socio-economic condition of the people	Ensure that any new job opportunities are extended to local community members	Redgas

6.2 Impacts from Decommissioning

Aspect	Impact	Mitigation Measures	Responsibility
Tanks and gas piping	If not properly done, the decommissioning of the tank and the gas pipelines can lead to major leaks that could pollute the environment, both solar and air.	Prior to the tanks and associated piping being decommissioning, residue product must be carefully removed from the system for recycling or safe disposal	Redgas
Health	LP Gas is not known to cause health problems aside from cold burns to the skin and unconsciousness at high concentrations	<ul style="list-style-type: none"> • For cold burns, immediately flush the area with cold water. • If exposed to high concentration, switch off the gas transmission and go to an open area with sufficient air circulation 	Redgas
Air quality (dust)	During the decommissioning phase of the development, there will be localised fugitive dust emissions due to decommissioning activities and the hauling and trucking of materials around the site	Ensure that appropriate dust suppression is undertaken on site so as to avoid nuisance impacts to neighbouring properties	Redgas
Traffic	A short-term, limited increase of vehicles on the roads could potentially result in traffic impacts in the vicinity of the site	Ensure that vehicles conduct decommissioning activities during non-peak times to minimise traffic disruption.	Redgas
Waste Management	The improper storage of waste and hydrocarbons could potentially result in the	<ul style="list-style-type: none"> • All hazardous waste generated by the facility must be stored in an enclosed, banded purpose-built facility for 	

Aspect	Impact	Mitigation Measures	Responsibility
	contamination of stormwater flows from the site during decommissioning	<p>collection by a registered waste contractor prior to safe disposal. Such disposal facilities must not be located within close proximity to adjacent industrial areas.</p> <ul style="list-style-type: none"> • General waste from the site will be disposed of into the municipal waste stream 	
Employment	Decommissioning is expected to create temporary employment opportunities that will improve the socio-economic condition of the people	Ensure that any new job opportunities are extended to local community members	Redgas
Noise	Decommissioning activities will result in short term noise impacts	Decommissioning activities should only take place during daylight hours	Redgas

7 EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT

7.1 PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective responses to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency responses and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of the construction phase detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Identification of areas where accidents and emergency situations may occur;
- Communities and individuals that may be impacted;
- Response procedure;
- Provisions of equipment and resources;
- Designation of responsibilities;
- Communication; and
- Periodic training to ensure effective response to potentially affected communities.

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arise during the construction and operation phases:

- Fires;
- Leakage of hazardous substances;
- Storage of flammable materials and substances;
- Flood events;
- Accidents; and
- Natural disasters

7.2 Emergency Response Plan

There are three levels of emergency as follows:

- **Local Emergency:** An alert confined to a specific locality.
- **Site Emergency:** An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
- **Evacuation:** An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation. Every effort must be made to control, reduce, or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur

7.2.1 Fire and Explosion

i. Action Plan

The following action plan is proposed in the event of a fire:

- Quantify risk.
- Assess person safety, safety of others and environment.
- If safe – attempt to extinguish the fire using appropriate equipment.
- If not safe to extinguish, contain fire.
- Notify the Depot Manager and emergency response crew and authorities.
- Inform users of the potential risk of fire.
- Record the incident on the company database or filing register.

ii. Procedures

Because large scale fires may spread very fast it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire. Portable firefighting equipment must be provided at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including portable fire extinguishers, hose reels and hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and national standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

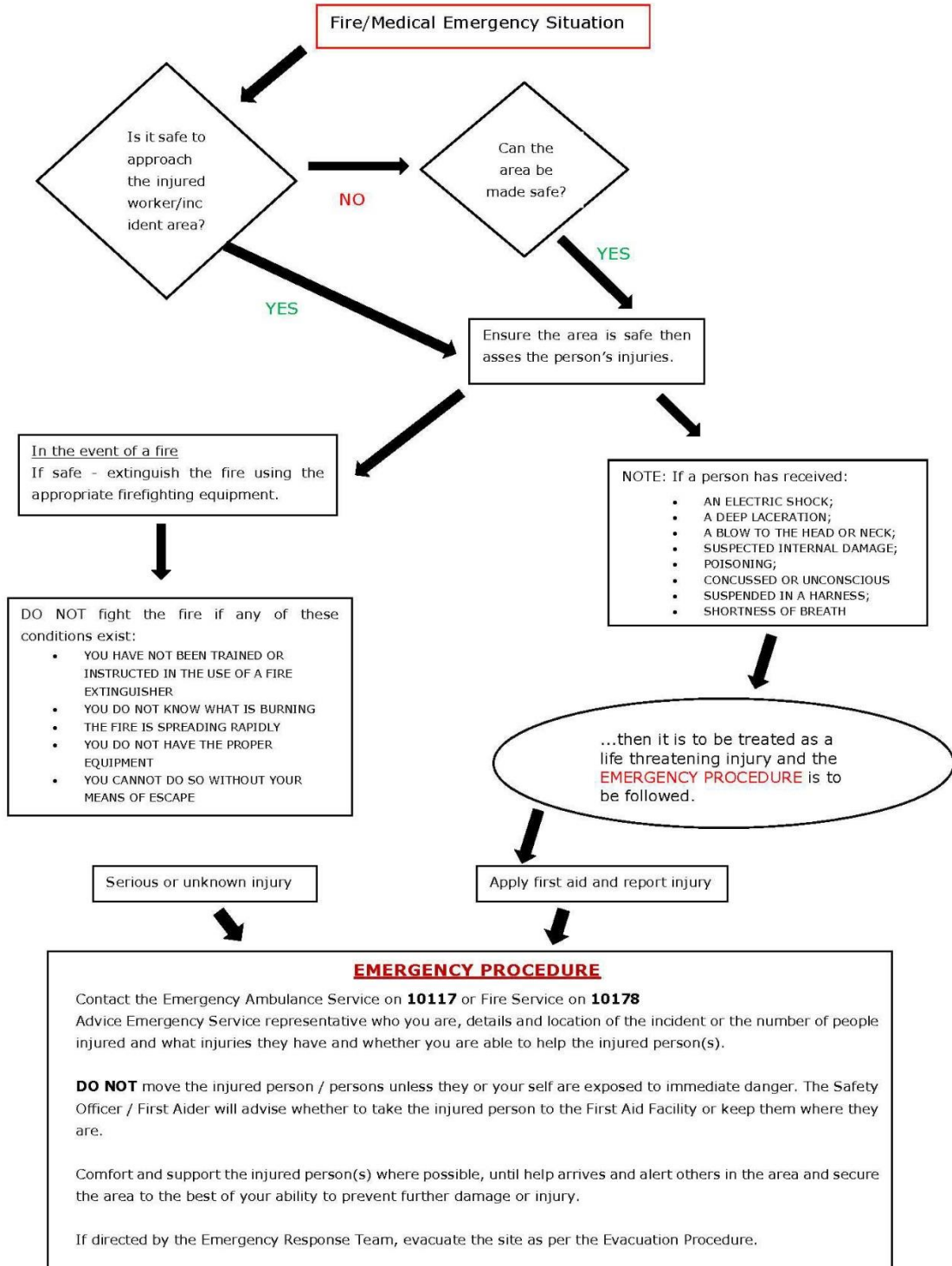
Persons should not fight the fire if any of the following conditions exist:

- They have not been trained or instructed in the use of a fire extinguisher.
- They do not know what is burning.
- The fire is spreading rapidly.
- They do not have the proper equipment.
- They cannot do so without a means of escape.
- They may inhale toxic smoke.

b) Reporting procedures

- In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality.
- Report fire immediately to the depot manager, who will determine if it is to be reported to the relevant emergency services and authorities.
- The depot manager must have copies of the Report form to be completed

Fire/Medical Emergency Situation



7.3 PROCEDURE RESPONSIBILITY

Redgas's Safety, Health, and Environment (SHE) Representative is responsible for managing the day-to-day on-site implementation of this Plan, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes

APPENDIX E: PUBLIC PARTICIPATION PROCESS

DRAFT

APPENDIX E1: SITE NOTICES

DRAFT

**CONSTRUCTION OF LIQUIFIED PETROLEUM GAS STORAGE TANK ON ERF 62, CARL TRICHARDT STREET,
OHRIGSTAD WITHIN FETAKGOMO LOCAL MUNICIPALITY, LIMPOPO PROVINCE:**


**NOTIFICATION OF INTENTION TO SUBMIT AN APPLICATION FORM IN TERMS OF SECTION 24G OF THE NATIONAL
ENVIRONMENTAL MANAGEMENT ACT (NEMA) (107 OF 1998) AND NOTIFICATION OF AVAILABILITY OF THE
AFOREMENTIONED DOCUMENTS FOR COMMENT**

S24G ENVIRONMENTAL IMPACT ASSESSMENT PROCESS:

LEDET Ref No.: 12/1/9/S24G-GS40

Redgas LPG Refill Station (Pty) Ltd commenced with and stopped the construction and installation of an LPG Storage tank, located on Erf 62 Carl Trichardt Street, Ohrigstad during 2022.

Southings	24°44'59.33"
Eastings	30°33'44.05"



The storage tank will have a capacity of 35 000 litres and an additional 2000 cylinders will be stored on site. No Environmental Authorisation was obtained prior to commencement of construction. The Applicant now wishes to complete the construction and installation of the storage tank on site, subject to the approval of Environmental Authorisation.

GCC Sustainable Consulting Engineers (Pty) Ltd has been appointed by Redgas to undertake the requisite Environmental Impact Assessment process for the project (in this case a Section 24G process) in accordance with the National Environmental Management Act (NEMA) (No. 107 of 1998), as amended, EIA Regulations (2014).

Potential Interested & Affected Parties (I&APs) have 30 days (excluding public holidays and construction break), i.e. until 13 January 2023, to register as I&APs and raise any initial issues or concerns related to the proposed project and the aforementioned documents. Any comments received from I&APs will be incorporated into a Comments and Response Report.

Should you have any comments, issues or concerns regarding the proposed project, please provide your comments in writing to

Charles of GCC Sustainable Consulting Engineers, by email or SMS (email:

charles@gccsustainableconsultingengineers.co.za), SMS: 0735658847) on or before 13 January 2023.



APPENDIX E2: NEWSPAPER ADVERT

DRAFT

CLASSIFIEDS

Lydenburg 013-591-4697

Weekly distribution of 18 000 copies

Deadlines

All classifieds display, block or lineage adverts: Tuesday by 11:00

How to advertise

Step 1
Prepare the outline of your wording
Step 2
Have your telephone number, address, ID number and postal details ready
Step 3
Our consultant will assist you in the placing of important details regarding your item for sale, vacancy or service

Cost Of Advert (Newspaper & Website)

The minimum cost of the advertisement will depend on the number of lines and the number of insertions. e.g.: The first 5 lines cost R119.00 thereafter, R12,50 per line (two to three words per line)

Remember: For private advertisers. The more you tell the more you sell!

Payment: First time advertisers are required to pay cash at Lowveld Media or by EFT payment into the Lowveld bank account. A 30 day account is available once a credit application is approved.

Adjustments & Errors

Display Adverts:
Although every effort is made to place display adverts next to relevant columns we cannot guarantee that this will be done. All display adverts will be placed as close to the relevant column as possible. The newspaper accepts no responsibility for more than one incorrect insertion of any classified advertisement or any costs beyond the costs of the space occupied by the error. All queries on the advertisement and account must reach the newspaper within 14 days of publication of advertisement. Failure to do so will result in the order and advertisement accepted as correct. No further discussions will be entered into.

The use of the letter "A":

For the purpose of bringing the advert to the top of a classification, this is strictly prohibited. The right is reserved to withhold advertisement for publication and to cancel any order that has been accepted.

Cancellations

When cancelling an advert you must receive a cancellation ref number - no queries can be dealt with if you do not quote this number. Cancellation of advert will only be accepted in writing.

Classifieds Consultants

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Home Improvement/ Property/For Sale
Motoring/ Notices/ Services/ Vacancies
Legal Notices

CAUTION

In general, you should be vigilant when contacting anyone who seeks to do business with you. This remains true even though we make this platform available in good faith, and appreciate our advertisers. Check the credentials of those with whom you do business, before you do business with them. Beware of job scams – if someone asks you for a deposit or your bank details in exchange for offering recruitment services or jobs, do not proceed. If you are looking to buy a product, do research to ensure that you pay a fair price for a worthy product. Do not pay a deposit if you have not confirmed that the product you secure is available and worth every cent. This publication does not take responsibility for the contents of classified advertisements. Take responsibility for your safety while doing business.

Circulating in Burgersfort, Steelpoort, Ohrigstad, Lydenburg and surrounding areas.

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NOTICES

0035 DEATHS



084-587-5666
DE CLERQ STR 67
LYDENBURG

FARMER Noreen Ann
Gebore: 1948-03-25
Afsterwe: 2022-11-08
CP007913



084-587-5666
DE CLERQ STR 67
LYDENBURG

FOURIE Barend Rudolf
Gebore: 1966-10-05
Afsterwe: 2022-11-07
CP007909

SERVICES

0309 BUILDING CONSULTANTS / DESIGNS / PLANS

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• All building structures
• Competitive prices
• Professional services
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sanmos@telkomsa.net
CP007884

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0515 FLATS / UNITS

WOONSTEL LYDENBURG
2 Slk woonstel.
R4,000 pm.
Krugerspost, 20 km vanaf Lydenburg op Ohrigstad-pad
Skakel: Johan
082-253-4525
CP007892

VACANCIES

0878 GENERAL EMPLOYMENT WANTED

ELMON
I WANT WORK AS A DRIVER. I have Code 10 licence and Forklift experience. Available immediately.
082-690-9279
BG000009

LEGALS

0910 PUBLIC / LEGAL NOTICES

NOTICE OF CONSTRUCTION OF LIQUIFIED PETROLEUM GAS STORAGE TANK ON ERF 62, CARL TRICHARDT STREET, OHRIGSTAD WITHIN FETAKGOMO LOCAL MUNICIPALITY, LIMPOPO PROVINCE: NOTIFICATION OF INTENTION TO SUBMIT AN APPLICATION FORM IN TERMS OF SECTION 24G OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (NEMA) (107 OF 1998) AND NOTIFICATION OF AVAILABILITY OF THE FOREMENTIONED DOCUMENTS FOR COMMENT S24G ENVIRONMENTAL IMPACT ASSESSMENT PROCESS: LEDET
Ref No.: 12/19/S24G-GS40
Redgas LPG Refill Station (Pty) Ltd commenced with and stopped the construction and installation of an LPG Storage tank, located on Erf 62 Carl Trichardt Street, Ohrigstad during 2022. Southings 24°44'59.33" Eastings 30°33'44.05"
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GCC Sustainable Consulting Engineers (Pty) Ltd has been appointed by Redgas to undertake the requisite

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Pieter Nel Attorneys Inc

Environmental Impact Assessment process for the project (in this case a Section 24G process) in accordance with the National Environmental Management Act (NEMA) (No. 107 of 1998), as amended, EIA Regulations (2014).
Potential Interested & Affected Parties (I&APs) have 30 days (excluding public holidays and construction break), i.e. until 13 January 2023, to register as I&APs and raise any initial issues or concerns related to the proposed project and the aforementioned documents. Any comments received from I&APs will be incorporated into a Comments and Response Report.
Should you have any comments, issues or concerns regarding the proposed project, please provide your comments in writing to Charles of GCC Sustainable Consulting Engineers, by email or SMS (email: charles@gccsustainableconsultingengineers.co.za, SMS: 073-565-8847) on or before 13 January 2023.
CP007917

0915 SALES IN EXECUTION



NOTICE OF AUCTION - NOTICE OF SALE IN EXECUTION - IMMOVALBE PROPERTY IN THE HIGH COURT OF SOUTH AFRICA (GAUTENG DIVISION, PRETORIA) CASE NUMBER: 13812/2021
In the matter between: **FIRST RAND BANK LIMITED PLAINTIFF (formerly known as FIRST NATIONAL BANK OF SOUTHERN AFRICA LIMITED) and WERNER SWART DEFENDANT**
This sale in execution conducted in accordance with the Consumer Protection Act 68 of 2008 (as amended) pursuant to a Judgment obtained in the High Court Under case number 13812/2021 dated the 9TH AUGUST, 2022, and a Warrant of Execution against Immoveable property is to be held with a reserve of R208,000.00 at SHERIFF LYDENBURG, 80 KANTOOR STREET, LYDENBURG on 7TH DECEMBER, 2022 AT 11H00 PROPERTY: **ERF 2834 BURGERSFORT EXTENSION 34 TOWNSHIP REGISTRATION DIVISION KT LIMPOPO DIVISION MEASURING: 538 (FIVE HUNDRED AND THIRTY EIGHT) SQUARE METRES HELD BY DEED OF TRANSFER NO. T 103486/2008 SUBJECT TO THE CONDITIONS THEREIN CONTAINED AND MORE ESPECIALLY SUBJECT TO CERTAIN RESTRICTS BY BLUE HORIZON INVESTMENTS 10 (PROPRIETARY) LIMITED NO. 2005/019802/2007 AND SUBJECT TO THE CONDITIONS IMPOSED BY THE APPIESDORNDRAAI RESIDENTS ASSOCIATION (ASSOCIATION INCORPORATED UNDER SECTION 21) REG. NO. 2006 /017756/2008 KNOWN AS 15 THOLWANE CLOSE, BURGERSFORT EXT. 34 (SITUATE IN THE MOTAGANENG ESTATE) IMPROVEMENTS: **VACANT GROUND ZONING: Residential (the accuracy hereof not guaranteed)**
1. The rules of this auction are available 24 hours before the auction at the offices of the Sheriff of the High Court Lydenburg, 80 Kantoort Street, Lydenburg during office hours. Advertising cost at current publication rates and**

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sale costs according to Court Rules apply Registration a buyer is a pre-requisite subject to condition, inter alia (a) Directive of the Consumer Protection Act 68 of 2008 (URL <http://www.info.gov.za/view/DownloadFilesAction?id=99981>) (b) Fica-legislation: Requirement proof of ID and residential address (c) Payment of a Registration fee of R200,00 (refundable) in cash or bank guaranteed cheque (d) Registration condition 2. The full conditions of sale may be inspected at the offices of the Sheriff of the High court Lydenburg, 80 Kantoort Street, Lydenburg HACK STUPEL & ROSS Attorneys for Plaintiff PO BOX 2000, PRETORIA TEL: 012-325-4185 REFERENCE: DU PLOOY/GP 12732
CP007841

0925 ESTATES

NOTICE
In the Estate of the Late: Christina Zodwa Mabelane, id no 651001 0244 087 Date of death: 10/02/2015, last address Erf 1427, Fontein Street, Mashishing, 1123, Estate no: 004655/2015. In terms of section 35(5) of the Administration of the Estate Act, No 66 of 1965, notice is hereby given that the copies of the liquidation and distribution accounts in the above Estate will lie for inspection at the office of Master of High court Pretoria and at the office of Mashishing Magistrate court for a period of 21 days from the date of publication hereof.
Attorney : JT RATAU ATTORNEYS, 88 VILJOEN STREET , LYDENBURG, 081-511-6330.
Date Submitted: 2022-11-11
CP007914

0935 TOWN PLANNING

NOTIFICATION OF LAND DEVELOPMENT APPLICATION IN TERMS OF THE THABA CHWEU BY-LAW ON SPATIAL PLANNING AND LAND USE MANAGEMENT
We, Mabuyi Development Planners, on behalf of the registered owner of Erf 1479, Sabie Extension 3, located on the corner of Second and Potgieter Street has lodged and application in terms of Section 66, of the Thaba Chweu By-Law on Spatial Planning and Land Use Management, 2016 under Thaba Chweu Amendment Scheme 64/2018 for the rezoning of the aforementioned Erf from "Residential 1" to "Business 2".
The purpose of the application is to allow for a nursery, place of refreshment and self-catering units.
A copy of the application and supporting documentation is available for viewing during normal office hours at the Municipal Manager and Town Planning Office: Office 30, Civic Centre, Cnr of Central and Viljoen Street , Lydenburg, 1120, who can be contacted at the following contact number: 013-235- 7388 or emailed at townplanner@tclm.gov.za/ debby.nkosi@tclm.gov.za
Written comments or objections together with reasons therefore in respect of the application must be submitted, in the prescribed format, to the Municipal Manager, P O Box 61, Lydenburg, 1120; or delivered to the Town Planning Office, Office 30, Civic Centre, 1 Cnr of Central and Viljoen Street, Lydenburg; or emailed to:

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A copy of the application and supporting documentation is available for viewing during normal office hours at the Municipal Manager and Town Planning Office: Office 30, Civic Centre, Cnr of Central and Viljoen Street , Lydenburg, 1120, who can be contacted at the following contact number: 013-235- 7388 or emailed at townplanner@tclm.gov.za/ debby.nkosi@tclm.gov.za
Written comments or objections together with reasons therefore in respect of the application must be submitted, in the prescribed format, to the Municipal Manager, P O Box 61, Lydenburg, 1120; or delivered to the Town Planning Office, Office 30, Civic Centre, 1 Cnr of Central and Viljoen Street, Lydenburg; or emailed to:

NOTIFICATION OF LAND DEVELOPMENT APPLICATION IN TERMS OF THE THABA CHWEU BY-LAW ON SPATIAL PLANNING AND LAND USE MANAGEMENT
We, Mabuyi Development Planners, on behalf of the registered owner of Erf 1479, Sabie Extension 3, located on the corner of Second and Potgieter Street has lodged and application in terms of Section 66, of the Thaba Chweu By-Law on Spatial Planning and Land Use Management, 2016 under Thaba Chweu Amendment Scheme 64/2018 for the rezoning of the aforementioned Erf from "Residential 1" to "Business 2".
The purpose of the application is to allow for a nursery, place of refreshment and self-catering units.
A copy of the application and supporting documentation is available for viewing during normal office hours at the Municipal Manager and Town Planning Office: Office 30, Civic Centre, Cnr of Central and Viljoen Street , Lydenburg, 1120, who can be contacted at the following contact number: 013-235- 7388 or emailed at townplanner@tclm.gov.za/ debby.nkosi@tclm.gov.za
Written comments or objections together with reasons therefore in respect of the application must be submitted, in the prescribed format, to the Municipal Manager, P O Box 61, Lydenburg, 1120; or delivered to the Town Planning Office, Office 30, Civic Centre, 1 Cnr of Central and Viljoen Street, Lydenburg; or emailed to:

townplanner@tclm.gov.za /debby.nkosi@tclm.gov.za by no later than 17 December 2022. The format for the comments or objections is available from the Town planning office at the above-mentioned address or on the municipality's website (www.tclm.gov.za). Any person who cannot read or write may consult with any staff member of the Town Planning office Section during office hours and assistance will be given to transcribe that person's objections or comments. Applicants Contact Details: Name: Mabuyi Development Planners, PO Box 21007, Nelspruit, 1200, Phone No: 083-527-0673, Email address: info@mabuyi.co.za, Ref: P7_Er 1479
CP007911

NOTICE AMENDMENT OF LAND USE SCHEME OR REZONING IN TERMS OF SECTION 62(1) OF THE FETAKGOMO TUBATSE LOCAL MUNICIPALITY LAND USE MANAGEMENT BY-LAW 2018. AMENDMENT SCHEME NUMBER: 8/2021
Notice is hereby given that Hlatzes Investment Group Pty Ltd, being the authorised agent of the owner of ERF 2412 BURGERSFORT EXTENSION 21 TOWNSHIP, FETAKGOMO TUBATSE LOCAL MUNICIPALITY, Carissa Street in terms of Sections 62(1) and 93 (2) of the Fetakgomo Tubatse Land Use Management By-Law 2018 for the amendment of the Fetakgomo Tubatse Town Planning Scheme, 2021 by the rezoning of the property described above, from **Residential 1 to Residential 3** for the purpose of building dwelling units. Particulars relating to the application will lie for inspection during normal office hours at the office of the Executive Manager Development Planning Directorate, for a period of 30 (thirty) days from **11 November 2022**, at the Head Office situated 1 Kastania Street, Burgersfort. Any objection or representation with regard to the application must be submitted (within a period of 30 days from **11 November 2022**) to both the owner/agent and the Office of the Municipal Manager at the above address or posted to The Municipal Manager Fetakgomo-Tubatse Local Municipality P.O Box 206, Burgersfort, 1150, or an e-mail send to MaMethebula @ftlm.gov.za by no later than **11 December 2022**. Any person who cannot write may during office hours attend or visit the municipal offices at above mentioned address in the Office of the Municipal Manager to be assisted in transcribing their objections, comments or representations. **OWNER/AUTHORISED AGENT Full name:** Hlatzes Investment Group Pty Ltd **Address:** 20 Acacia Street, Ebony Park, 1632 **Cell No:** 078-767-0045 **Email Address:** Phosa.mahlats@tclm.gov.za **DATE: 11 November 2022**
CP007916

KENNISGEWING AANSOEK VIR SPESIALE PERMISIE IN TERME VAN SEKSE 5(57)(J) VAN DIE THABA CHWEU RUIMTELIKE BEPLANNING AND GROND GERUIKS BESTUURS WET 2016, VIR DIE OPRIGTING VAN 'N 30m SELLULERE TELEFOON MAS EN BASIS STASIE OP DIE OORBLIWENDE PORSIE VAN DIE PLAAS VYGEBOOM NO. 512-KT
Hiermee word bekend gemaak dat ek, die ondergetekende, Ernie van Tonder, van die firma ACE Environmental Solutions (Edms) Bpk, van voornemens is om by die Thaba Chweu Plaaslike Munisipaliteit aansoek te doen, Vir Spesiale Permisie Vir Die Oprigting van 'n 30m Sellulere Telefoon Mas En Basis Stasie Op Die Oorblywende Porsie Van Die Plaas Vygeboom No. 512-Kt. Besonderhede en planne van hierdie aansoek kan gedurende gewone werksure by die ondervermelde adres van die aansoeker geïnspekteer word. Enige iemand wat beswaar wil aanteken teen die goedkeuring van hierdie aansoek, moet dit skriftelik (tesame met die redes daarvoor) rig aan beide die aansoeker (ACE Environmental Solutions (Pty) Ltd) en aan die Town planning department: Department City Development, Executive Director: Cnr Central Viljoen Street, Mashishing, Lydenburg 1120, tussen **17 November 2022 - 24 Desember 2022** Crystal Springs ACE Environmental Solutions (Pty) Ltd Postnet Suite 207 Private Bag X32 Suite 13B, Benchmark Office Park

KENNISGEWING AANSOEK VIR SPESIALE PERMISIE IN TERME VAN SEKSE 5(57)(J) VAN DIE THABA CHWEU RUIMTELIKE BEPLANNING AND GROND GERUIKS BESTUURS WET 2016, VIR DIE OPRIGTING VAN 'N 30m SELLULERE TELEFOON MAS EN BASIS STASIE OP DIE OORBLIWENDE PORSIE VAN DIE PLAAS VYGEBOOM NO. 512-KT
Hiermee word bekend gemaak dat ek, die ondergetekende, Ernie van Tonder, van die firma ACE Environmental Solutions (Edms) Bpk, van voornemens is om by die Thaba Chweu Plaaslike Munisipaliteit aansoek te doen, Vir Spesiale Permisie Vir Die Oprigting van 'n 30m Sellulere Telefoon Mas En Basis Stasie Op Die Oorblywende Porsie Van Die Plaas Vygeboom No. 512-Kt. Besonderhede en planne van hierdie aansoek kan gedurende gewone werksure by die ondervermelde adres van die aansoeker geïnspekteer word. Enige iemand wat beswaar wil aanteken teen die goedkeuring van hierdie aansoek, moet dit skriftelik (tesame met die redes daarvoor) rig aan beide die aansoeker (ACE Environmental Solutions (Pty) Ltd) en aan die Town planning department: Department City Development, Executive Director: Cnr Central Viljoen Street, Mashishing, Lydenburg 1120, tussen **17 November 2022 - 24 Desember 2022** Crystal Springs ACE Environmental Solutions (Pty) Ltd Postnet Suite 207 Private Bag X32 Suite 13B, Benchmark Office Park

KENNISGEWING AANSOEK VIR SPESIALE PERMISIE IN TERME VAN SEKSE 5(57)(J) VAN DIE THABA CHWEU RUIMTELIKE BEPLANNING AND GROND GERUIKS BESTUURS WET 2016, VIR DIE OPRIGTING VAN 'N 30m SELLULERE TELEFOON MAS EN BASIS STASIE OP DIE OORBLIWENDE PORSIE VAN DIE PLAAS VYGEBOOM NO. 512-KT
Hiermee word bekend gemaak dat ek, die ondergetekende, Ernie van Tonder, van die firma ACE Environmental Solutions (Edms) Bpk, van voornemens is om by die Thaba Chweu Plaaslike Munisipaliteit aansoek te doen, Vir Spesiale Permisie Vir Die Oprigting van 'n 30m Sellulere Telefoon Mas En Basis Stasie Op Die Oorblywende Porsie Van Die Plaas Vygeboom No. 512-Kt. Besonderhede en planne van hierdie aansoek kan gedurende gewone werksure by die ondervermelde adres van die aansoeker geïnspekteer word. Enige iemand wat beswaar wil aanteken teen die goedkeuring van hierdie aansoek, moet dit skriftelik (tesame met die redes daarvoor) rig aan beide die aansoeker (ACE Environmental Solutions (Pty) Ltd) en aan die Town planning department: Department City Development, Executive Director: Cnr Central Viljoen Street, Mashishing, Lydenburg 1120, tussen **17 November 2022 - 24 Desember 2022** Reference: **Warden** ACE Environmental Solutions (Pty) Ltd Postnet Suite 207 Private Bag X32 Suite 13B, Benchmark Office Park Tel: 012-663-5200 Fax: 086-565-9264 E-mail: ernie@ace-env.co.za Highveld Park, 0169
CP007907

Tel: 012-663-5200
Fax: 086-565-9264
E-mail: ernie@ace-env.co.za
Highveld Park, 0169
CP007906

NOTICE PHETOLO YA LAND USE SCHEME OR REZONING GO YA LE KA SECTION 62(1) OF THE FETAKGOMO TUBATSE LOCAL MUNICIPALITY LAND USE MANAGEMENT BY-LAW 2018. AMENDMENT SCHEME NUMBER: 8/2021

Tsebišo e fihla gore Hlatzes Investment Group Pty Ltd, e le moemedi yo a dumeletswego wa mong wa ERF 2412 BURGERSFORT EXTENSION 21 TOWNSHIP, FETAKGOMO TUBATSE LOCAL MUNICIPALITY, Carissa Street go ya ka Dikarolo 62(1) le 93 (2) tsa Fetakgomo Tubatse Land Use Management By-Law, 2018 bakeng sa phetošo ya Fetakgomo Tubatse Town Planning Scheme, 2021 ka go fetolelwa ka lefelo la bodulo go tloga Residential 1 to Residential 3 ka nepo ya go aga mafelo a mmalwa a bodulo. Ditlabakelo tse di amanago le kgopelo di tse di hlahlobja ka dinako tse di tlwaelegilego tsa ofisi ka ofising ya Molaoediphetisi wa Lefapha la Peakanyo ya Tlhabollo, lebaka la matsatsi a 30 (matsatsi a masometharo) go tloga ka la 11 Dibatsela 2022, ka Kantorongkolo yo e lego 1 Kastania Street, Burgersfort. Kganeitšo efe goba efe goba boemedi mabapi le kgopelo e swanetše go romelwa (mo nakong ya matsatsi a 30 go tloga ka la 11 Dibatsela 2022) go bobedi mong/moemedi le Kantororo ya Molaoedi wa Mmasapala atereseng ye e lego ka mo godimo goba e romelwe go Molaoedi wa Mmasapala Fetakgomo- Tubatse Fetakgomo- Tubatse Mmasapala wa Selegae P.O Box 206, Burgersfort, 1150, goba e-mail e romelwa go MaMethebula@ftlm.gov.za e sego ka morago ga la 11 Manhole 2022. Motho ofe goba ofe yo a sa kgonego go ngwala a ka tsenela goba go etela diofisi tsa masepala atereseng ye e boletswego ka mo godimo ka Kantorong ya Molaoedi wa Mmasapala go thuswa go ngwala dikganeitšo tsa bona, ditshwayotshwayo goba boemedi. **MONG/MOEMEDI YO A DUMELETSWEGO** Leina le le fetletsego: Hlatzes Investment Group Pty Ltd Aterese: 20 Acacia Street, Ebony Park, 1632 Nomoroya ya Sellaathekeng: 078-767-0045 Aterese ya Imelle: Phosa.mahlats@tclm.gov.za LETSATSI: 11 Dibatsela 2022
CP007915

NOTICE APPLICATION FOR CONSENT USE IN TERMS OF SECTION 5(57)(J) OF THE THABA CHWEU SPATIAL PLANNING AND LAND USE MANAGEMENT BY-LAW 2016 FOR THE PROPOSED CONSTRUCTION OF A FREE-STANDING CELLULAR COMMUNICATION BASE STATION WITH 30M MAST ON THE REMAINDER OF THE FARM VYGEBOOM NO. 512-KT.

Notice is hereby given that I, the undersigned, Ernie van Tonder, from the firm ACE Environmental Solutions (Pty) Ltd, intend to apply to the Thaba Chweu Local Municipality in Terms Of Section 5(57)(J) Of The Thaba Chweu Spatial Planning And Land Use Management By-Law 2016 For The Proposed Construction Of A Free-Standing Cellular Communication Base Station With 36m Treemast Type Mast On: The Remainder Of The Farm Vygeboom No. 512-Kt Particulars and plans of this application may be inspected during normal office hours at the under mentioned address of the applicant. Any person or persons wishing to object to the approval of this application must lodge such objection, together with the grounds thereof, to both the applicant (ACE Environmental Solutions (Pty) Ltd) and the Municipal Manager: Department City Development, Executive Director: Town Planning, Thaba Chweu Local Municipality Cnr Central Viljoen Street, Mashishing Lydenburg 1120, Between on **17 November 2022 - 24 December 2022** Reference: **Warden** ACE Environmental Solutions (Pty) Ltd Postnet Suite 207 Private Bag X32 Suite 13B, Benchmark Office Park Tel: 012-663-5200 Fax: 086-565-9264 E-mail: ernie@ace-env.co.za Highveld Park, 0169
CP007907

APPENDIX E3: I&AP DATABASE

To be completed after public consultation

DRAFT

APPENDIX E4: BACKGROUND INFORMATION DOCUMENT

DRAFT

BACKGROUND INFORMATION DOCUMENT (BID) FOR A SECTION 24G RECTIFICATION PROCESS FOR A LIQUIFIED PETROLEUM GAS REFILL STATION ON ERF 62 OHRIGSTAD TOWNSHIP, FETAKGOMO-TUBATSE LOCAL MUNICIPALITY

REFERENCE #: 12/1/9/S24G-GS40

INTRODUCTION

Redgas LPG Refill Station (Pty) Ltd 'hereinafter' referred to as Redgas located on Erf 62 Ohrigstad Township, in Ohrigstad within the jurisdiction of Fetakgomo Tubatse Local Municipality recently embarked on the construction and installation of a bulk Liquified Petroleum Gas (LPG) tank of 35 000 litres (refer to Table 1). The activity undertaken, constitute listed activities under the Environmental Impact Assessment (EIA) Regulations promulgated in terms of the National Environmental Management Act, 1998 (NEMA) (Act No. 107 of 1998). The development activity in question commenced in 2022, and applicant was made aware of the requirement for an Environmental Authorisation (EA) by the Limpopo Department of Economic Development, Environment and Tourism (LEDET)..

PURPOSE OF THE DOCUMENT

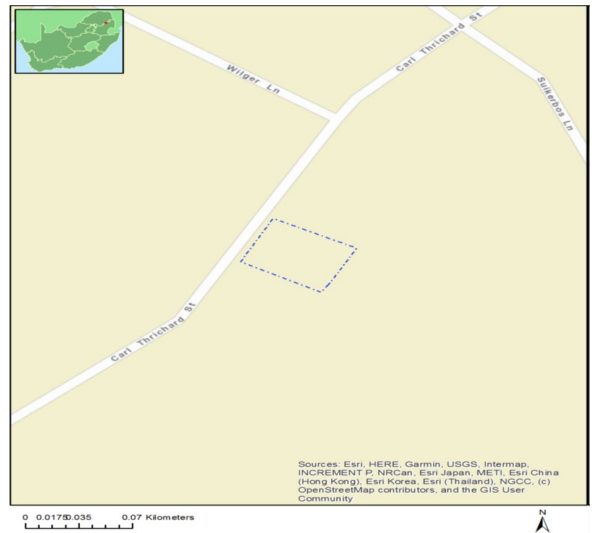
The purpose of this Background Information Document (BID) is to provide a brief description of the project and the rectification process that will be followed, and to obtain initial comments and contributions from Interested and Affected Parties (IAPs) on the issues relating to the proposed development.

PROJECT LOCATION

The development is located on Erf 62, Carl Trichardt Street,

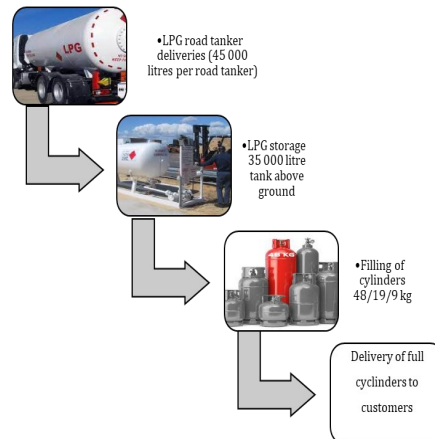
Southings	24°44'59.33"
Eastings	30°33'44.05"

Ohrigstad within Fetakgomo – Tubatse Local Municipality of Sekhukhune District .

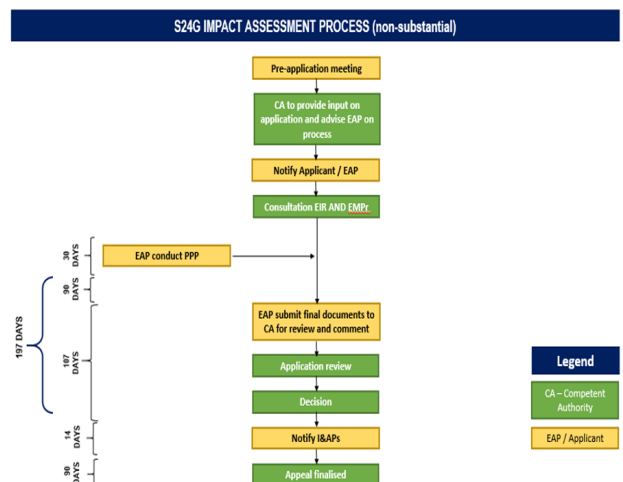


ACTIVITY DESCRIPTION

Redgas proposes to install a bulk LPG tank of 35 000 litres above-ground in Ohrigstad. The LPG product is used to fill cylinders at a filling platform. Redgas will receive LPG from road tankers (capacity 45 000 litres) and store it in one aboveground tank. Road tankers will deliver on average 17 000 litres per week to the site. LPG is used to fill cylinders.



SECTION 24G RECTIFICATION PROCESS



POTENTIAL ENVIRONMENTAL IMPACT ASSESSMENTS

A number of potential environmental issues have already been identified and are listed below to assist I&APs to better understand the investigations to be undertaken as part of the environmental assessment process. Potential environmental issues include:

- Social impacts (Job Creation, uplifting of local as well as local economy);
- Visual impacts arising from the finished construction depot;
- Soil pollution, during operation of the development.

YOUR COMMENTS AND REGISTRATION AS AN I&AP ARE IMPORTANT

You are invited to participate freely and to submit any comments or information you feel may be useful to this process. Registered I&APs are entitled to comment, in writing, on all written submissions to GCC Sustainable Consulting Engineers to bring to their attention any issues which the party believes may be of significance to the consideration of the application. You have to register as an I&AP to receive further details of public review of reports produced as part of the process. To register as and I&AP please complete the attached comment sheet/ registration sheet.

Registered I&APs will be informed about availability of reports and scheduled stakeholder meetings by means of their preferred means of communication (email, post or fax). Contributions from stakeholders will assist in informed decision-making for authorities and provides information to be considered by the project team and specialists conducting studies. All comments can be submitted using the contact details which appear on the cover page or as part of the Comment and Registration Sheet. Contact person and details are below:


**Charles of GCC Sustainable Consulting Engineers, by email or SMS **

**(email: charles@gccsustainableconsultingengineers.co.za),
SMS: 0735658847) on or before 23 January 2023.**



INTERESTED AND AFFECTED PARTIES REGISTRATION FORM

REFERENCE #: 12/1/9/S24G-GS40

Name and Surname	
Physical Address	
Postal Address	
Contact Details	Telephone No.: Fax No.: Cell No.: E-mail Address:
Please indicate any issues, comments and concerns with regard to the proposed project	
Please indicate in which aspects you would require more information	
Please indicate any I&APs whom you think should be contacted	
<p>In order to be registered as an I&AP for this project fax, mail, or e-mail the completed registration form to</p> <p>Charles of GCC Sustainable Consulting Engineers, by email or SMS (email: charles@gccsustainableconsultingengineers.co.za), SMS: 0735658847) on or before 23 January 2023.</p>	
	

APPENDIX E5: CIRCULATION OF DRAFT REPORT

To be completed after public consultation

DRAFT

APPENDIX E6: COMMENTS RECEIVED FROM I&APS

To be completed after public consultation

DRAFT

APPENDIX E7: COMMENTS AND RESPONSE REPORT

To be completed after public consultation

DRAFT

APPENDIX E8: CORRESPONDENCE WITH STATE ORGANS

DRAFT



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF ECONOMIC DEVELOPMENT
ENVIRONMENT & TOURISM
ENVIRONMENTAL IMPACT MANAGEMENT
MOPANI & SEKHUKHUNE

2022 - 11 - 08

DEPARTMENT OF
ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

PO BOX 55464, POLOKWANE 0700
TEL: 015 291 1315

LIMPOPO PROVINCE

Enq: Mogashoa MS Tel: 015 293 8686

Email: mogashoams@ledet.gov.za

Reference: 12/1/9/S24G-GS40

GCC Sustainable Consulting Engineers
51 Lloyd Road, Birchleigh North
KEMPTON PARK
1618

Attention: GC Chigurah

E-mail: charles@gccsustainableconsultingengineers.co.za

RE: APPLICATION IN CONSEQUENCE OF UNLAWFUL DEVELOPMENT OR CONTINUATION OF A LISTED ACTIVITY IN TERMS OF SECTION 24G OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) FOR THE UNLAWFUL INSTALLATION OF GAS STORAGE TANK WITH A CAPACITY OF 37M³ ON ERF 62 OHRIGHSTAD WITHIN FETAKGOMO TUBATSE LOCAL MUNICIPALITY OF SEKHUKHUNE DISTRICT

1. The above matter refers.
2. The Department acknowledges receipt of the above mentioned application for the above-mentioned project received on 31 August 2022.
3. The application has been assigned reference number 12/1/9/S24G – GS40. Kindly quote this reference number in any future correspondence in respect of the application.
4. Based on the review of the application, the Department requires you to compile an Environmental Impact Report (EIR), within three (3) months of the date of this letter, detailing, *inter-alia*, the following:
 - 4.1 A description of the need and desirability of the activity;
 - 4.2 An assessment of the nature, extent, duration and significance of the consequences for or impacts on the environment of the activity, including the cumulative effects and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be and have been affected by the activity;
 - 4.3 The report of an assessment must include the significance of the impacts of the activity on the environment, in all phases of the development, that is planning, construction, operational and decommissioning phases;
 - 4.4 A description of mitigation measures undertaken or to be undertaken in all phases of the development, in respect of the consequences for or impacts on the environment of the activity;
 - 4.5 A detailed report containing information on availability of services, particularly, water and waste management, their sources, demands and capacities must be included;
 - 4.6 Clear google maps and pictures depicting the site prior and post the installation of the tank must be attached to the EIR;

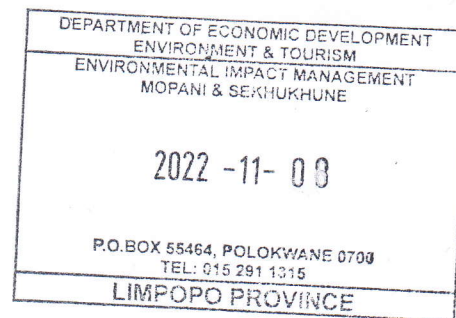
HEAD OFFICE

- 4.7 Any sensitive features on site must be identified. i.e water courses with flood lines, ridges and wetlands with buffers, etc and reported on. The measures undertaken or to be undertaken in order to manage impacts on these sensitive areas must be clearly outlined;
- 4.8 A description of the public participation process followed in respect of the development, including all comments received from interested and affected parties and an indication of how the issues raised have been addressed as well as consensus reached for issues and any objections raised;
- 4.9 A site specific Environmental Management Programme (EMPr) report that addresses impacts as would be indicated in the Environmental Impact Report and the content thereof must comply with Appendix 4 of the Environmental Impact Assessment (EIA) Regulations of 2014;
- 4.10 The project value must be provided;
- 4.11 Your attention is drawn to, amongst others, Section C, Part 1 of the Section 24G Fine Regulations of 2017 (attached for ease of reference); and
- 4.12 Details of previous offences committed in terms of environmental legislations if any must be provided in the EIR.
5. Should you have any queries regarding this correspondence, please contact the Department at the above given contact details.

Yours faithfully,


DEPUTY DIRECTOR
ENVIRONMENTAL IMPACT MANAGEMENT

DATE: 8/11/2022



CC: Redgas LPG Refill Station Pty Ltd Attention: Elphas Sithole Email: elphasithole@live.com



LIMPOPO

PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
ECONOMIC DEVELOPMENT, ENVIRONMENT & TOURISM

Enq: Ms Kubaye TA

Tel: 015 293 8830

E-mail: KubayeTA@ledet.gov.za

Ref: 12/1/9/E-GS1025

Redgas LPG Refill Station (Pty) Ltd
62 Carl Trichardt Street
OHRIGSTAD
1459

Attention: Mr Elphas Sithole

Cell: 072 472 8199

Email: elphassithole@live.com

CONFIRMATION OF A LISTED ACTIVITY: PROPOSED STORAGE OF LPG GAS ON ERF 62, CARL TRICHARDT STREET, OHRIGSTAD WITHIN FETAKGOMO-TUBATSE LOCAL MUNICIPALITY OF SEKHUKHUNE DISTRICT


1. The enquiry form received on 30 August 2022 and the site visit conducted on 06 September 2022 refer.
2. The information provided indicates that Redgas LPG Refill Station (Pty) Ltd has established one LPG gas storage tank of 35m³. The development is located on Erf 62, Carl Trichardt Street, Ohrigstad within Fetakgomo-Tubatse Local Municipality of Sekhukhune District. The site geographical coordinates are 24° 44' 59.33" South and 30° 33' 44.05" East.
3. The proposed development site falls within No Natural Remaining Area in terms of Sekhukhune Bioregional Plan of 2019.
4. Based on the information provided, the proposed activity triggers a listed activity in terms of the Environmental Impact Assessment Regulations, 2014 (Regulations), promulgated under the National Environmental Management Act (Act No. 107 of 1998) as amended (NEMA) and should have obtained environmental authorisation(EA) prior commencement.
5. The activity is as follows:

Listed in the Listing Notice 3 of the Regulations – Activity 10: "The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in Limpopo on all areas.

6. The activity is in contravention of section 24F of NEMA.

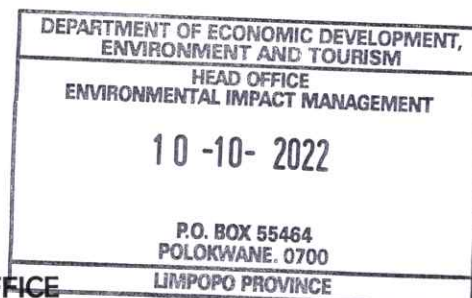
For any queries with regard to this correspondence, please do not hesitate to contact the Department.

Yours faithfully


**DIRECTOR
ENVIRONMENTAL IMPACT MANAGEMENT**

DATE:

10/10/2022



HEAD OFFICE



20 Hans Van Rensburg Street / 19 Biccard Street, Polokwane, 0700, Private Bag X 9484, Polokwane, 0700
(Switchboard) Tel: +27 15 293 8300 Website: www.ledet.gov.za

APPENDIX F: LOCALITY MAP

DRAFT

Project Location
Write a description for your map.

Legend


-  Delightful Overnight Occomodation?
-  Ohrigstad Gas Tank Location



Google Earth

Image © 2022 Maxar Technologies
© 2022 Google

100 m



APPENDIX G: GOOGLE EARTH MAPS

DRAFT

PRIOR TO CONSTRUCTION



DURING CONSTRUCTION



APPENDIX H: ENVIRONMENTAL SCREENING REPORT

DRAFT

**SCREENING REPORT FOR AN ENVIRONMENTAL AUTHORIZATION AS
REQUIRED BY THE 2014 EIA REGULATIONS – PROPOSED SITE
ENVIRONMENTAL SENSITIVITY**

EIA Reference number:

Project name: Section 24G Environmental Rectification Process

Project title: Section 24 G Environmental Rectification Process for a Gas Storage Tank in
Ohrigstad

Date screening report generated: 30/10/2022 17:01:52

Applicant: Redgas

Compiler: Gumisai Charles Chigurah

Compiler signature:
.....

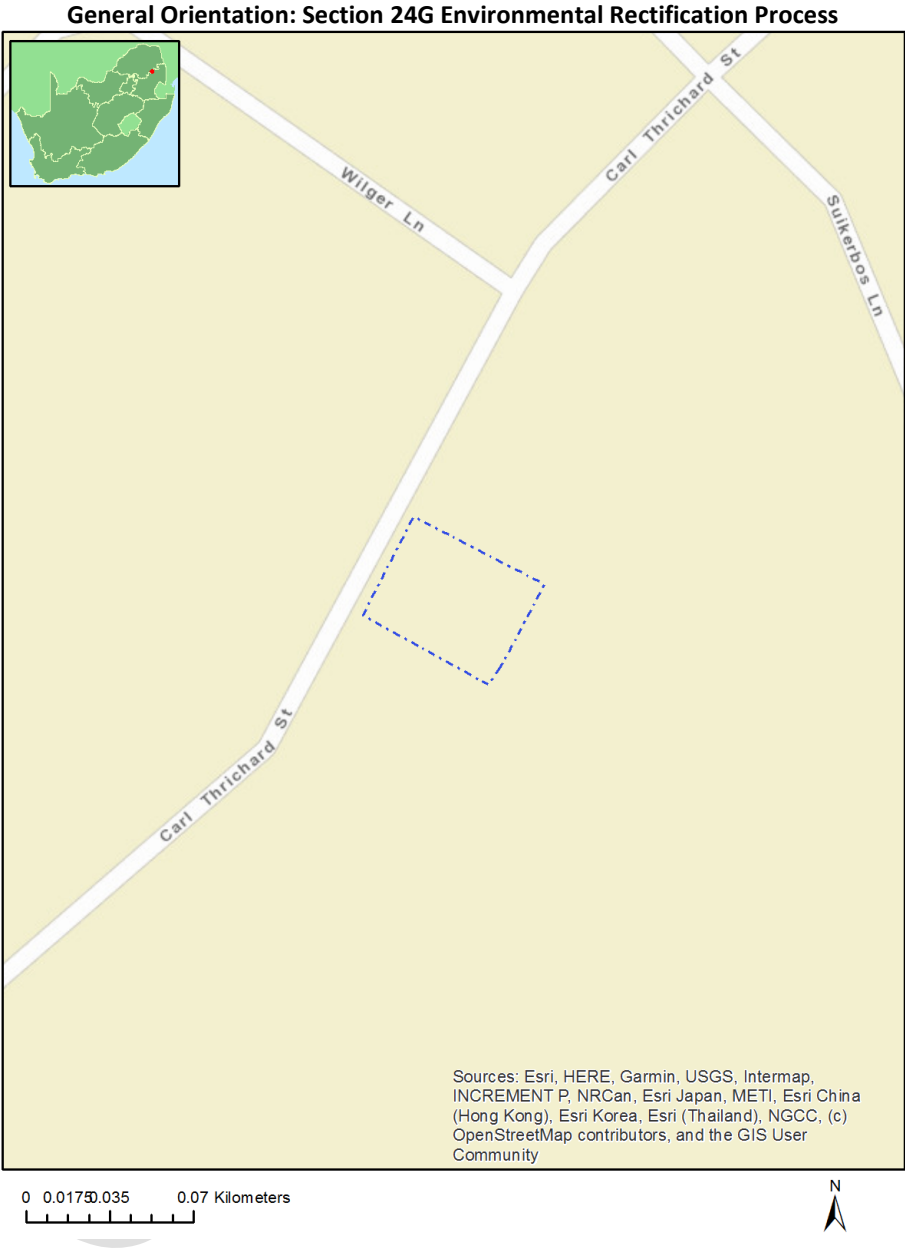
Application Category: Infrastructure | Localised infrastructure | Storage | Dangerous
Goods | Hydrocarbon | Gas

Table of Contents

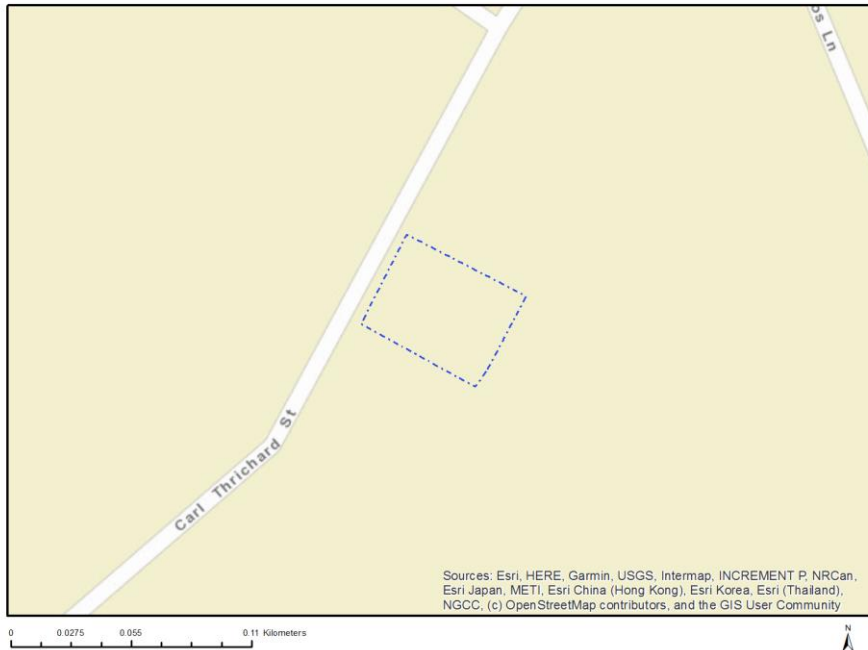
Proposed Project Location	3
Orientation map 1: General location	3
Map of proposed site and relevant area(s)	4
Cadastral details of the proposed site	4
Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area	4
Environmental Management Frameworks relevant to the application	5
Environmental screening results and assessment outcomes	5
Relevant development incentives, restrictions, exclusions or prohibitions	5
Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones	6
Proposed Development Area Environmental Sensitivity	6
Specialist assessments identified	7
Results of the environmental sensitivity of the proposed area	9
MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY	9
MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY	10
MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY	11
MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY	12
MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY	13
MAP OF RELATIVE DEFENCE THEME SENSITIVITY	14
MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY	15
MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY	16
MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY	17

Proposed Project Location

Orientation map 1: General location



Map of proposed site and relevant area(s)



Cadastral details of the proposed site

Property details:

No	Farm Name	Farm/ Erf No	Portion	Latitude	Longitude	Property Type
1	OHRIGSTAD	63	0	24°44'58.13S	30°33'44.79E	Erven
2	OHRIGSTAD	61	0	24°45'0.21S	30°33'43.59E	Erven
3	OHRIGSTAD	62	0	24°44'59.17S	30°33'44.18E	Erven
4	OHRIGSTAD	443	0	24°43'13.64S	30°35'4.22E	Farm
5	OHRIGSTAD	443	38	24°44'46.93S	30°33'47.68E	Farm Portion

Development footprint¹ vertices:

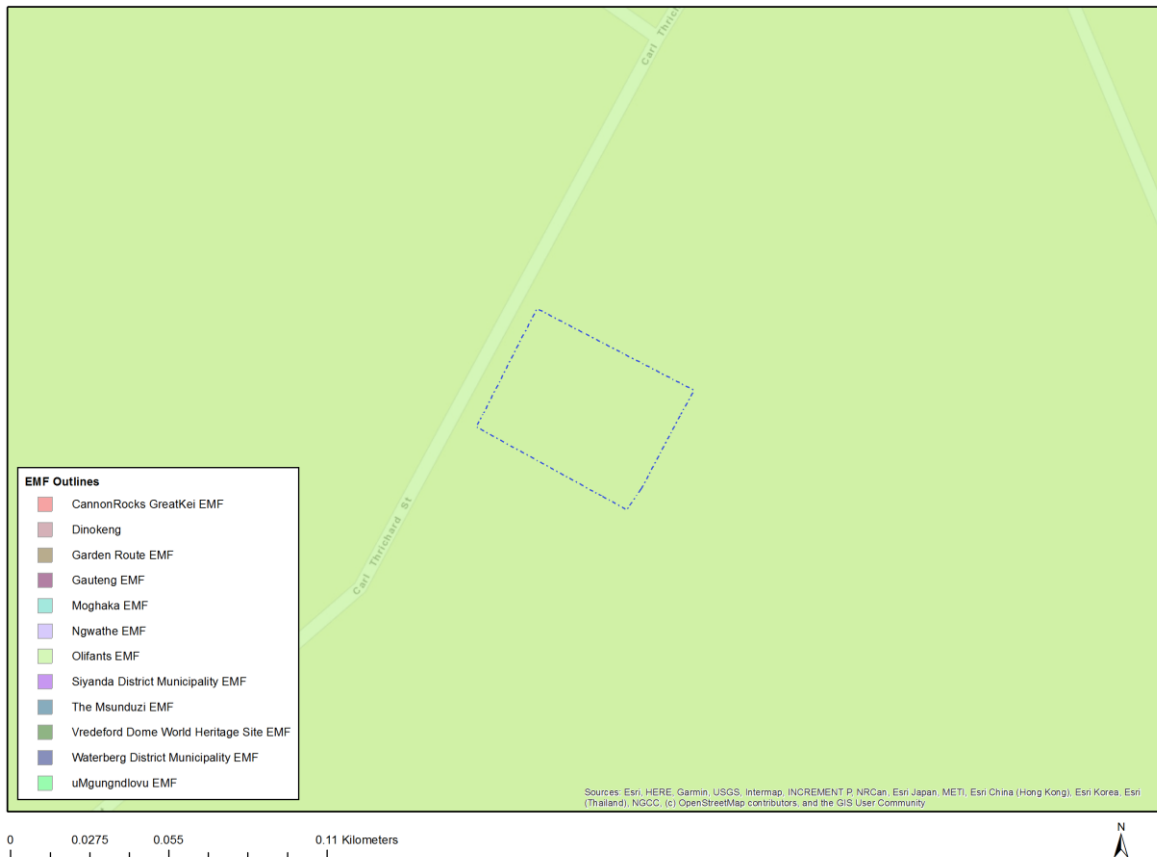
No development footprint(s) specified.

Wind and Solar developments with an approved Environmental Authorisation or applications under consideration within 30 km of the proposed area

No nearby wind or solar developments found.

¹ “development footprint”, means the area within the site on which the development will take place and includes all ancillary developments for example roads, power lines, boundary walls, paving etc. which require vegetation clearance or which will be disturbed and for which the application has been submitted.

Environmental Management Frameworks relevant to the application



Environmental Management Framework	LINK
Olifants EMF	https://screening.environment.gov.za/ScreeningDownloads/EMF/Zone_46, 67, 78, 80, 92, 103, 122, 129.pdf

Environmental screening results and assessment outcomes

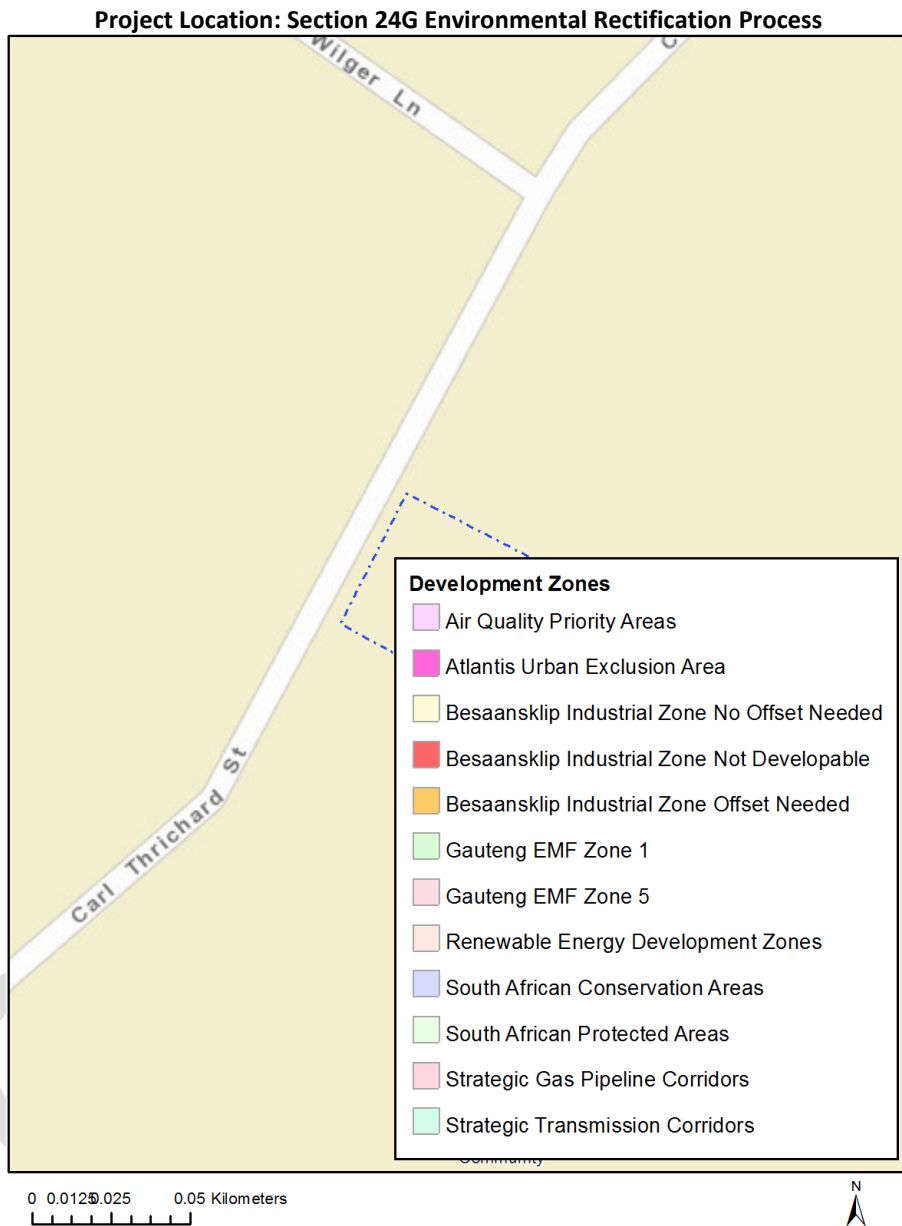
The following sections contain a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development site as well as the most environmental sensitive features on the site based on the site sensitivity screening results for the application classification that was selected. The application classification selected for this report is: **Infrastructure | Localised infrastructure | Storage | Dangerous Goods | Hydrocarbon | Gas.**

Relevant development incentives, restrictions, exclusions or prohibitions

The following development incentives, restrictions, exclusions or prohibitions and their implications that apply to this site are indicated below.

No intersection with any development zones found.

Map indicating proposed development footprint within applicable development incentive, restriction, exclusion or prohibition zones



Proposed Development Area Environmental Sensitivity

The following summary of the development site environmental sensitivities is identified. Only the highest environmental sensitivity is indicated. The footprint environmental sensitivities for the proposed development footprint as identified, are indicative only and must be verified on site by a suitably qualified person before the specialist assessments identified below can be confirmed.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity

Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme			X	
Plant Species Theme				X
Terrestrial Biodiversity Theme				X

Specialist assessments identified

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report. It is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the site situation.

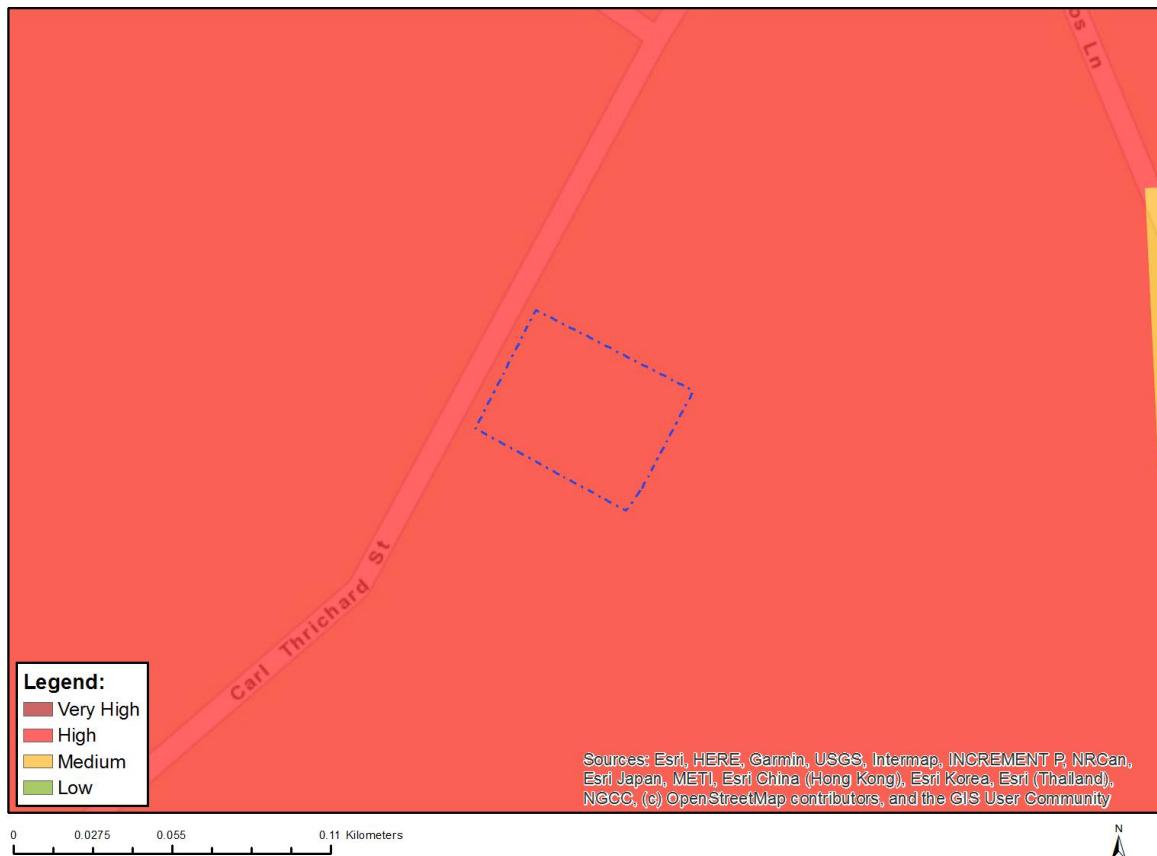
No	Specialist assessment	Assessment Protocol
1	Agricultural Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Agriculture_Assessment_Protocols.pdf
2	Archaeological and Cultural Heritage Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
3	Palaeontology Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
4	Terrestrial Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf
5	Aquatic Biodiversity Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf

6	Hydrology Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
7	Noise Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Noise_Impacts_Assessment_Protocol.pdf
8	Traffic Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
9	Geotechnical Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
10	Socio-Economic Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
11	Ambient Air Quality Impact Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_General_Requirement_Assessment_Protocols.pdf
12	Plant Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Plant_Species_Assessment_Protocols.pdf
13	Animal Species Assessment	https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Animal_Species_Assessment_Protocols.pdf

Results of the environmental sensitivity of the proposed area.

The following section represents the results of the screening for environmental sensitivity of the proposed site for relevant environmental themes associated with the project classification. It is the duty of the EAP to ensure that the environmental themes provided by the screening tool are comprehensive and complete for the project. Refer to the disclaimer.

MAP OF RELATIVE AGRICULTURE THEME SENSITIVITY

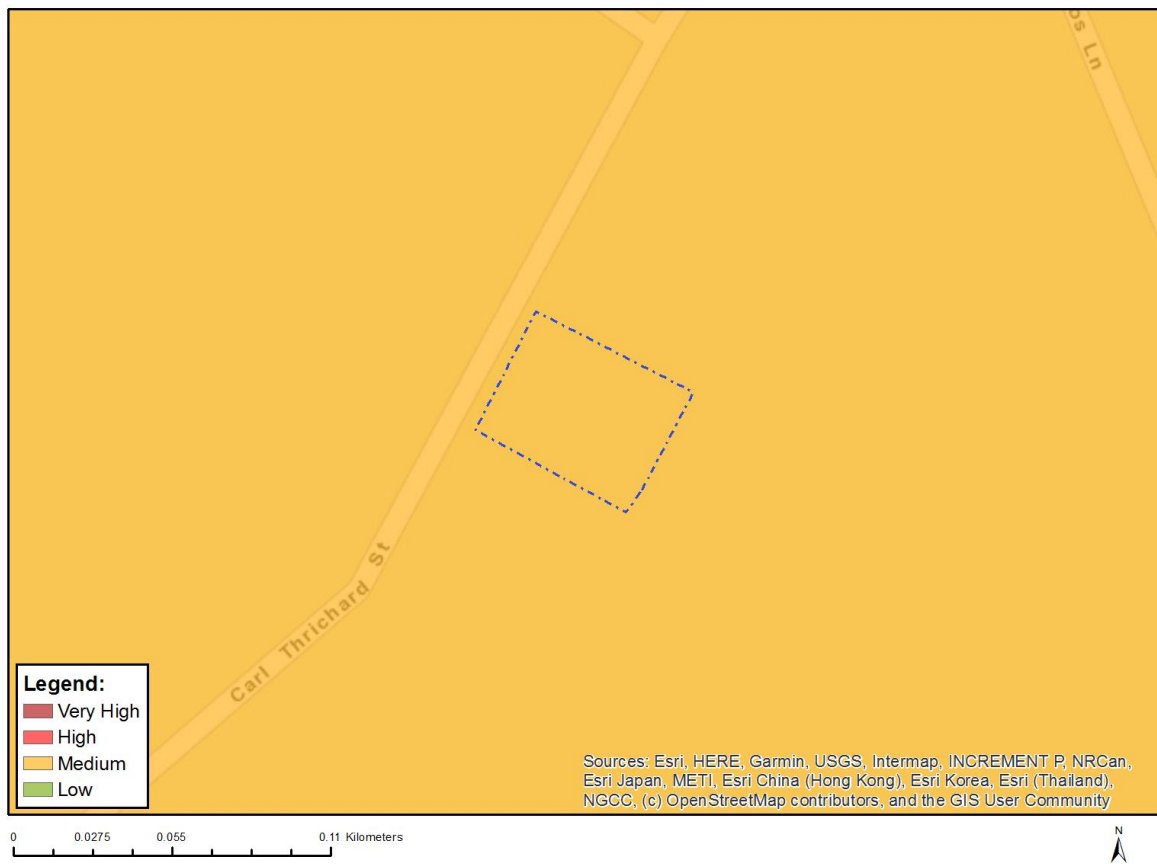


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Land capability;09. Moderate-High/10. Moderate-High

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



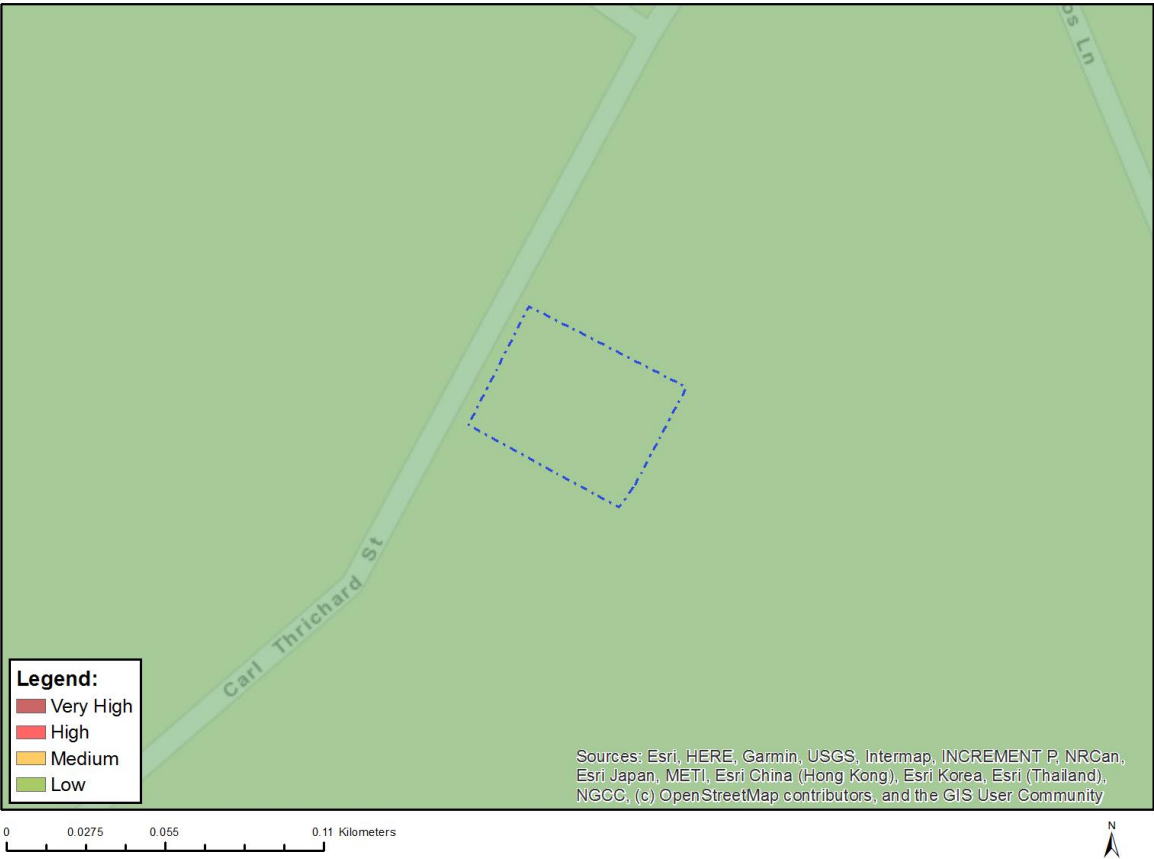
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Aves-Sagittarius serpentarius
Medium	Aves-Eupodotis senegalensis
Medium	Mammalia-Crocidura maquassiensis
Medium	Mammalia-Dasymys robertsii
Medium	Mammalia-Ourebia ourebi ourebi
Medium	Invertebrate-Aroegas fuscus

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY

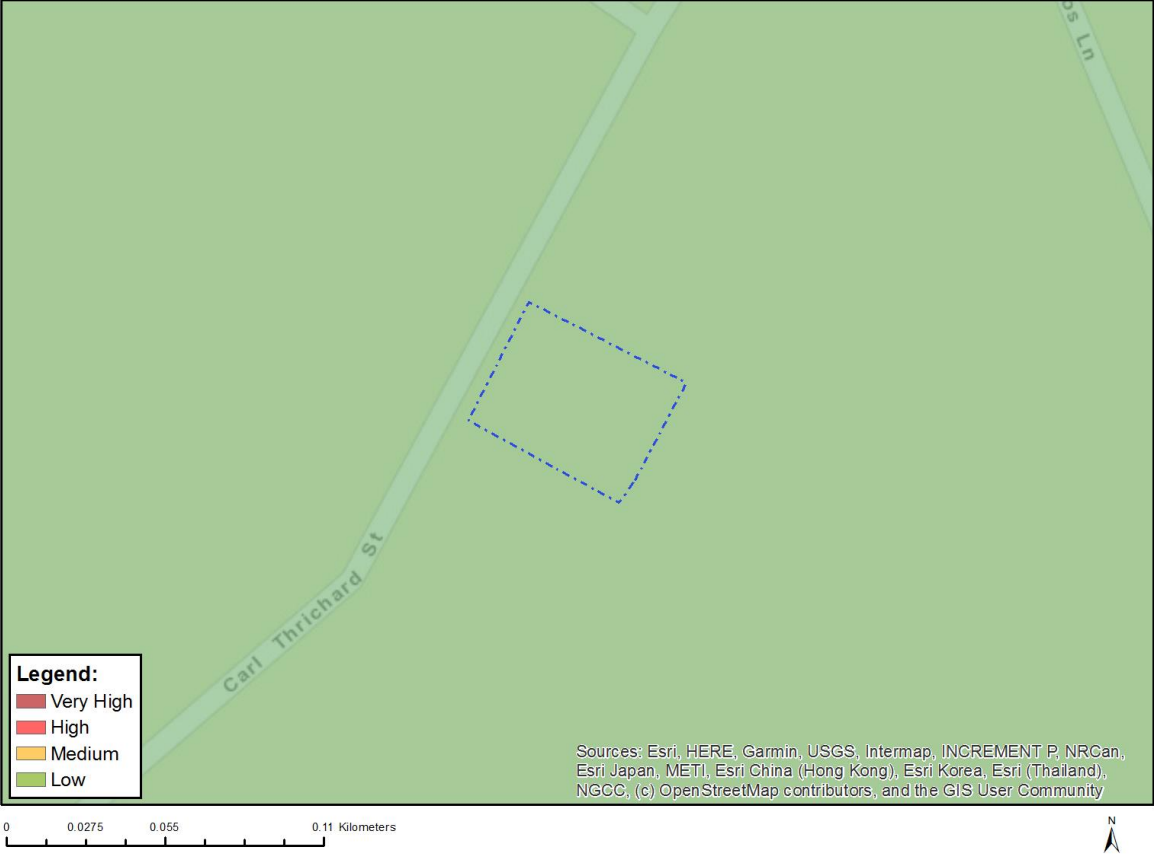


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE ARCHAEOLOGICAL AND CULTURAL HERITAGE THEME SENSITIVITY

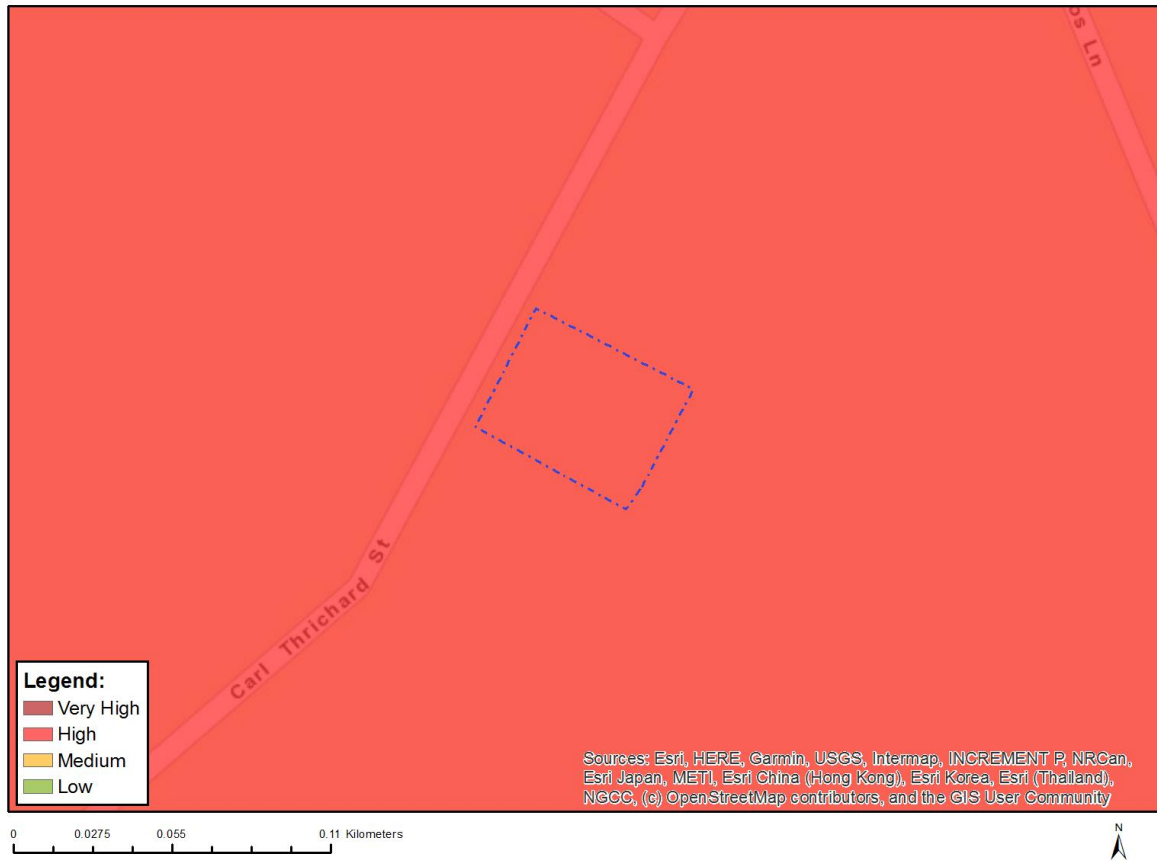


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

MAP OF RELATIVE CIVIL AVIATION THEME SENSITIVITY

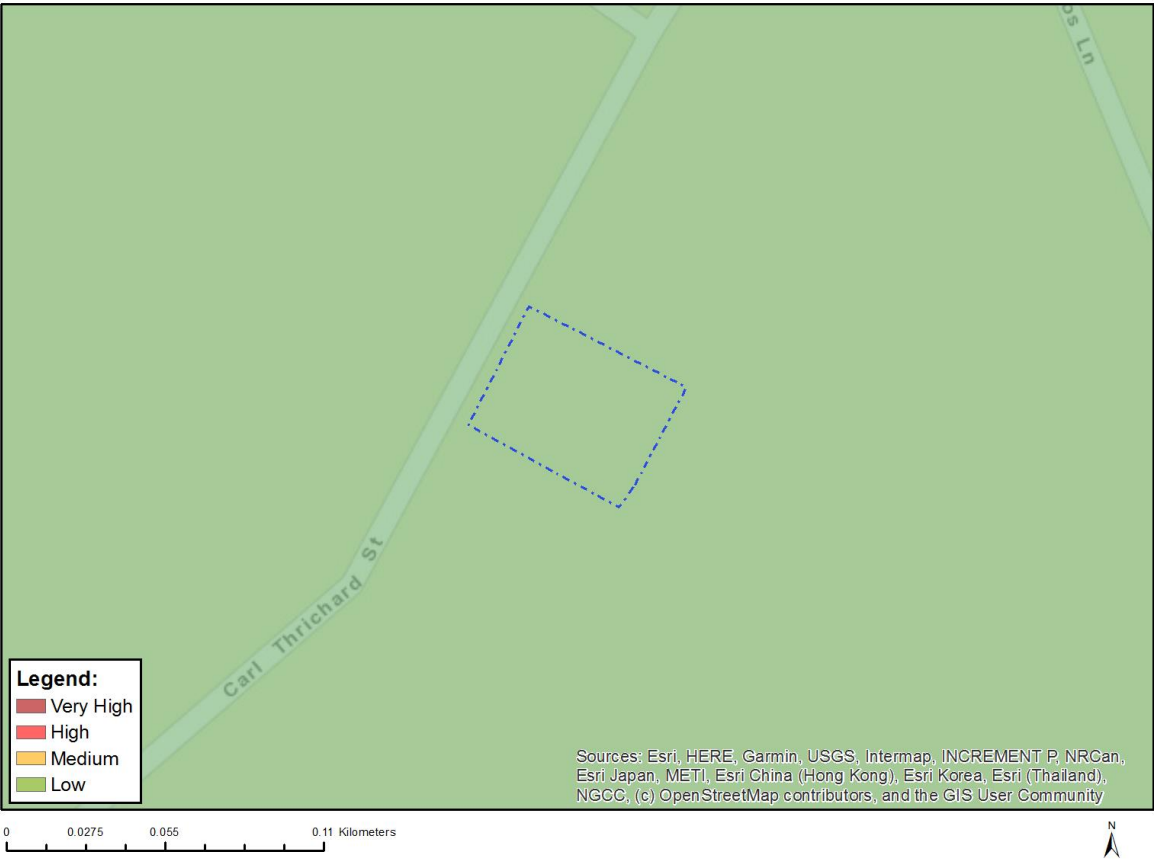


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
	X		

Sensitivity Features:

Sensitivity	Feature(s)
High	Dangerous and restricted airspace as demarcated

MAP OF RELATIVE DEFENCE THEME SENSITIVITY

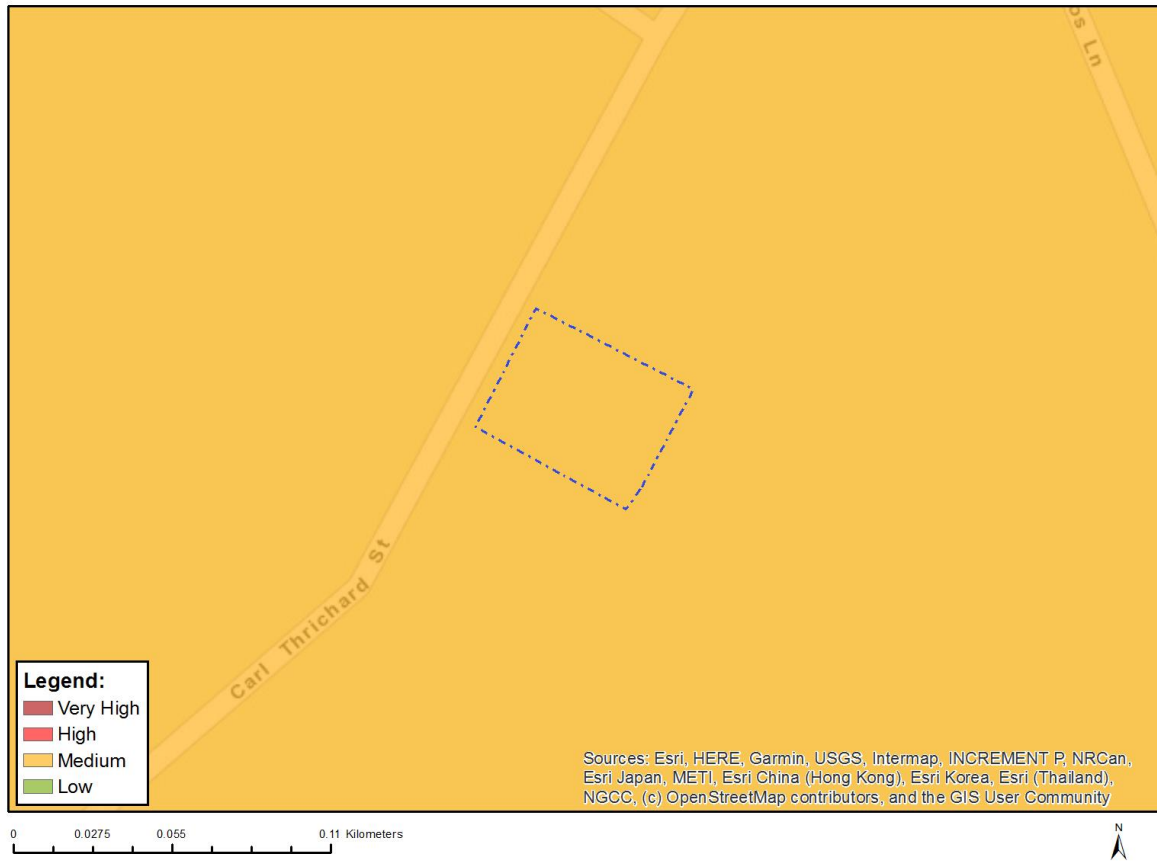


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE PALEONTOLOGY THEME SENSITIVITY

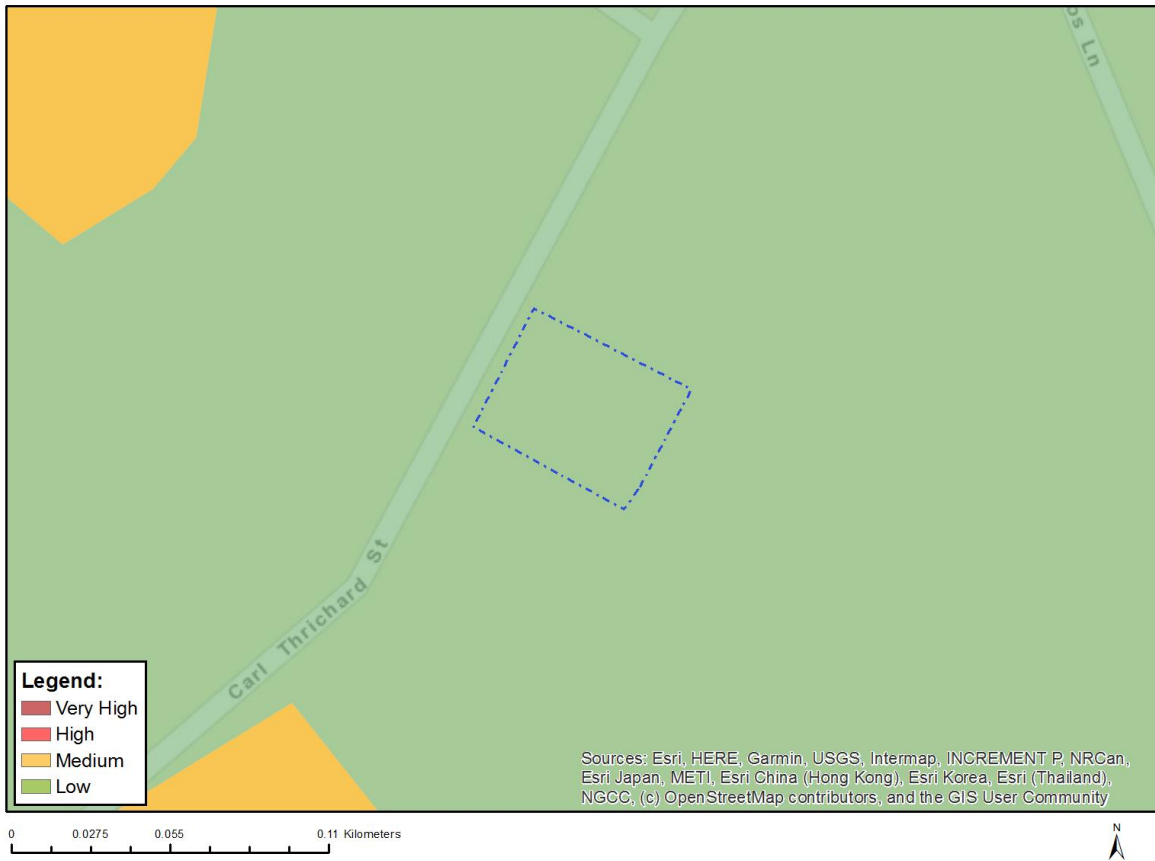


Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Medium	Features with a Medium paleontological sensitivity

MAP OF RELATIVE PLANT SPECIES THEME SENSITIVITY



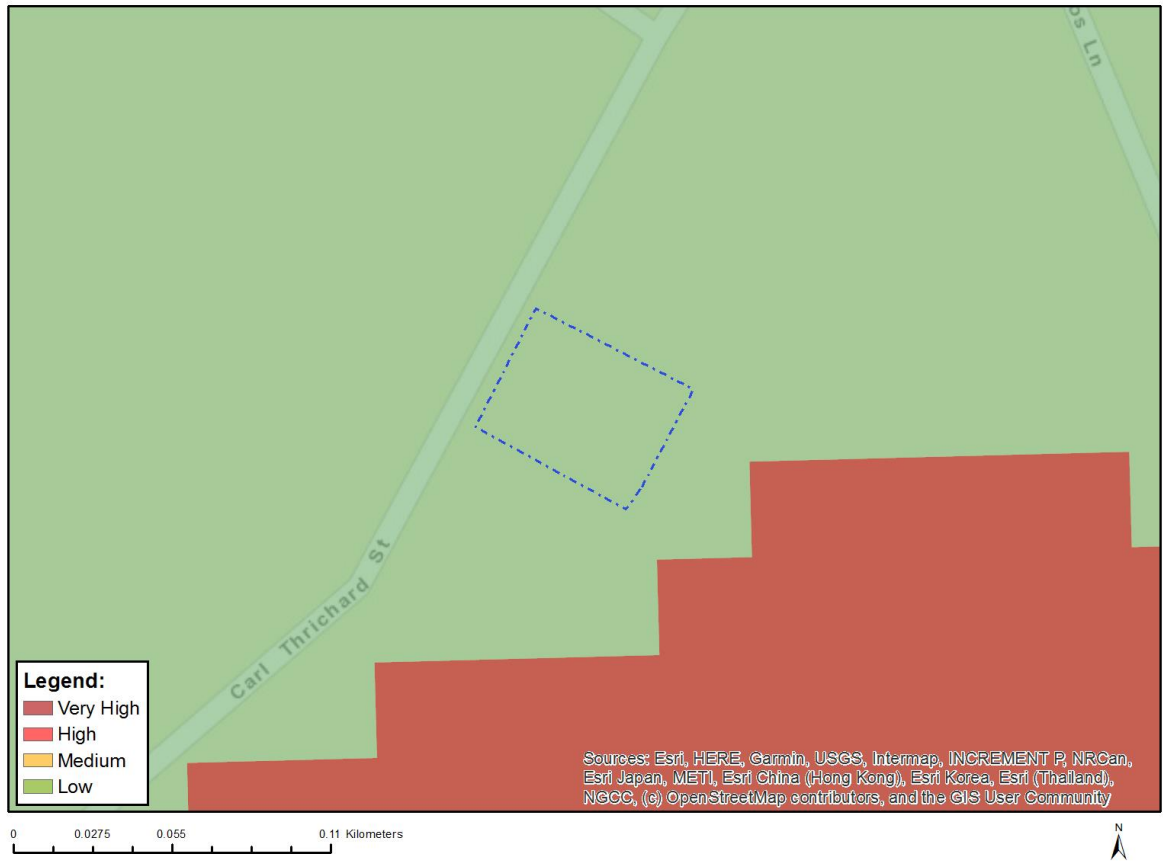
Where only a sensitive plant unique number or sensitive animal unique number is provided in the screening report and an assessment is required, the environmental assessment practitioner (EAP) or specialist is required to email SANBI at eiadatarequests@sanbi.org.za listing all sensitive species with their unique identifiers for which information is required. The name has been withheld as the species may be prone to illegal harvesting and must be protected. SANBI will release the actual species name after the details of the EAP or specialist have been documented.

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity

MAP OF RELATIVE TERRESTRIAL BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low Sensitivity