ENVIRONMENTAL IMPACT ASSESSMENT

PROPOSED AUGEIGAS TOWNSHIP DEVELOPMENT PROJECT ON PORTION 24 OF THE FARM AUGEIGAS NO. 34, WINDHOEK

JUNE 2022

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List of Abbreviations

EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EMA	Environmental Management Act
EMS	Environmental Management System
ESA	Environmental Scoping Assessment
I&Aps	Interested and Affected Parties
PPPPs	Projects, Plans, Programmes and Policies

PROJECT DETAILS

TEAM MEMBERS		
NAME	**POSITION**	**COMPANY**
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REPORT STATUS:	**FINAL**

1. BACKGROUND AND INTRODUCTION

Plan Smart Integrated Business Solutions Pty (Ltd) is proposing to develop Augeigas Township on portion 24 of the farm Augeigas no. 34 in Windhoek, Khomas Region. The proposed development is aimed at addressing the housing scarcity in Windhoek, and ultimately eradicating the informal settlement mushroming in the Windhoek outskirts and accommodating the beneficiaries in formal housing. The proposed development will offer affordable housing in the City to cater for low income group as well as the high income groups. Bulk Services and infrastructure that will be installed include provision of sewage, water, electricity, stormwater management and bitumen roads.

Matrix Consulting Services, an independent consultant, has been appointed by Plan Smart Integrated Business Solutions Pty (Ltd) to undertake an Environmental Impact Assessment (EIA) on the development/servicing of Augeigas Township, in Windhoek.

An assessment will be undertaken to determine the potential impact of the development on the environment and to determine all safety, health and social impacts associated with the proposed development activities. The project location is indicated on the map.

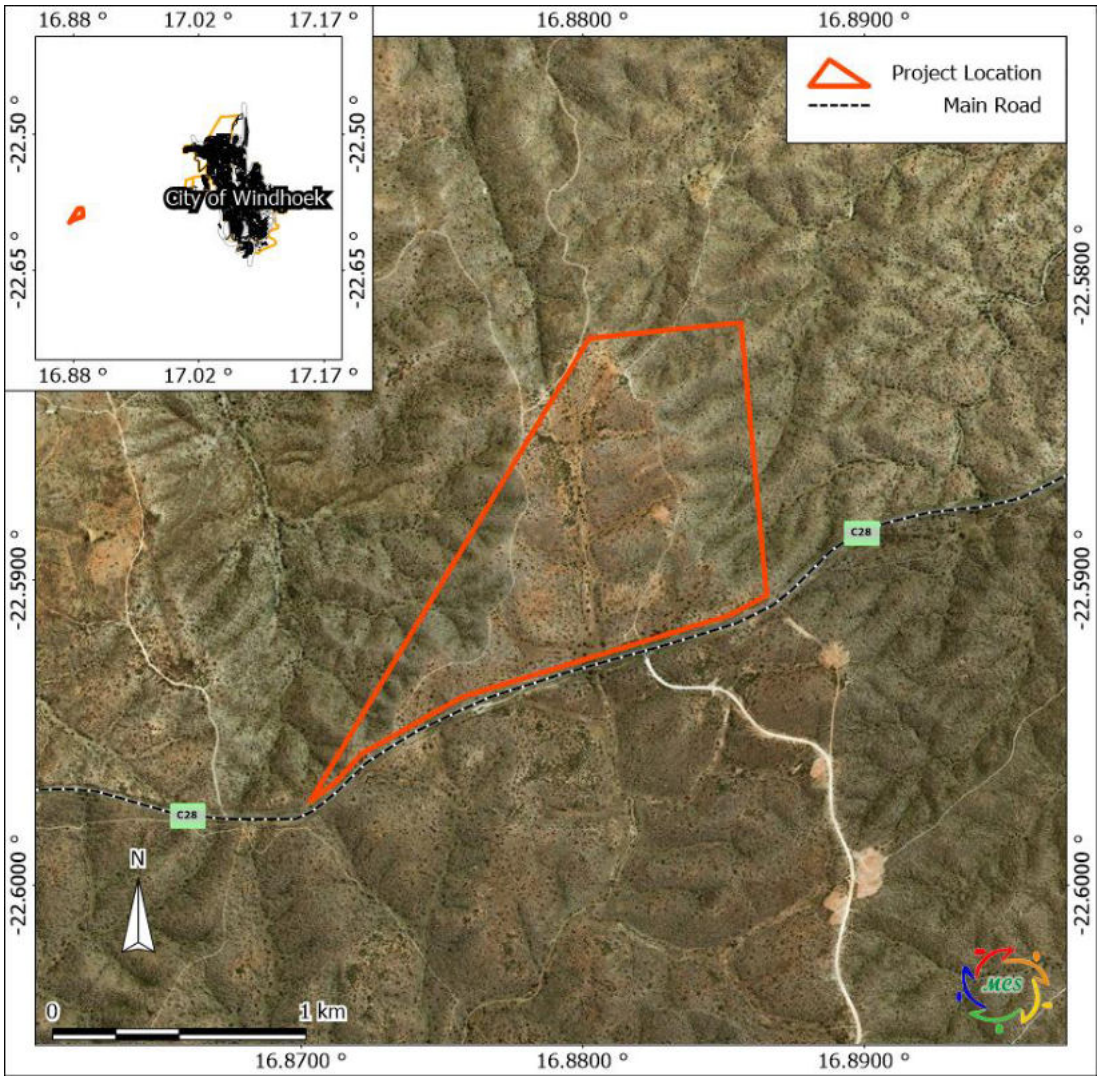


Figure 1. Location Map

The environmental assessment will be conducted as per Namibia's Environmental Assessment Policy and the Environmental Management Act No.7 of 2007 and its regulations of 2012 .

The proposed Augeigas is currently zoned "farming" in the Windhoek structure plan and the developers wishes to apply for the rezoning of Augeigas Portion 24 from "farming" to a township consisting of various zonings to be accommodated in the layout, at the same time maintaining sensitive the environmental setting of the area e.g vegetation, groundwater etc.

2. TERMS OF REFERENCE

Plan Smart Integrated Business Solutions Pty (Ltd) has commissioned an Environmental Impact Assessment (**EIA**) for the proposed Augeigas Township project, in Windhoek. The proposed township is one of the development mechanism projects that the proponent has engaged to address housing scarcity in Windhoek. The Augeigas Township is located at -22.592014 S, 16.882113 E.

Matrix Consulting Services was appointed to undertake the Environmental Impact Assessment of the proposed Augeigas Township Development. This study will enable decision makers to make an informed decision regarding the development and make sure it does not have significant impacts and that they are mitigated. The environmental impact assessment was conducted to comply with the Environmental Assessment Policy (1995) and the Environmental Management Act (2007).

3. PROJECT INFORMATION

3.1 Project Rationale

The City of Windhoek is currently experiencing a scarcity of developable land for residential areas and therefore Plan Smart Integrated Business Solutions Pty (Ltd) ikntends to develop (service) Augeigas to address the serviced land scarcity in the city.

The need for the project relate to the strategic plans of the City of Windhoek to eradicate or minimize all informal settlements in its area of jurisdiction. The aim is to integrate the residents into housing in a sustainable manner.

The proposed project will provide housing for a market that suffers from a lack of housing availability. Other associated land uses of the proposed townships are industrial , business, institutional and social services (shops ,churches, schools, clinics, community halls, multi-purpose centres, libraries etc) and provision of bulk services. The development will therefore not only benefit the future residents but also the surrounding areas by providing necessary facilities and social services that are not currently in place.

The proposed development of the site is desirable from the perspective of availability and proximity of engineering bulk services, compatibility with adjacent projects, accessibility, size and locality. The proposed development will also create employment, both during the construction and operational phase.

The Augeigas Township will consist of about 1151 residential ervens. The proposed township will be serviced to level 5, to ensure the provision of all municipal services, such as water, sewerage, tarred roads and electricity.

Other Potential spin-offs from the development of Augeigas Township:

- Potential revenue generation from the sale of Ervens by the proponent.
- Reduced serviced land scarcity in Windhoek.
- Reduced housing scarcity in Windhoek.
- Creation of job opportunities, training and skills development during construction and operational phase. It is estimated that the new jobs will improve the livelihoods of the workers and their families. Given that the unemployment rate of 30% in the region, this in itself is regarded as a significant benefit to the socio-economic situation in the region (2011, NSA).
- Provision of housing and community facilities.
- Impact on health and safety of Augeigas residents by providing proper housing and sanitation.
- Change the sense of the place of the area from undeveloped townland to a formal housing development.
- Increase in economic opportunities in the area.
- General enhancement of the quality of life in the Khomas Region and the surrounding area, should the project be economically viable.

4. AUGEIGAS Township Development Activities

4.1 Current land-use of AUGEIGAS

The propose site is not developed in any form, besides the track roads and farm house. About 10-20% of the site could be regarded natural and maybe not disturbed, otherwise a large area of the proposed site is previously disturbed, with visible invader plants on some parts of the extensions and sand mining activities.

Current state of site

4.2 Proposed land-use of Augeigas Township

The proposed Augeigas Township is planned to be within the existing Windhoek townlands. The proposed development is aimed at eradicating the spread of informal settlement in Windhoek by accommodating the beneficiaries in formal housing in a sustainable and integrated development like Augeigas. The proposed development will offer affordable housing as well as other land-use type erven.

The development will consist of a total of 1151 Residential erven, General residential erven, Business erven, and Institutional erven (schools, churches, crèches, institutional use, community facilities, children's home), public open space. The proposed layout of the Augeigas Township is illustrated in the map below.

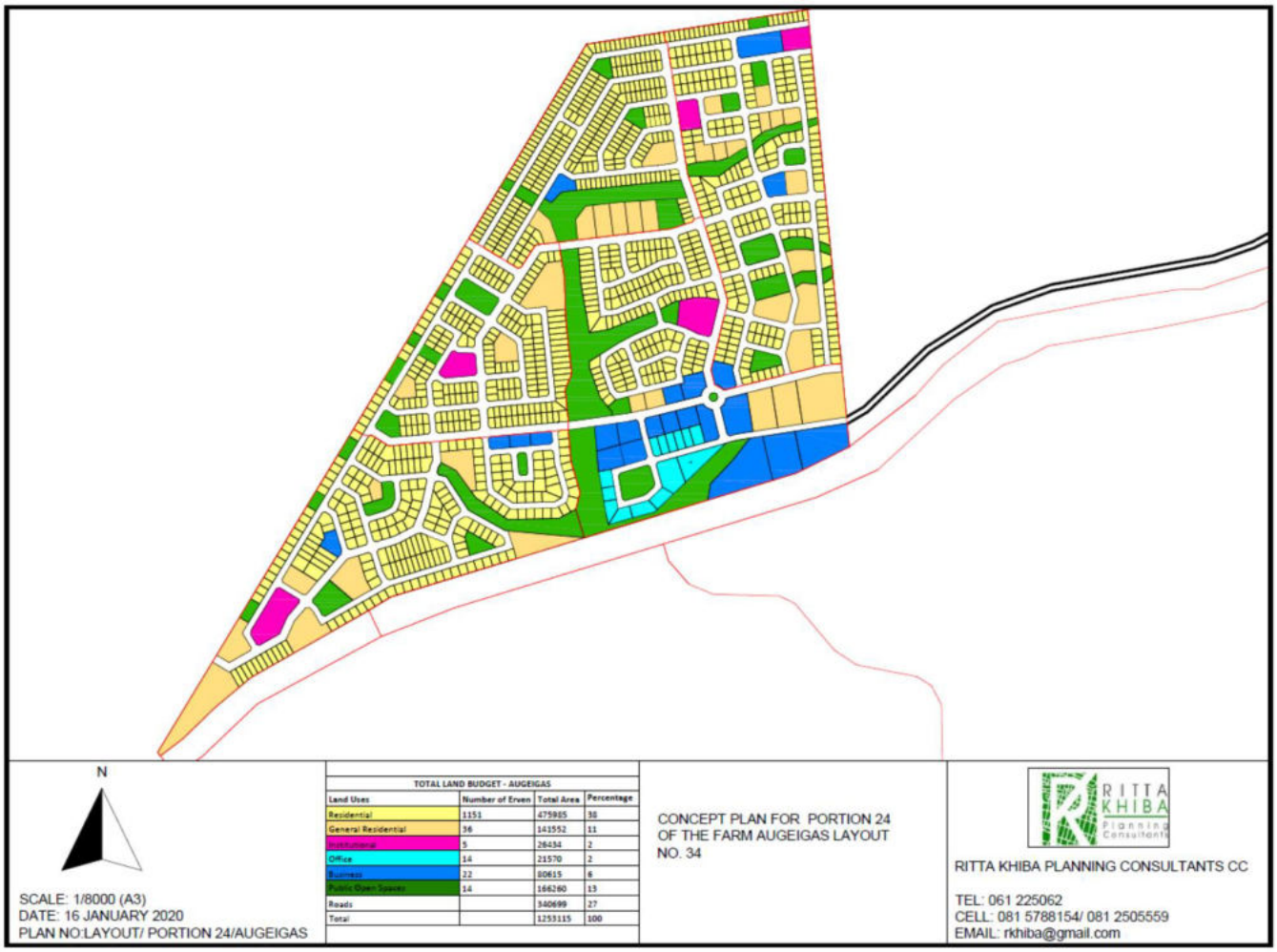


Figure 2: Proposed land-use for Augeigas Township

The establishment of the proposed development requires the installation of supporting bulk services infrastructure, and will be serviced to level 5 in accordance to City of Windhoek regulations. The bulk services required for the construction of the development will include the following:

Sewage: A full waterborne sewage system is proposed for all erven. Excavations for sewer pipelines will have the maximum depth of 2.8m. Sewage generated from the proposed development will be pumped to the newly proposed Waster Water Treatment Works, as the current treatment works do not have extra capacity to handle the new load. The proposed bulk sewer network has sufficient capacity to cope with the demand. See Appendix D for the infrasture report.

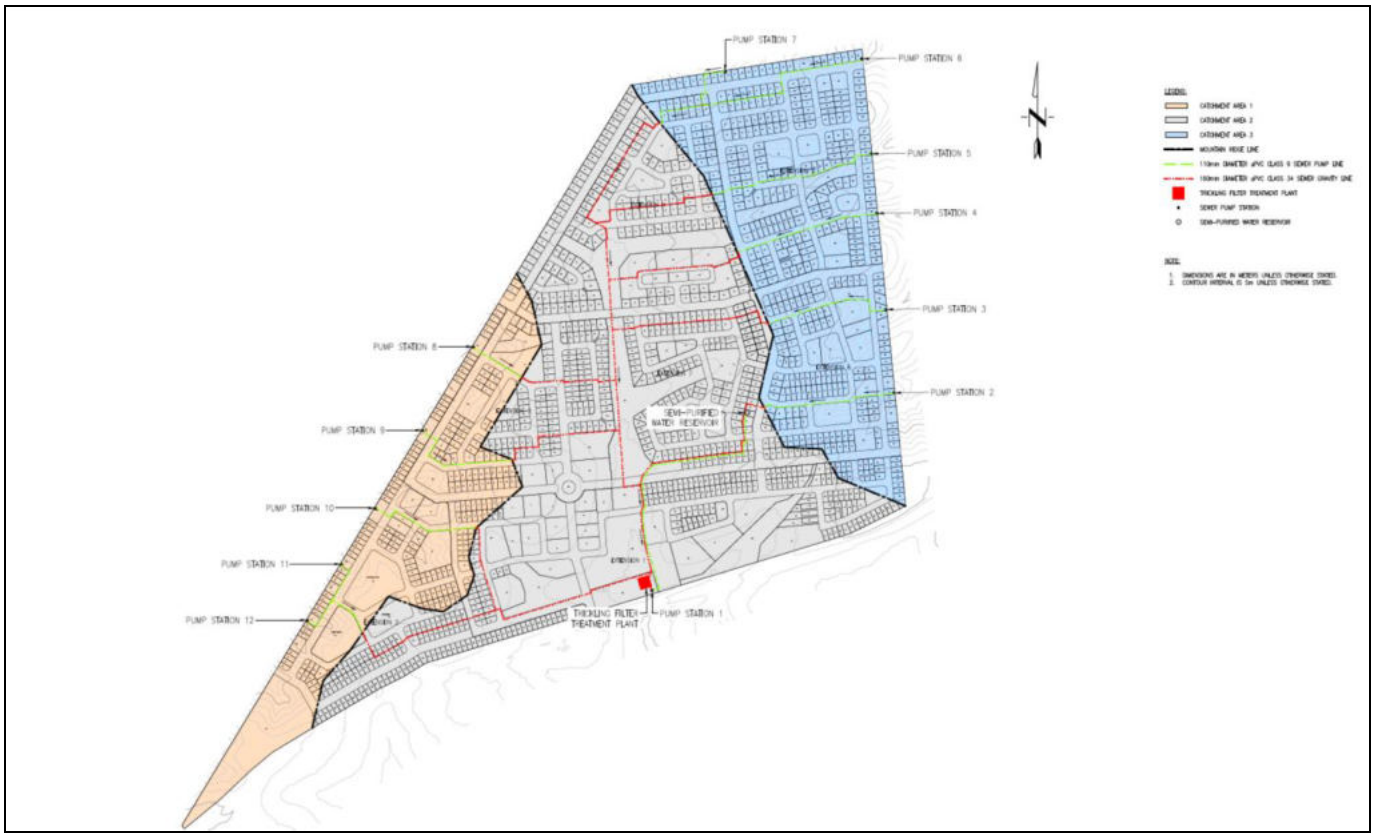


Figure 3: Proposed Sewer Network Layout

A new wastewater treatment plant (WWTP) is required for the Augeigas Development, on the northwestern outskirts of Windhoek. The expected effluent discharge from this new infrastructure will be serviced by a permanent WWTP. For Phase 1 (current) a new plant to serve 10 000 people and with an average dry weather flow (ADWF) of 1 000 m^3/d will be provided (Lempert, 2019).

The new waste water treatment plant will comply with the requirements of Section 21(1) and 21(2) of the Water Act (Act 54 of 1956) as amended and that the purified water will comply with the **Special Standard** as laid out in Government Gazette R553 of 5 April 1962. Additionally, the final effluent will also conform to the envisaged new Water Quality Standards for Effluent, Special Standard, as already defined by the Department of Water Affairs but not yet legalised.

The new WWTP as designed is based on New Generation Trickling Filter technology and incorporates all unit processes typically provided for biological treatment of wastewater with subsequent polishing to achieve the General Standard. This includes: screening and grid removal; primary clarifier; anoxic tank; trickling filter; secondary clarifier; humus tank; chlorine contact basin; and sludge dewatering (filter press) (Lempert, 2019).

The Department of Water Affairs and Forestry (DWAF) requires that an exclusive area/zone is provided between the WWTP and the nearest dwellings in order to prevent obnoxious odours and vectors from becoming a nuisance to inhabitants close by. At Augeigas Township, this zone will be 150 m wide (Lempert, 2019).

For treatment plants that incorporate a primary clarifier, such as Augeigas WWTP, the Code of Practice from DWAF dealing specifically with Trickling Filters (DWAF, Vol. 3, 2010) specifies for the exclusive zone (quoted from Vol. 3):

> ***"If a septic tank or primary clarifier is employed as primary treatment process, this distance may be reduced to 250 m. Latter distance may even be further reduced but is subject to odour control and needs approval by DWAF."***

The Trickling Filters do not emit obnoxious odours when operating properly, utmost care was taken during the detail design stage to capture and/or prevent odours being emitted. An exclusive zone of 150 m will be allowed around the Augeigas WWTP, where no houses will be built (Lempert, 2019).

Water: City of Windhoek will provide the water for the proposed development from the existing Namwater/City of Windhoek reservoirs. Water will be provided by connecting to the existing bulk water main system that passes near the site. New reservours will be . Excavation for water pipelines will be ±1.2m, with soil cover of a minimum 600mm. Below is the proposed water serveces layout with the newly proposed water reservoirs and pipelines.

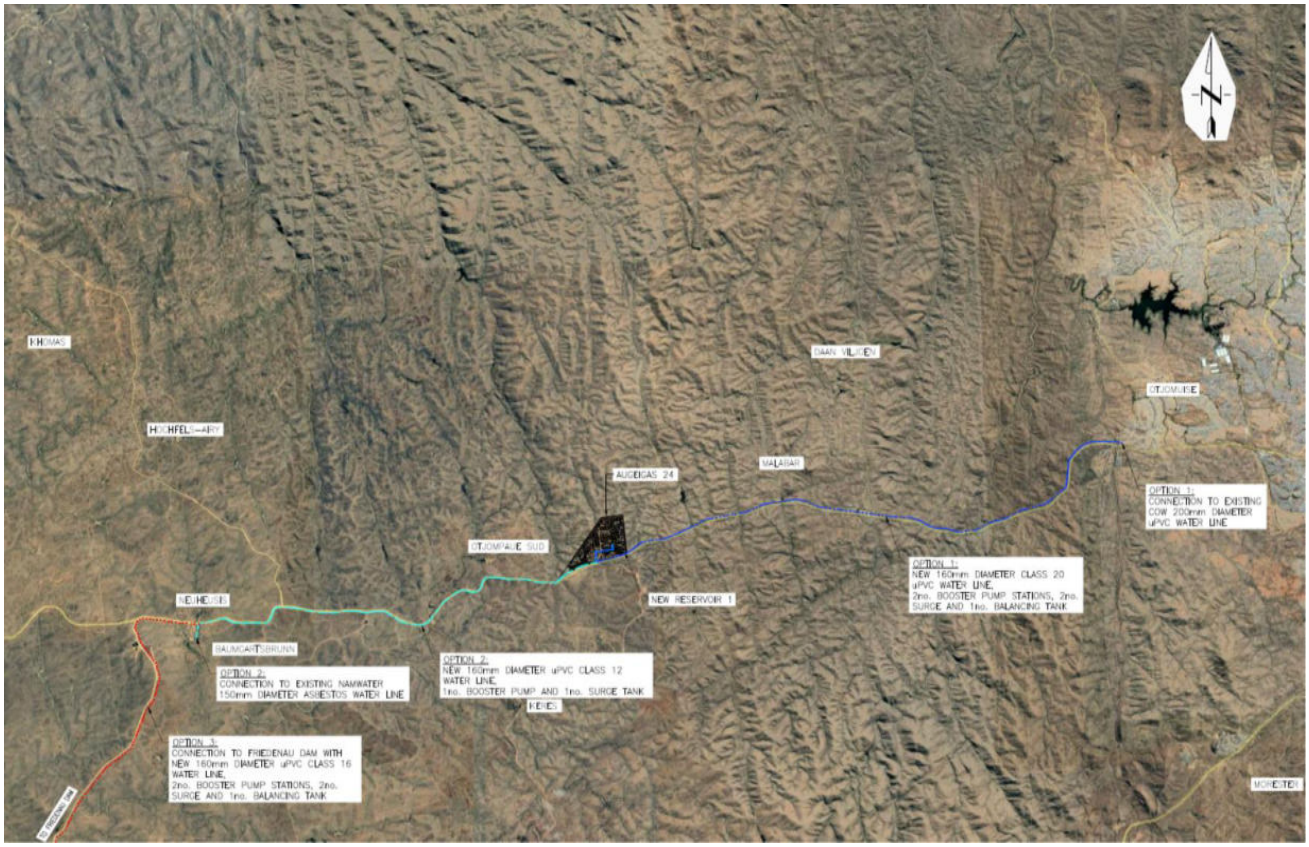


Figure 4: Proposed water services layout

Electricity: The development will be supplied from the existing Nampower/City of Windhoek grid. Power will be connected to the ring network via underground cables from the Substations. Excavations for Electrical cables will be ±1.0m, with soil cover of a minimum 600mm.

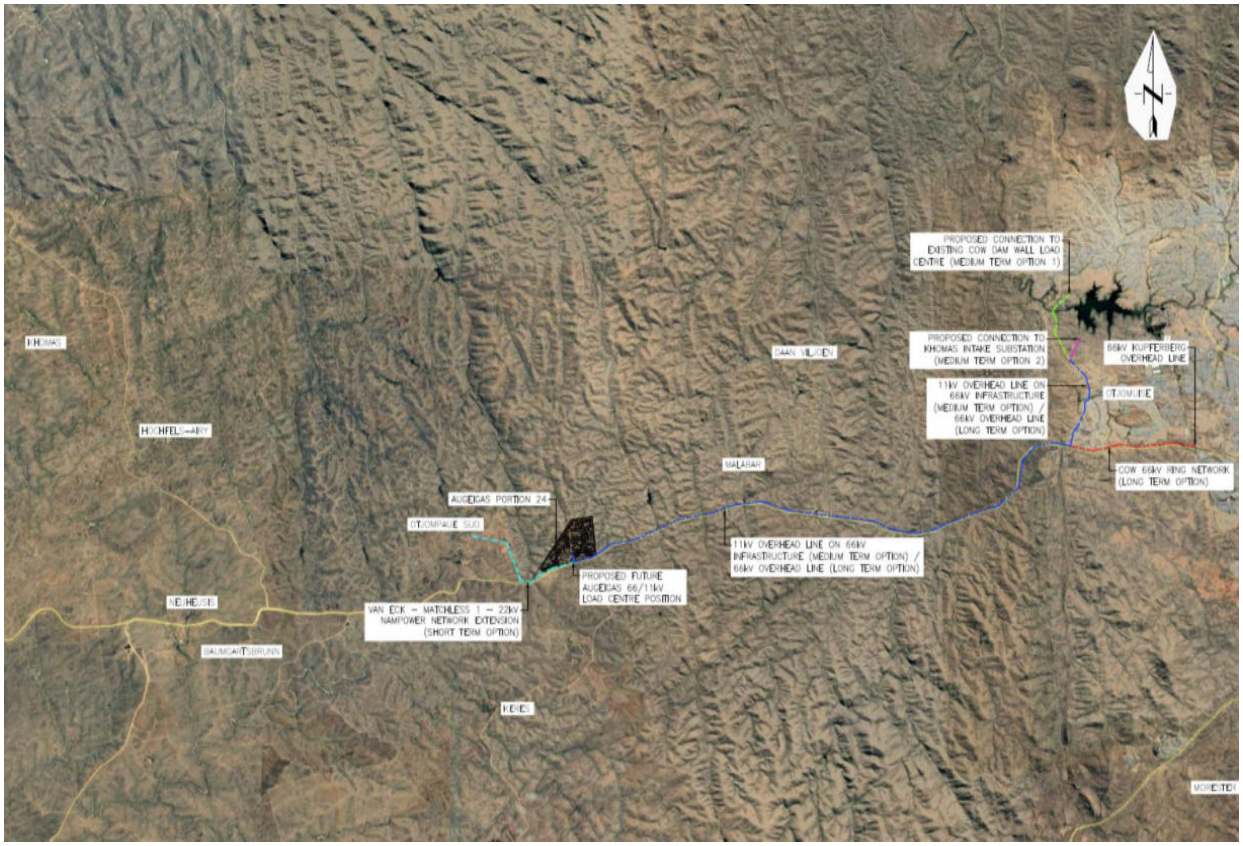


Figure 5: Proposed electrical services layout

Roads: The existing road network will be utilised to service the proposed development. Street roads and access roads to AUGEIGAS will be upgraded to bitumen standards. AUGEIGAS will be accessed via the existing Monte Christo Road.

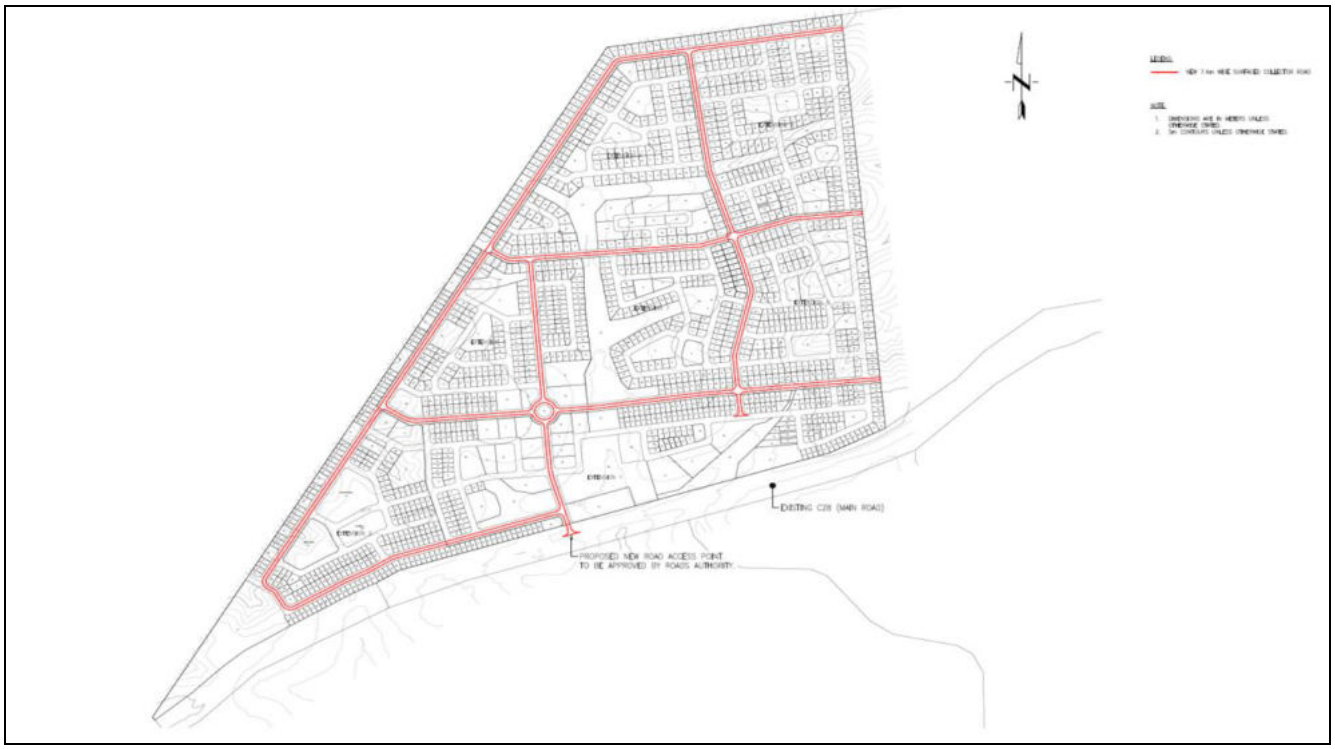
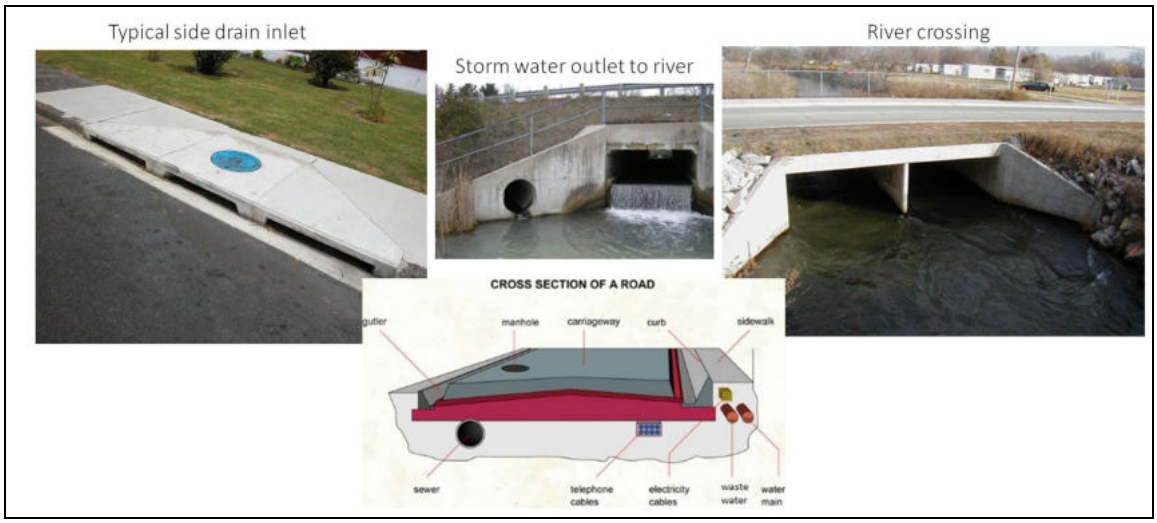


Figure 6: Proposed Road Network

Stormwater Management Sytem: Provision will be been made for stormwater attenuation to reduce the increase in stormwater run-off resulting from the development compared to pre-development phase, through the incorporation of stormwater stormwater management system. The pictures below illustrates typical designs for road and stormwater infrastructure.



The natural drainage is illustrated below.

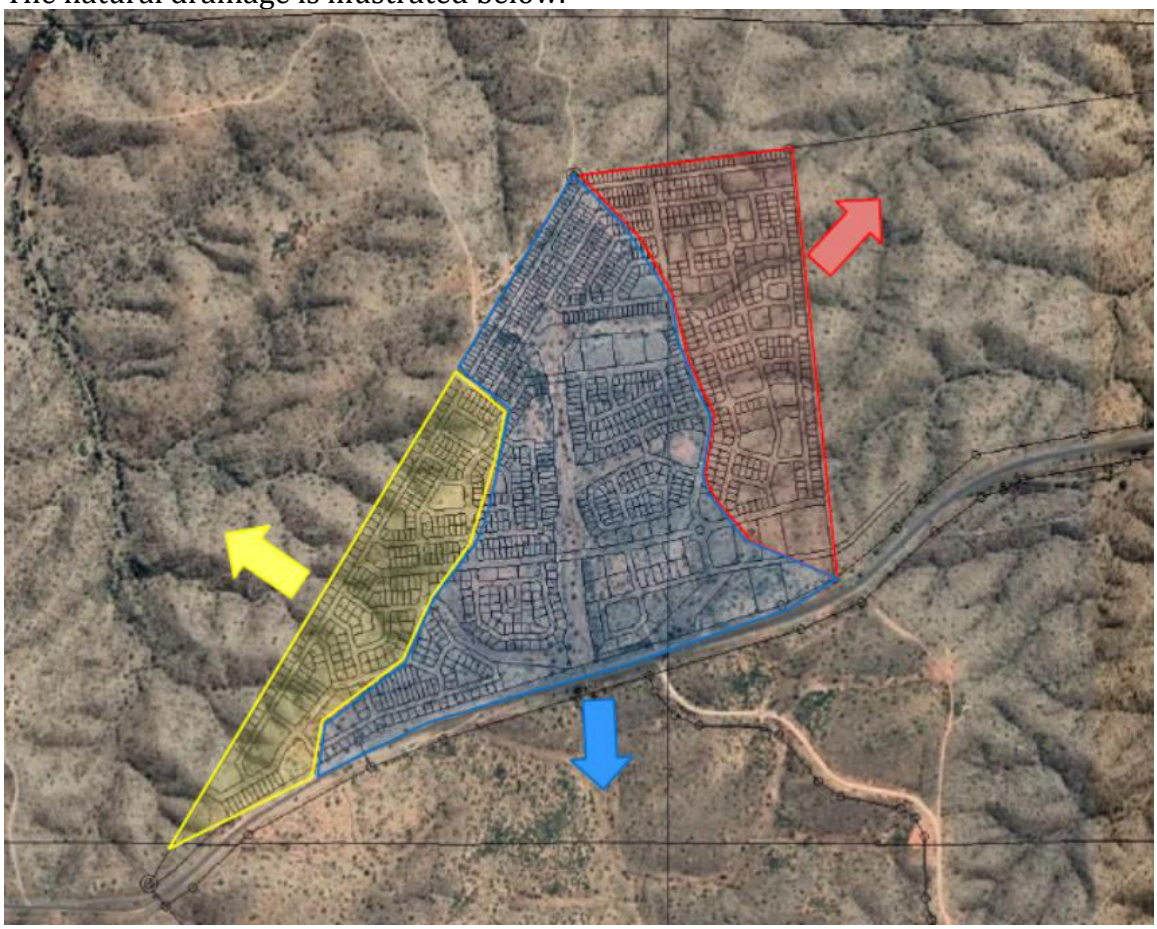


Figure 7: Natural Drainage of the Area

Waste: City of Windhok waste removal contractors (e.g. Rent a Drum, Kleen Tek, Salute Trading etc) will remove domestic waste.

4.2.1 Construction Activities

- Transporting relevant building material and equipment.
- Installation of associated electrical supply cables.
- Installation of associated water pipelines.
- Installation of associated sewer lines.
- Installation of stormwater management system
- Roads construction
- Land clearance

4.2.2 Operational Activities

- Operation and maintenance of the sewer , water, electrical services and roads.

4.2.2 Housing

No contractors are allowed to camp on site during all phases of the project.

4.2.3 Access Road

The site will be accessed using C28 road.

4.2.4 Waste Management

All waste generated at the site will be collected in plastic or steel drums and removed from site and disposed at Kupferberg Landfill. Hazardous waste will be collected and stored separately, and disposed off at an appropriate hazardous waste cell at Kupferberg landfill.

Mobile toilets will be used by the contractors during the construction phase respectively. They waste must be disposed off at Gammams Waste Water Treament Works.

4.2.5 Site Rehabilitation

After the construction is complete, the site will be cleared of all chemical and hydrocarbon spills, pipe cuttings, electrical cuttings etc. Excvations for bulk services will need to be covered and levelled properly.

5. ENVIRONMENTAL STUDY REQUIREMENTS

According to the Environmental Management Act no. 7 of 2007 the proponent requires an environmental clearance certificate from the Ministry of Environment and Tourism (Department of Environmental Affairs) to undertake the development of Augeigas from an undeveloped townland to a township, in Khomas Region. The rezoning of land from agricultural to any other land use is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

The environmental clearance certificate issuance means that the Ministry of Environment and Tourism is satisfied that the activity in question will not have an unduly negative impact on the environment. It may set conditions for the activity to prevent or to minimise harmful impacts on the environment.

6. DESCRIPTION OF ALTERNATIVES

6.1 No-Go Alternative

The no-development alternative is the option of not going ahead with the development of Augeigas. The no-go alternative will keep the site in its current state. This alternative is undesirable in terms of the current housing scarcity in Windhoek. The site is vacant, with part of it previously occupied illegally, and other parts disturbed by sand mining activities. The informal settlement in Windhoek is growing rapidly. Should the site remain in this state, the possibility and threat of illegal land invasions and squatters settling on the site will persist.

Should the proposed activity not take place, the region could be deprived of developing a township, and ultimately reducing the housing demand in Windhoek. The proposed activity could yield positive results that could provide an alternative serviced land to Windhoek inhabitants. The No-go option will not be a viable alternative at this stage.

6.2 Site Alternative

The existing Augeigas portion 24 is already located within Windhoek Townlands and belongs to the proponent. The PPP members wants to provide serviced land and housing to the people of Windhoek. There are engineering services capacity to support the proposed Augeigas Township, thus the site is ideally suited for this type of development.

The area holds less ecological and conservation values, and the best option chosen is to develop with strict consideration of environmental aspects. Mitigation measures on impacts likely to be caused by the activity are incorporated in the planning and execution of the activity. The development of Augeigas Township will then have minimal impact on the environment. The environmental footprint of this activity is expected to be minimal.

7. SCOPE OF THE EIA

The scope of the EIA aims at identifying and evaluating potential environmental impacts emanating from the proposed development of AUGEIGAS Township. Relevant data have been compiled by making use of secondary sources and from project site visits. Potential environmental impacts and associated social impacts are identified and addressed in this report.

The environmental impact assessment report aims to address the following:

a) Identification of potential positive and negative environmental impacts.

b) Provide sufficient information to determine if the proposed project will result in significant adverse impacts.

c) Identification of "hotspots" which should be avoided where possible due to the significance of impacts.

d) Evaluation of the nature and extent of potential environmental impacts.

e) Identify a range of management actions which could mitigate the potential adverse impacts to required levels.

f) Provide sufficient information to the Ministry of Environment to make an informed decision regarding the proposed project.

g) Present and incorporate comments made by stakeholders.

8. METHODOLOGY

The following methods were used to investigate the potential impacts on the social and natural environment that could arise from the development of Augeigas Township in Windhoek:

a) Information about the site and its surroundings was obtained from existing secondary information and site visits.

b) Interested and affected Parties (I&APs) were consulted and their views, comments and opinions are presented in this report.

9. STATUTORY REQUIREMENTS

9.1 National Legislative Requirements

The EIA process is undertaken in terms of Namibia's Environmental Management act no. 7 of 2007 and the Environmental Assessment Policy of 1995, which stipulates activities that may have significant impacts on the environment. Listed activities require the authorisation from the Ministry of Environment and Tourism (DEA). Section 32 of the Environmental Management Act requires that an application for an environmental clearance certificate be made for the listed activities. The following environmental legislations are relevant to this project:

- ***The Namibian Constitution***

The Namibian Constitution has a section on principles of state policy. These principles cannot be enforced by the courts in the same way as other sections of the Constitution. But they are intended to guide the Government in making laws which can be enforced.

The Constitution clearly indicates that the state shall actively promote and maintain the welfare of the people by adopting policies aimed at management of ecosystems, essential ecological processes and biological diversity of Namibia for the benefit of all Namibians, both present and future.

- ***Environmental Management Act No.7 of 2007***

This Act provides a list of projects requiring an Environmental Assessment. It aims to promote the sustainable management of the environment and the use of natural resources and to provide for a process of assessment and control of activities which may have significant effects on the environment; and to provide for incidental matters.

The Act defines the term "*environment*" as an interconnected system of natural and human-made elements such as land, water and air; all living organisms and matter arising from nature, cultural, historical, artistic, economic and social heritage and values.

The Environmental Management Act has three main purposes:

(a) to make sure that people consider the impact of activities on the environment carefully and in good time.

(b) to make sure that all interested or affected people have a chance to participate in environmental assessments

(c) to make sure that the findings of environmental assessments are considered before any decisions are made about activities which might affect the environment

The rezoning of land from open space to any other land use is a *'listed activity'* as per the *List of Activities requiring Environmental Clearance* (Government Notice 29 of 6 February 2012) and accordingly requires an Environmental Impact Assessment (EIA) to be conducted.

Line Ministry: Ministry of Environment and Tourism

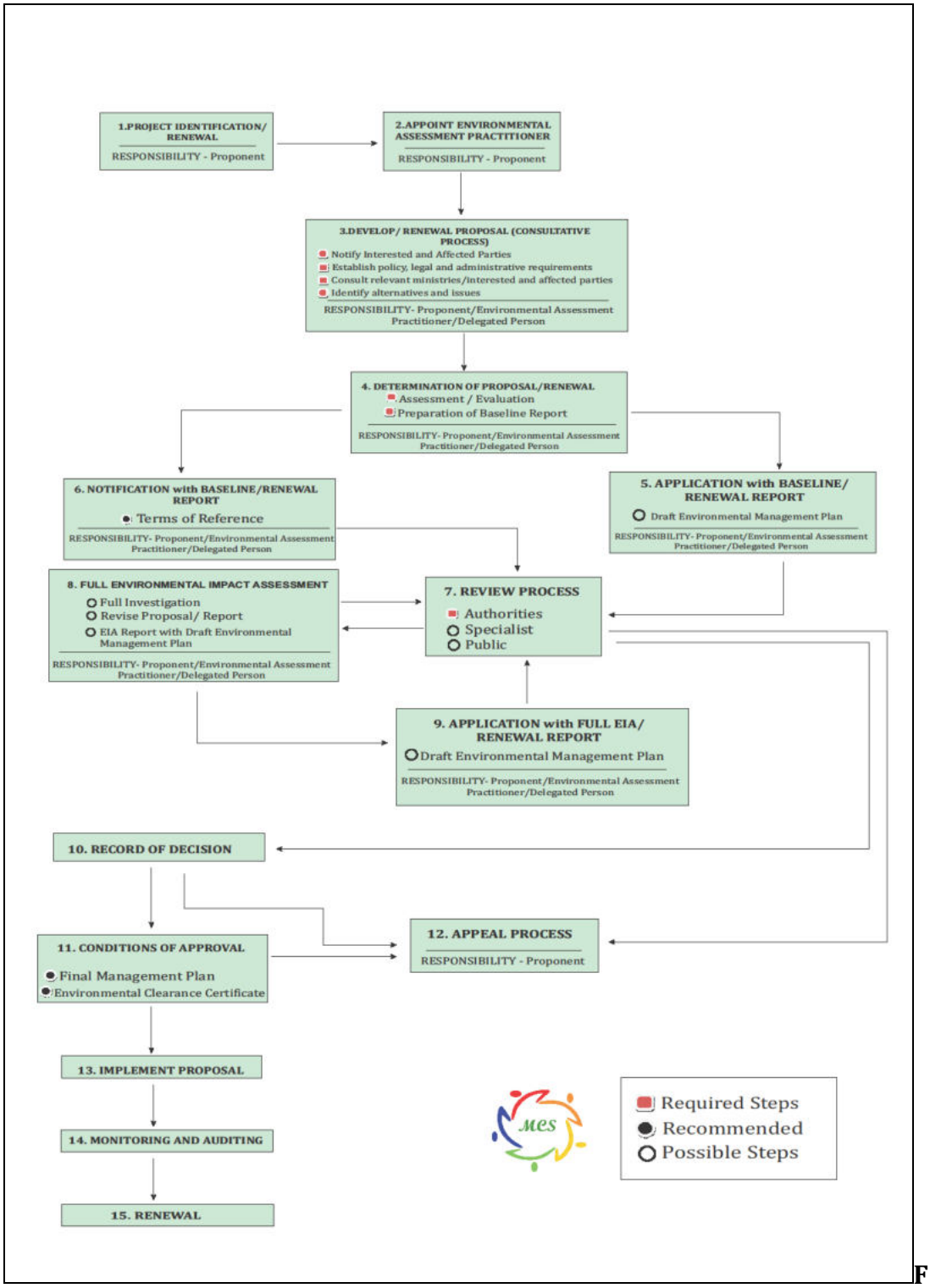


Figure 8. Environmental Assessment Procedure of Namibia

- ***Atmosphere Pollution Prevention Ordinance (1976)***

This Ordinance generally provides for the prevention of the pollution of the atmosphere. Part IV of this ordinance deals with dust control. The Ordinance is clear in requiring that any person carrying out an industrial process which is liable to cause a nuisance to persons residing in the vicinity or to cause dust pollution to the atmosphere, shall take the prescribed steps or, where no steps have been prescribed, to adopt the best practicable means for preventing such dust from becoming dispersed and causing a nuisance.

Line Ministry: Ministry of Environment and Tourism

- ***Water Resources Management Act of Namibia (2004)***

This act repealed the existing South African Water Act No.54 of 1956 which was used by Namibia. This Act ensures that Namibia's water resources are managed, developed, protected, conserved and used in ways which are consistent with fundamental principles depicted in section 3 of this Act. Part IX regulates the control and protection of groundwater resources. Part XI, titled Water Pollution Control, regulates discharge of effluent by permit. Thus developers are required to efficiently plan for sewage disposal.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

- ***Water Act No.54 of 1956***

This Act provides for Constitutional demands including pollution prevention, ecological and resource conservation and sustainable utilisation. In terms of this Act, all water resources are the property of the State and the EIA process is used as a fundamental management tool.

A water resource includes a watercourse, surface water, estuary or aquifer, and, where relevant, its bed and banks. A watercourse means a river or spring; a natural channel in which water flows regularly or intermittently; a wetland lake or dam, into which or from which water flows; and any collection of water that the Minister may declare to be a watercourse. Permits are required in terms of the Act for the undertaking of the following activities relevant to the proposed project:

- ✓ Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit in terms of Section 21 (f); and
- ✓ Disposal of waste in a manner that may detrimentally impact on a water resource in terms of Section 21 (g).

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

- ***The Draft Wetland Policy (1993)***

Requires that any wetlands and its associated hydrological functions form a part, to be managed in such a way that their biodiversity, vital ecological functions and life support systems are protected for the benefit of present and future generations.

Line Ministry: Ministry of Environment and Tourism

- ***Environmental Assessment Policy of Namibia (1995)***

Environmental Assessments (EA's) seek to ensure that the environmental consequences of development projects and policies are considered, understood and incorporated into the planning process, and that the term ENVIRONMENT (in the context of IEM and EA's) is broadly interpreted to include biophysical, social, economic, cultural, historical and political components.

All listed policies, programmes and projects, whether initiated by the government or the private sector, should be subjected to the established EA procedure as set out in Figure 2.

Line Ministry: Ministry of Environment and Tourism

- ***Forestry Act (No.12 of 2001)***

This Act makes provision for the protection various plant species. Harvesting permits are required from the Directorate of Forestry to clear certain protected vegetation species from the site.

Line Ministry: Ministry of Agriculture, Water Affairs and Forestry

- ***Townships and Division of Land Amendment Act (No.28 of 1992***

Article (l) of this Act stipulates that "Whenever any area of land constitutes, by reason of its situation, a portion of an approved township, or adjoins an approved township, the Executive Committee may, by proclamation notice in the Gazette and after consultation with the Board, extend the boundaries of the township to include such an area". Thus the new township needs to be approved by the Namibian Planning Advisory Board and the Townships Board.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

- ***Sewerage and Drainage Regulations(amendments) Local authorities act, section 23 (1992).***

The regulations makes provision for proper construction of pipelines in drainage lines. The regulations also stipualate the prevention of pollution and environmental damage caused by improper construction of sewerage and water pipelines in drainage lines.

Line Ministry: Ministry of Regional and Local Government, Housing and Rural Development

- ***Soil Conservation Act (No.76 of 1969).***

The Act advocates for the Prevention and combating of soil erosion, conservation, improvement and manner of use of soil and vegetation, and protection of water resources.

- ***Draft Pollution Control and Waste Management Bill***

The proposed project of Augeigas Township Development, only applies to Parts 2 and 7 of the Bill.

Part 2 stipulates that no person shall discharge or cause to be discharged any pollutant to the air from a process except under and in accordance with the provisions of an air pollution licence issued under section 23. It further provides for procedures to be followed in licence application, fees to be paid and required terms of conditions for air pollution licences.

Part 7 states that any person who sells, stores, transports or uses any hazardous substances or products containing hazardous substances shall notify the competent authority, in accordance with sub-section (2), of the presence and quantity of those substances.

- ***Hazardous Substances Ordinance No. 14 of 1974***

The Ordinance applies to the manufacture, sale, use, disposal and dumping of hazardous substances, as well as their import and export and is administered by the Minister of Health and Social Welfare. Its primary purpose is to prevent hazardous substances from causing injury, ill-health or the death of human beings.

Line Ministry: Ministry of Health and Social Services

- ***Public Health Act 36 of 1919 and Subsequent Amendments***

The Act, with emphasis to Section 119 prohibits the presence of nuisance on any land occupied. The term nuisance for the purpose of this EIA is specifically relevant specified, where relevant in Section 122 as follows:

- ✓ any dwelling or premises which is or are of such construction as to be injurious or dangerous to health or which is or are liable to favour the spread of any infectious disease;
- ✓ any area of land kept or permitted to remain in such a state as to be offensive, or liable to cause any infectious, communicable or preventable disease or injury or danger to health; or
- ✓ any other condition whatever which is offensive, injurious or dangerous to health.

Potential impacts associated with the development of Augeigas project are expected to include dust, air quality impacts, noise nuisance and smoke emissions.

Line Ministry: Ministry of Health and Social Services

- ➢ ***National Heritage Act (No.76 of 1969).***

The Act calls for the protection and conservation of heritage resources and artefacts. Should any archaeological material, e.g. old weapons, coins, bones found during the construction, work should stop immediately and the National Heritage Council of Namibia must informed as soon as possible. The Heritage Council will then decide to clear the area or decide to conserve the site or material.

(Contact: Tel: 061-244375, National Heritage Council of Namibi)

9.2 International Conventions and Regulations

Article 144 of the Namibian Constitution states that "the general rules of public international law and international agreements binding upon Namibia form part of the law of Namibia." This means that all the international agreements that Namibia signed become part of the law of our country. These laws and/or agreements are:

- ✓ Convention on Biological Diversity, 1992;
- ✓ United Nations Framework Convention on Climate Change, 1992;
- ✓ Kyoto Protocol on the Framework Convention on Climate Change, 1998;
- ✓ Stockholm Convention of Persistent Organic Pollutants, 2001.

9.3 Municipal By-laws (City of Windhoek)

- ***Groundwater Protection Regulations***

The protection of the groundwater resource in a development scenario should be provided for, in a formally documented and legislated EIA process. The EIA process or procedure provides for the institutionalization of decision making regarding the potential impact development activities will have on the receiving natural, social and cultural environment. Further, the process makes provision for the identification and listing of types of activities that would be required to follow the process before any authorisation will be given.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***Environmental Structure Plan and Policy***

The Environmental Structural Plan & Policy provides sufficient information for those making decisions regarding a particular development so that proper environmental evaluation can be conducted, which is appropriate to the scale of the proposed project and the risks to the environment which it may pose.

It establishes where there are potential and real problem environmental areas, such as land degradation, pollution, indiscriminate resource use etc. The Environmental Structural Plan is the baseline upon which the policy is established.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***Windhoek Town Planning Scheme (2005)***

The Town Planning Scheme enables the comprehensive management of all property and related public sector functions across the city. The guidelines on the Conservation of Natural Resources should be addressed in this project.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

- ***Policy for the Distribution and Future Usage of Public Open Spaces in Windhoek (2000)***

The policy provides guidelines for the establishment of open spaces and green corridors along drainage lines and sensitive environmental areas. The policy advocates for the provision of land for the explicit development of open spaces.

(Contact: Mr. Olavi Makuti, Tel: 061-290 3518, e-mail: olm@windhoekcc.org.na)

10. GENERAL ENVIRONMENT OF THE STUDY AREA

This section lists the most important environmental characteristics of the study area and provides a statement on the potential environmental impacts on each.

10.1 Location and Land Use

The township development is located within the CoW townlands on remainder of Farm Augeigas PTN 24, approximately fifteen kilometres west from Outjomuise on the C28 road towards Otjompaue Sud and situated north-east of Keres. See Figure 1.

The site is located within an undeveloped townlands (agricultural), as per local municipal regulations, which is surrounded by Farm portions (Small-holdings) .

10.2 Topography and Surface Water

The landscape of the Augeigas Township is classified as being in the Khomas Hochland Plateau region, which is characterized by rolling hills in the west with many summit heights equivalent reflecting older land surfaces.

The township development lies in the Aretaragas River catchment , the river that lies on the eastern side of the development. Drainage is well developed and runoff takes place through small streams (rivers) running through the site. This streams eventually join the Aretaragas River course, flowing towards the north into the Swakop River. Care should be taken to avoid contamination of these surface water bodies in the area, especially during rainy seasons, as water in these bodies is used for aquifer recharge.

*10.3 **Climate** (Mandelsohn et al, 2003)*

Table 1. Climate Data

Classification of climate:	Sub-tropical area
Average rainfall:	Rainfall in the area is averaged to be between 300-350 mm per year.
Variation in rainfall:	Variation in rainfall is averaged to be 30-40 % per year.
Average evaporation:	Evaporation in the area is averaged to be between 2100-2240 mm per year.
Precipitation:	The highest summer rains are experienced in February.
Water Deficit:	Water deficit in the area is averaged to be between 1700- 1900mm per year.
Temperatures:	Temperatures in the area are averaged to be between 18- 20 °C per year.

Wind direction: Wind directions in the area are predominantly easterly winds.

10.4 Geology of the Area

The project location has a very thin soil cover (less than 35cm), however this differs in the in the rivers and tributaries. The general geology or rock formations underlying the township development consists mainly of mica rich schist and quartz rich schist (quartzite), containing quartz veins. All of the intersected rock formations belong to the Kuiseb formation of the Damara Sequence. In this area the formation is known to have a dip of ±30° in a northerly direction. The schist has an abundance of layers (schistosity) consisting of quartz rich and mica rich layers. Some major Amphibolite intrusions are also present in the area.

North-southerly faults are common in the area, with a large north-south striking fault observed on the eastern half of the project location. The Aretaragas River lies east of the project location also follows a major north-south striking fault. The Amphibolite intrusions in the area are clearly affected by the faults and large displacements are visible.

The overall complex geology of the Windhoek area is a result of numerous folding and faulting episodes, including thrusting and rifting, to which the area has been subjected. Metasedimentary rocks of the Swakop Group, which is part of the Damara Sequence, constitute the Windhoek Aquifer.

10.5 Hydrogeological Characteristics

A number of north-southerly striking faults and joints found in Windhoek form the major underground water conduits of the Windhoek Aquifer and hence determine the conditions of the aquifer. Secondary porosity giving rise to high aquifer transmissivity is best developed in faults with post-hydrothermal alteration brecciation in quartzitic environments. Moreover host rock fracturing along fault planes results in better development of secondary porosity in quartzite compared to schistose terrain such that the aquifer reaches its maximum potential in this type of setting. The sedimentary formations of the study area strike in an east-north-easterly direction and dip 25-30° to the north-northwest.

The micaceous schist found in the area, is prone to plastic deformation rather than brittle, fracturing, exhibiting significantly lower secondary porosity and permeability. Groundwater flow would be mostly through secondary porosity along fractures, faults and other geological structures present within the underlying formations in the area.

On the other hand, the more competent quartzite is subject to brittle deformation and thus exhibits relatively high secondary porosity and permeability due to jointing. The joints of the quartzite show evidence of fluid flow by carbonate and quartz infill and iron staining.

Groundwater flow from the site is expected from north to south. According to the City of Windhoek, Namwater, Department of Water Affairs (DWA) and MCS database approximately 2 boreholes are present within a 3km radius of the project location. Groundwater table in the area is expected to be less than 10m below ground level (mbgl).

Groundwater belongs to the government of the Republic of Namibia; hence the area does fall within the Windhoek-Gobabis Subterranean Water Control Area, of Government Notice 189 of 6 February 1970. This means that Government controls groundwater usage in this area.

The area is outside the mapped area considered in the Vulnerability Study of the Windhoek Aquifer (City of Windhoek, 2000) , However due to the presence of a highly sensitive fault present in the area, it should be regarded as a sensitive area. These geological features might form preferential pathways to the underlying aquifer.

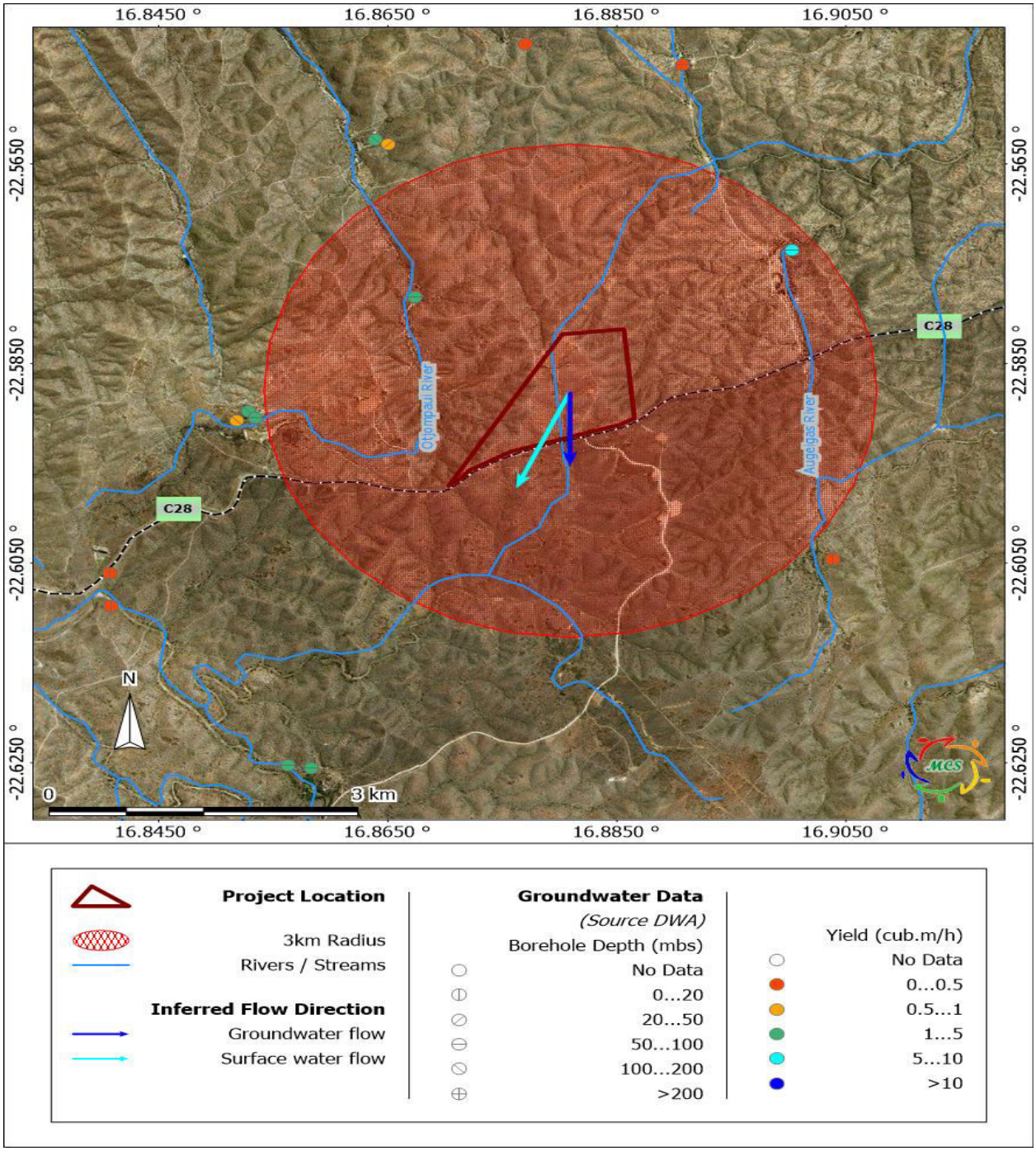


Figure 9. Hydrogeological map

10.6 General Ecology

The vegetation at Portion 24 is typically a highland savannah with a dominance of phanerophyte species such as A. mellifera and *D. cinerea, A.reficiens, A. erubescens, G. Flava and C.alexandrii* that are known to occur commonly in this area. No red-listed species were encountered during the survey. Tree species encountered here that are currently protected under the Forestry Act (Act 12 of 2001) in Namibia include: *Boscia albitrunca*, *Albizia anthelmintica*, *Acacia erioloba*, *Faidherbia albida*, and *Ziziphus mucronata*. Caution must be exercised to minimise damage to these trees. It is strongly recommended that these trees

should rather be factored into the development as far as possible, because they can be used for shade and can contribute positively to the general aesthetics of the proposed development. Invasive species were also encountered at the site, which is a sign of distubance.

The following photos illustrate the vegetation on site.

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Deducing from the Atlas of Namibia, the proposed site is within the area that is known to have >500 plant species (Mandelsohn et al, 2003).

With regards to fauna, it is estimated that at least 71 to 80 reptile, 8 to11 amphibian, 61 to 75 mammal (e.g. Baboons) and 201 to 230 bird species (breeding residents e.g. Guinea fowl) are known to or are expected to occur in the project area of which only a very few proportion are endemics. However, there were very few birds observed at the study area, because of current movements in the highly populated neighbouring townships and informal settlement.

11. SOCIO-ECONOMIC ASPECTS

This section provides an overview of socio-economic characteristics of the study area. It provides regional and local information on the, economic activities, population dynamics, vulnerability, and social services currently available in the area.

11.1 Regional Information

The proposed Augeigas project will be situated in the Khomas Region of Namibia. The total current population is estimated to be 342,141 (169,672 males and 172,469 females) (NSA, 2011). Ninety-Seven percent of the population of the Khomas Region over 15 years of age are literate. The estimated unemployment rate in Khomas region is 30. The population density in Khomas region is relatively high at 6.8 persons per km^2, compared to the national average of 2 persons per km2.

The life expectancy in Khomas region is 56 years in females and 54 years in males. The Human Poverty Index in Khomas region is 17.09, meaning almost a quarter of all people living in Khomas are poverty stricken.

11.2 Windhoek

11.2.1 Economic Activities

The City of Windhoek is the capital city of Namibia and is often referred to as the cleanest city in Africa. The city is the hub for all economic activities in the Khomas Region and is linked to Namibia's air, rail and road network, making it well situated to service Zambia, Zimbabwe, Botswana, Southern Angola and South Africa.

The Augeigas project is a win-win opportunity for all parties involved, whether they are the land owners and/or potential residents and the local government, or the surrounding community. The Augeigas project will address the housing scarcity that is currently rife in Windhoek. The Augeigas project has a potential revenue generation from the sale of erven.

11.2.2. Employment (Job Opportunities)

Unemployment still hampers most of the developing world and Windhoek is not an exception. The proposed gas extraction project is likely to increase the job opportunities in Windhoek. The construction phase of the project will provide job opportunities, of which 80% are expected to be unskilled and semi-skilled people and can be sourced from the unemployed labour force of Windhoek (unemployment rate is 30% in Khomas Region).

Even before projects produce profits from the sale of erven or use of bulk services, they produce a related benefit for the surrounding communities and the city at large, which is job creation. Bulk servies construction involve engineers, construction firms, equipment vendors, and utilities. All

of this cost is spent locally for piping, construction, and operational personnel, contractors, providing additional economic benefits to the community through increased employment and local sales.

Some of the services in the operational phase will be outsourced e.g. maintenance of bulk services, waste removal etc. The outsourcing of these services will strengthen existing business operating in the area and provide employment to people.

11.2.3 Livelihoods

Economic activities in Windhoek and the surrounding areas are limited and livelihoods are heavily dependent on the business sector and salaries of civil servants. The livelihoods of the locals are likely to be positively impacted therefore predicted to be better than before the development of the township project in the area.

11. 2.4 Tourism

Windhoek is the major tourism gateway to the rest of Namibia. The city itself also attracts a lot of tourists from all over the world, due to its range of attractions in and around the city; and the rich cultural diversity found in the capital.

This tourist city renowned for being one of the cleanest in the world, therefore the Augeigas Project helps combat the lack of housing available for low-middle-high income groups.

Excessive waste, dust, noise, vibrations and appalling air quality can have negative impacts on the tourism industry in the area, as it can become a nuisance to tourists.

11. 2.5 In - Migration

Due to enhanced employment opportunities that could be created by the envisaged project, some in-migration of job seekers to Windhoek can be expected. Depending on the amount of in-migration, local areas may start experiencing overcrowdings, over use of infrastructure, local conflicts, increase of goods prices due to increased demand etc.

11. 2.6 HIV & Prostitution

Namibia has a high incidence of HIV/AIDS, which has a strong and adverse socio-economic impact on livelihoods of people in the region. The HIV prevalence rate for the age group 15 to 49 is estimated at 21.3% for Namibia (UNDP, 2005).

The spending power of locals working on this project are likely to increase, and this might be a perfect opportunity for sex workers to explore. Migrant

labourers from other regions and expatriates are normally vulnerable and may use the services rendered by the sex workers.

Should the HIV prevalence increase, the following consequential issues could arise:

- ✓ Reduced workforce in the Khomas Region.
- ✓ Diversion of income expenditure to medical care.
- ✓ Increase in orphans and household headed by children.
- ✓ Increase in pregnancy related mortality.
- ✓ The current rate of 3,129 people per doctor could increase.

11. 2.7 Infrastructure & Increased Traffic

The traffic in the area would be expected to increase slightly and it might contribute to heavy traffic during peak hours and a higher number of car accidents. Infrastructure like roads will be affected due to increased traffic and heavy-duty cargo trucks accessing the site from C28 road.

12. STAKEHOLDER PARTICIPATION

Consultation with the public forms an integral component of an EIA investigation and enables I&APs e.g. neighbouring landowners, local authorities, environmental groups, civic associations and communities, to comment on the potential environmental impacts associated with the proposed development and to identify additional issues which they feel should be addressed in the EIA. The primary aims of public participation were:

- ❖ To initiate participation of Interested and affected parties (I&APs), e.g. local authorities and communities.
- ❖ To inform I&APs and key stakeholders about the proposed development.
- ❖ To identify issues and concerns of key stakeholders and I&Aps with regards to the proposed development.
- ❖ To provide information to enable informed decision making
- ❖ To develop a communication structure with stakeholder and I&APs
- ❖ To promote transparency of the project
- ❖ To ensure the public and stakeholders comments are considered for the development.
- ❖ To provide answers to I&APs queries
- ❖ To encourage shared responsibility and sense of ownership.

Decision-making authorities were consulted throughout from the outset of the study, and have been engaged throughout the project process. Consultation with the department of Environmental Affairs (MET) included the environmental assessment procedure and application procedure.

Public participation notices were advertised in local newspapers on two different occasions, namely; (See Appendix G)

- ✓ The Namibian Newspaper, 29 October and 05 November 2015
- ✓ The Newera Newspaper, 29 October and 06 November 2015

In the adverts an e-mail address was provided to the general public to register as interested and affected parties; and to request a background information document for the project. Posters were place at strategic locations to invite interested and affected parties to the meeting, e.g at the Farm gate, City of Windhoek offices, Goreangab Shopping centre, Otjomuise Police Station and Havana Primary School. A public meeting was held at the Polytechnic Hotel and Tourism School, at 09H00, on the 05th of December 2019. An environmental assessment and process presentation were presented at public participation meeting (see appendix C).

Most of the comments raised during the meeting where mostly about access roads and bulk services to the new development. Participants also raised concerns over water availability for area, which the City of Windhoek will be responsible for as in

other townships within its jurisdiction. The participants also suggested new sustainable solutions to be incorporated in the new development, such solar power, bicycle lanes, pedestrian walkways, public transport systems. See Appendix C for all the comments and answers during the meeting.

Table 2. Interviewed Stakeholders/I&APS

NAME	ORGANISATION/ERF	OWNER/POSITION
Mr. R. Khiba	Ritta Khiba Town Planning Consultants	Town Planner
Mr. O. Makuti	City of Windhoek	Environmental Officer
Mr. E. Roux	North Khomashochland Farmers Association	Interested and Affected Party
W.Tebner	Farm Otjopmuae	Interested and Affected Party
F. Löhnert	Private	Interested and Affected Party
J. Tjilondelo	Private	Interested and Affected Party

13. ENVIRONMENTAL IMPACT EVALUATION

The Environmental Impact Assessment sets out potential positive and negative environmental impacts associated with the proposed Augeigas Township Development. The following assessment methodology will be used to examine each impact identified, see Table 3:

Table 3. Impact Evaluation Criterion *(DEAT 2006)*

Criteria	**Rating (Severity)**	
Impact Type	**+VE**	Positive
	0	No Impact
	-VE	Negative
Significance of impact being either	**L**	Low (Little or no impact)
	M	Medium (Manageable impacts).
	H	High (Adverse impact).

Probability:	**Duration:**
5 - Definite/don't know	5 - Permanent
4 - Highly probable	4 - Long-term (impact ceases
3 - Medium probability	3 - Medium-term (5-15 years)
2 - Low probability	2 - Short-term (0-5 years)
1 – Improbable	1 - Immediate
0 – None	
Scale:	**Magnitude:**
5 – International	10 - Very high/don't know
4 – National	8 - High
3 – Regional	6 - Moderate
2 – Local	4 - Low
1 - Site only	2 - Minor
	0 - None

13.1 Construction Activities of the Augeigas Township.

13.1.1 Dust Pollution and Air Quality

Dust will be generated during the construction and installation of bulk services, and problems thereof are expected to be site specific. Dust is expected to be worse during the winter months when strong winds occur. Release of various particulates from the site during the construction phase and exhaust fumes from vehicles and machinery related to the construction of bulk services are also expected to take place. Dust is regarded as a nuisance as it reduces visibility, affects the human health and retards plant growth.

It is recommended that regular dust suppression be included in the construction activities, when dust becomes an issue. No unnecessary revving of engines or operation of vehicles is allowed. In general, the servicing of Augeigas Township is envisaged to have minimal impacts on the surrounding air quality.

Impact Evaluation:

Aspect	**Impact Type**	**Scale**	**Duration**	**Magnitude**	**Probability**	**Significance**	
						Unmitigated	**Mitigated**
Dust & Air Quality	-VE	2	1	2	1	M	L

13.1.2 Noise Impact

An increase of ambient noise levels at Augeigas Township site is expected due to the construction activities. Noise pollution due to heavy-duty equipment and machinery will be generated.

It is not expected that the noise generated during construction will impact any third parties. Ensure all mufflers on vehicles are in full operational order; and any audio equipment should not be played at levels considered intrusive by others. The construction staff should be equipped with ear protection equipment.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	1	4	4	M	L

13.1.3 Safety and Security

Safety issues could arise from the earthmoving equipment and tools that will be used on site during the construction phase. This increases the possibility of injuries and the contractor must ensure that all staff members are made aware of the potential risks of injuries on site. The presence of equipment lying around on site may also encourage criminal activities (theft).

Sensitize operators of earthmoving equipment and tools to switch off engines of vehicles or machinery not being used. The contractor is advised to ensure that the team is equipped with first aid kits and that they are available on site, at all times. Workers should be equipped with adequate personal protective gear and properly trained in first aid and safety awareness.

No open flames, smoking or any potential sources of ignition should be allowed at the project location. Signs such as 'NO SMOKING' must be prominently displayed in parts where inflammable materials are stored on the premises. Proper barricading and/or fencing around the work sites should be erected to avoid entrance of animals and/or unauthorized persons. Safety regulatory signs should be placed at strategic locations to ensure awareness. Adequate lighting within and around the construction locations should be erected, when visibility becomes an issue.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety & Security	-VE	1	1	4	2	M	L

13.1.4 Contamination of Groundwater

Groundwater quality could be impacted through oil leakages, lubricants and grease from the equipment and machinery utilised during the bulk servicing of Augeigas Township. Possibility of contamination from surface sources exist in the proximity of fault zones.

Care must be taken to avoid contamination of soil and groundwater. Use drip trays when doing maintenance on machinery. Maintenance should be done on dedicated areas with linings or concrete floor. The risk can be lowered further through proper training of staff.

All spills must be cleaned up immediately. Excavations should be backfilled and sealed with appropriate material, if it is not to be used further.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater	-VE	2	2	2	2	M	L

13.1.5 Contamination of Surface Water

Contamination of surface water might occur might occur through oil leakages, lubricants and grease from the equipment and machinery during the installation and maintenance of bulk services at Augeigas Township. Oil spills may form a film on water surfaces in the nearby streams causing physical damage to water-borne organisms.

Machinery should not be serviced at the construction site to avoid spills. All spills should be cleaned up as soon as possible. Hydrocarbon contaminated clothing or equipments should not be washed within 25m of any surface water body.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Surface water	-VE	2	2	2	3	M	L

13.1.6 Generation of Waste

This can be in a form of rubble, cement bags, pipe and electrical wire cuttings. Contaminated soil due to oil leakages, lubricants and grease from the contruction equipment and machinery may also be generated during the construction phase.

The oil leakages, lubricants and grease must be addressed. Contaminated soil must be removed and disposed off at the hazardous waste cell at Kupferberg Landfill. The contractor must provide containers on-site, to store any hazardous waste produced. Regular inspection and housekeeping procedure monitoring should be maintained by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste	-VE	1	1	4	4	M	L

13.1.7 Traffic

The servicing of Augeigas Township activities are expected to have a minor impact on the movement of traffic along C28 road. No diversion of traffic or closure of roads are expected.

Speed limit warning signs must be erected to minimise accidents. Heavy-duty vehicles and machinery must be tagged with reflective signs or tapes to maximise visibility and avoid accidents.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	2	1	4	3	M	L

13.1.8 Fires and Explosions

There should be sufficient water available for fire fighting purposes. Ensure that all fire-fighting devices are in good working order and they are serviced. All personnel have to be trained about responsible fire protection measures and good housekeeping such as the removal of flammable materials on site. Regular inspections should be carried out to inspect and test fire fighting equipment by the contractor.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Fires and Explosions	-VE	1	1	4	2	M	L

13.1.9 Nuisance Pollution

Aesthetics and inconvenience caused to persons using the C28 road and surrounding areas. The construction activities would be visible from the road section within Farm Portion 24, thus the supervisor should maintain tidiness on site at all times. Take cognition when parking vehicles and placing equipment.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Nuisance Pollution	-VE	1	1	2	2	L	L

13.1.10 Erosion and Sedimentation

Vegetation clearance and creation of impermeable surfaces could result in erosion in areas across Augeigas Township. The clearance of vegetation will further reduce the capacity of the land surface to slow down the flow of surface water, thus decreasing infiltration, and increasing both the quantity and velocity of surface water runoff. The particles in suspension will be transported towards the north and could increase the sedimentation in the Aretaragas river tributary flowing in the northen direction.

The proposed development will increase the amount of impermeable surfaces and therefore decrease the amount of groundwater infiltration. As a result, the amount of stormwater during rainfall events could increase. If proper stormwater management measures are not implemented this will impact negatively on the water courses close to the site.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Erosion and Sedimentation	-VE	1	1	4	2	M	L

13.1.10 Ecological Impacts

The proposed Augeigas Township is an already disturbed area, which has a few conservation worthy vegetation and fauna. The Camlethorn trees larger than 150mm in girth should be left intact, and let the residents decide on whether to incorporate it in their residence plans. Land will be cleared, leaving the big trees to maintain the vegetation within Augeigas Township. However, impacts on fauna and flora are expected to be minimal. Disturbance of areas outside the designated working zone is not allowed.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology	-VE	1	1	4	2	L	L

Summary of all potential impacts expected during the construction of the bulk services of Augeigas Township:

In general, impacts are expected to be low to medium, mostly short lived and site specific. Mitigation options recommended in the Environmental Management Plan (EMP) will guide and ensure that the impacts during the construction activities are minimised.

The contractor on site should be made aware of the content and environmental requirements of this report through proper induction training.

13.2 Operational Activities of Augeigas Township

13.2.1 Dust Pollution and Air Quality

Vehicles that will be accessing Augeigas Township will contribute to the release of hydrocarbon vapours, carbon monoxide and sulphur oxides into the air. Possible release of sewer odour, due to sewer system failure or maintenance might also occur. All maintenance of bulk services of Augeigas Township procedures have to be designed to enable environmental protection .

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Dust & Air Quality	-VE	2	1	2	1	M	L

13.2.2 Noise Impact

Noise pollution already exists around the site in the form of noise generated from vehicles frequenting the existing access road. Noise pollution due to this project in the operational phase is expected to be mainly from generators or pumps, road maintenance machinery during maintenance.

Ensure that generator engines are fitted with mufflers. Operators working in close proximity to the generators should be equipped with ear protection equipment, when noise becomes an issue. Observation of on-site noise levels by the Manager or Supervisor of Bulk Services Maintenance Department.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Noise	-VE	1	3	4	4	M	L

13.2.3 Contamination of Groundwater and Surface Water

Spillages might also occur during maintenance of the sewer system or from failure of the proposed treatment plant. This could have negative impacts on surface and groundwater especially in cases of large sewer spills.

Potential health impact on groundwater users do exist. Potential impact on the natural environment from possible polluted groundwater also exits. The area is subjected to north-northwest structures, which might act as preferential pathways for any contaminants entering the saturated zone. Proper containment should be used in cases of sewerage system and treatment plant maintenance to avoid any possible leakages. A buffer pond must form part of the waste water treatment plant to hold out of specifications water during the breakdown of the waste water treatment plant.

Pollution Monitoring boreholes must be installed to pro-actively monitor pollution around the proposed waste water treatment plant. Monitoring boreholes must installed both downstream and upstream on WWTP in the Aretaragas River and Otjompaui River. This will enable early detection of pollution emanating from the treatment plant.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Groundwater contamination	-VE	2	3	3	3	M	L

13.2.5 Generation of Waste

Waste in the form of solid waste from households, businesses and institutions will be generated. Waste will be removed and disposed off at Kupferberg Landfill by City of Windhoek Waste Removal Contractors e.g. Rent-a-Drum, Kleen Tek etc.

The City of Windhoek will have waste skips around Augeigas Township like the rest of the suburbs in Windhoek.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Waste Generation	-VE	1	1	2	4	M	L

13.2.6 Failure of Reticulation Pipelines

Potential release of sewage, storm-water, water, into the environment environment due to pipeline/system failure. As a result, the spillage could be released into the environment and could potentially be a health hazard to surface and groundwater.

Proper reticulation pipelines and drainage systems should be installed. Regular bulk services infrastructure and system inspection should be conducted.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Failure of Reticulation Pipelines	-VE	1	1	4	2	L	L

13.2.7 Ecological Impacts

No impacts are expected as the proposed Augeigas Township project in the operational phase. Vegetation in open spaces should not be disturbed or removed during the operational phase. Minimise the area of disturbance by restricting movement to the designated working areas during Maintenance.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Ecology Impacts	-VE	1	1	4	2	L	L

13.2.8 Traffic

Traffic around the Augeigas Township should be monitored, to avoid traffic congestion in the area. Speed limits and road signs as set out by City of Windhoek Traffic Deparment should be adhered to in order to minimise accidents. It is advisable that traffic lights be erected at hot spots of Augeigas Township on problematic areas to ease traffic flow around the new township.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Traffic	-VE	1	3	4	4	M	L

13.2.9 Safety and Security

A number of health and safety threats exist during operational activities of Augeigas Township. Individuals in the community can suffer from noise from maintenance activities around the proposed township. Accidents on roads as a result of increased traffic and deteriorated.

The contractors are advised to ensure that proper personal protective gear and first aid kits are available, at all times. Workers should also be properly trained in first aid and safety awareness.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Safety and Security	-VE	1	3	6	3	M	L

Summary of all potential impacts expected during the operations of the Augeigas Township:

In general, impacts are expected to be low, short lived and site to local specific. An Environmental Management Plan (EMP) will ensure that the impacts during the operational activities are minimised and includes measures to reduce all impacts identified.

The contractor should be made aware of the content and environmental requirements of this report through proper induction training.

14. CUMULATIVE IMPACTS

These are impacts on the environment, which results from the incremental impacts of the Augeigas Township project when added to other past, present, and reasonably foreseeable future actions regardless of what person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In relation to an activity, it means the impact of an activity that in itself may not be significant, but may become significant when added to the existing and potential impacts resulting from similar or diverse activities or undertakings in the area.

Possible cumulative impacts associated with the development of Augeigas Township includes, noise emissions, land disturbance, Aretegaras River pollution, traffic and possible accidents involving vehicles frequenting the area. This impacts could become significant especially that other Portions are planned to be developed at the same time or in the near future. This could collectively impact on the environmental conditions in the area. Cumulative impacts could occur in both the operational and the construction phase.

Impact Evaluation:

Aspect	Impact Type	Scale	Duration	Magnitude	Probability	Significance	
						Unmitigated	Mitigated
Cumulative impacts	-VE	1	3	4	3	M	L

15. ENVIRONMENTAL MANAGEMENT PLAN

The Environmental Management Plan (**EMP**) provides management options to ensure impacts of the proposed servicing of Augeigas Township are minimised. An EMP is an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the Augeigas Township project are prevented, and the positive benefits of the projects are enhanced.

The objectives of the EMP are:

- ✓ to include all components of the Augeigas Township project;
- ✓ to prescribe the best practicable control methods to lessen the environmental impacts associated with the Augeigas Township project;
- ✓ to monitor and audit the performance of the project personnel in applying such controls; and
- ✓ to ensure that appropriate environmental training is provided to responsible project personnel.

The EMP acts as a stand-alone document, which can be used during the various phases of the proposed project. All contractors taking part in the bulk services construction activities should be made aware of the contents of the EMP. An EMP for the construction and operational phases of Augeigas Township project is attached as Appendix A.

16. CONCLUSIONS

All known environmental and social risks can be minimised and managed through implementing preventative measures and sound management systems. It is recommended that environmental performance be monitored regularly to ensure compliance and that corrective measures be taken if necessary. It is also recommended that this information be made available to the surrounding communities on a regular basis.

In general, the Augeigas Township project would pose limited environmental risks, provided the EMP for the activity is used properly during planning, construction and operational phase. The Environmental Management Plan should be used as an on-site tool during all phases of the Augeigas Township project. Parties responsible for non-conformances of the EMP will be held responsible for any rehabilitation that may need to be undertaken.

Should the Augeigas Township project and its design be modified or extended to a different area, it is recommended that a different EIA be done for the probable new location.

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