PROPOSED FORMALISATION OF GAMAKOR LOW COST HOUSING DEVELOPMENT ON PORTIONS 0 AND 128 OF FARM KOUSAS NO. 459, AND ERVEN 1470, 1474 AND 1480, KEIMOES, GORDONIA RD, KAI !GARIB LOCAL MUNICIPALITY, ZF MGCAWU DISTRICT MUNICIPALITY, NORTHERN CAPE PROVINCE

DRAFT
ENVIRONMENTAL IMPACT ASSESSMENT REPORT

D:E&NC reference number: NC/EIA/08/ZFM/KAI!/KEM1/2020

OCTOBER 2020

KAI !GARIB LOCAL MUNICIPALITY

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EXECUTIVE SUMMARY

Introduction

Consideration is being given to the development of a new township, consisting of low income housing, on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Gordonia Road, Kai !Garib Municipality, situated within the ZF Mgcawu District Municipality, Northern Cape. This comprises of the formalization of erven and development of low-cost housing in the Gamakor community, located within Keimoes.

The study area is comprised of:

- Portion 0 Of Farm Kousas No. 459
- Portion 128 Of Farm Kousas No. 459
- Erf 1470
- Erf 1474
- Erf 1480

The project entails the formalisation of approximately 1500 erven for the community of Gamakor, Keimoes. The site is zoned as Agricultural Zone I and Undetermined. A Spatial Planning Land Use Application ("SPLUMA") application has been submitted for the rezoning and subdivision of land use change (Appendix 4B). This involves the rezoning to various land uses, namely Residential Zone IV, Open Space Zone I, and Transport Zone II, for the community of Gamakor, and subdivision of 1500 erven. The total area to be developed measures approximately one hundred and four hectares (104ha).

The site is located in Gamakor, Keimoes, in the Kai !Garib Municipality, Northern Cape.

Environmental Requirements

The National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorization from the relevant authorities based on the findings of an environmental assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Northern Cape to the Department of Environment and Nature Conservation (DE&NC).

On the 04 December 2014 the Minister of Water and Environmental Affairs promulgated regulations in terms of Chapter 5 of the NEMA, namely the EIA Regulations 2014. These were amended on 07 April 2017 (GN No. 326, No. 327 (Listing Notice 1), No. 325 (Listing Notice 2), No. 324 (Listing Notice 3) in Government Gazette No. 40772 of 07 April 2017). Listing Notice 1 and 3 are for a Basic Assessment and Listing Notice 2 for a full Environmental Impact Assessment. According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities for the proposed agricultural development:

Government Notice R327 (Listing Notice 1) listed activities:

9 The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water;

(i) with an internal diameter of 0,36 metres or more; or

(ii) with a peak throughput of 120 litres per second or more;

excluding where;
a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or
b) where such development will occur within an urban area.

10 The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes
(i) with an internal diameter of 0,36 metres or more; or
(ii) with a peak throughput of 120 litres per second or more;

excluding where;
a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or
b) where such development will occur within an urban area.

12 The development of;
(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres;
(ii) infrastructure or structures with a physical footprint of 100 square metres or more;

where such development occurs;
(a) within a watercourse;
(b) in front of a development setback; or
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;

19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
(a) will occur behind a development setback;
(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or
(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.

24 The development of a road -
(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;

but excluding a road—
(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;

(b) where the entire road falls within an urban area; or
(c) which is 1 kilometre or shorter**.**

28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:

(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or

(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;

excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.

Government Notice **R325** (Listing notice 2) listed activities:

15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for;
(i) the undertaking of a linear activity; or
(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Government Notice **R324** (Listing notice 3) listed activities:

4 The development of a road wider than 4 metres with a reserve less than 13.5 metres

12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

14 The development of;
(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10 square metres;
(ii) infrastructure or structures with a physical footprint of 10 square metres or more;

where such development occurs;
(a) within a watercourse;
(b) in front of a development setback; or
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;
Excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;

The NEMA Application Form and Draft Scoping Report were submitted to DE&NC on the 18th March 2020. EnviroAfrica, as the appointed Environmental Assessment Practitioner (“EAP”), received the acknowledgement letter for the NEMA Application Form and Draft Scoping Report on the 27th August 2020. The Final Scoping Report was submitted on the 30th July 2020 and an acknowledgment of receipt of report was received on the 2nd October 2020. This Scoping Process was undertaken to identify potential issues.

The principles of environmental management as set out in section 2 of NEMA have been taken into account. The principles pertinent to this activity include:

- People and their needs will be placed at the forefront while serving their physical, psychological, developmental, cultural and social interests. The activity seeks to provide additional employment and economic development opportunities, which are a local and national need – *the proposed activity is expected to have a beneficial impact on people, especially developmental and social benefits, as well providing additional employment and economic development opportunities.*
- Development will be socially, environmentally and economically sustainable. Where disturbance of ecosystems, loss of biodiversity, pollution and degradation, and landscapes and sites that constitute the nation's cultural heritage cannot be avoided, are minimised and remedied. The impact that the activity will potentially have on these will be considered, and mitigation measures will be put in place - *potential impacts have been identified and considered, and any further potential impacts will be identified during the public participation process. Mitigation measures will be included in the Environmental Management Programme ("EMPr")*.
- Where waste cannot be avoided, it will be minimised and remedied through the implementation and adherence of the EMPr – *this will be included in the EIR*.
- The use of non-renewable natural resources will be responsible and equitable.
- The negative impacts on the environment and on people's environmental rights will be anticipated, investigated and prevented, and where they cannot be prevented, will be minimised and remedied.
- The interests, needs and values of all interested and affected parties will be taken into account in any decisions through the Public Participation Process.
- The social, economic and environmental impacts of the activity will be considered, assessed and evaluated, including the disadvantages and benefits.
- The effects of decisions on all aspects of the environment and all people in the environment will be taken into account, by pursuing what is considered the best practicable environmental option.

Need and Desirability

Housing is a national need, including in the Kai Garib Local Municipality.

According to the Kai Garib Municipality, the proposed development represents a significant step towards service delivery and housing objectives within the municipality and the broader Keimoes area. As such, this initiative is a positive step towards better governance and service delivery and will benefit the broader Keimoes community. Furthermore, this development will not only meet the pressing needs of adequate housing within the municipality but will also be in line to support the municipal IDP objectives of (i) providing housing for the poor, (ii) decreasing the city's housing backlog, and (iii) fulfil the Constitutional mandate to provide adequate housing and basic services to citizens.

According to the Kai !Garib Municipality's Integrated Development Plan (IDP 2020-21), … *there is a pressing need for houses, especially low-cost houses, as well as serviced plots within all of the communities within the Kai !Garib area. However, it is quite satisfying to see that a great deal of progress was made in the delivering brick houses to communities since 1994. Unfortunately, the communities need for houses exceed the speed at which houses are built on individual erven.*

According to the Census 2011 (Stats SA), 88.4 % of the population live in formal dwellings where 43.1% of households are comprised of houses which they own and have fully paid off. However, according to service delivery data from the Municipality, the number of informal settlements is growing overnight and the demand for service provision in these areas pose great challenges.

The demand for housing in the Kai !Garib Municipality includes the total number of households in the municipal area. The Municipality had a total of 6 500 very formal dwellings and 9 720 formal dwellings whereas the number of informal dwellings increased from 6 500 (in 2012) to approximately 9 698 units (currently). This highlights the growing backlog of housing required within the Kai !Garib Municipality and the need for housing within the Municipality.

The proposed location is considered a viable option as the proposed site for development is located adjacent to the existing Gamakor Settlement, allowing accessibility and linkage to the existing services infrastructure (refer to Draft Engineering Services Report – **Appendix 4B**). The main environmental issues, as detailed in the Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21[1], include sanitation and sewerage (associated with the informal settlements), littering, river pollution, and lack of sufficient cemeteries. Sanitation has been identified as a key challenge by the Kai !Garib Municipality, where the current state of sewerage infrastructure in many settlements, including Keimoes, have reached capacity and pose health risks to the affected communities. Therefore, the socio-economic, as well as the environmental issues, must be incorporated in determining the desirability of the location of the site. Due to the existing settlement, namely the Gamakor Settlement, the proposed development will expand the housing footprint in the immediate area. The proposed development will tie into existing services, reducing costs and environmental impact associated with the construction. As per the Draft Engineering Services Report, the current WWTW is under capacity and therefore cannot service the current Gamakor community. Moreover, as per the IDP (2020/21), the sewerage systems within the formal areas of Keimoes, Kakamas and Kenhardt are currently under strain and need to be upgraded.

Other than the drainage lines, identified within the proposed development footprint, no physical characteristics of these properties or environmental constraints would exclude the site from development.

Site Description

Consideration is being given to the development of a new township, consisting of low income housing, on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Gordonia Road, Kai !Garib Municipality, situated within the ZF Mgcawu District Municipality, Northern Cape. This comprises of the formalization of erven and development of low-cost housing in the Gamakor community, located within Keimoes.

The study area is comprised of:

- Portion 0 Of Farm Kousas No. 459
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[1] Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21. Accessed at: http://www.kaigarib.gov.za/idp-2020-2021/

The project entails the formalisation of approximately 1500 erven for the community of Gamakor, Keimoes. The site is zoned as Agricultural Zone I and Undetermined. A Spatial Planning Land Use Application ("SPLUMA") application has been submitted for the rezoning and subdivision of land use change (Appendix 4A). This involves the rezoning to various land uses, namely Residential Zone IV, Open Space Zone I, and Transport Zone II, for the community of Gamakor, and subdivision of 1500 erven. The project also includes the construction of associated infrastructure such as water, electricity, sewage, and solid waste removal. The total area to be developed measures approximately 104ha.

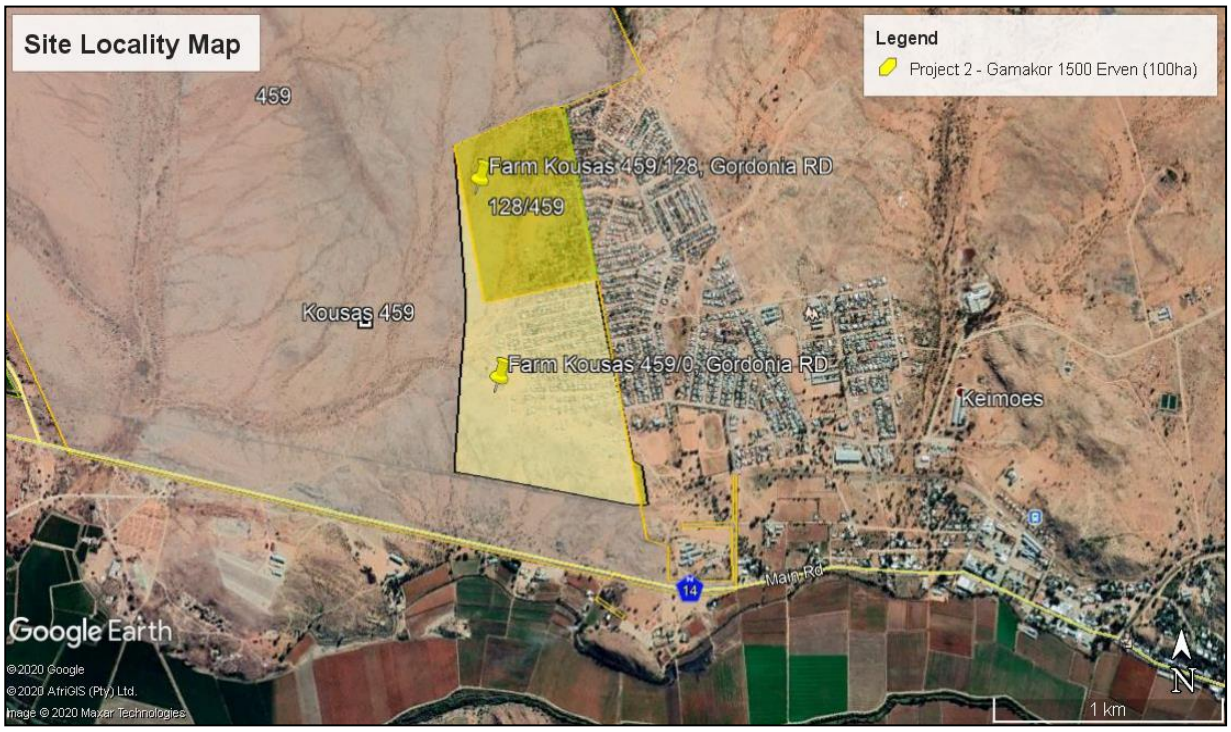

Figure I: Google Earth Aerial image of the proposed site for the Gamakor Housing Development.

As per the Figure below (Figure II), large areas of the proposed site have been transformed, namely by informal settlements. The footprint is located on municipal land adjacent to an existing urban area. Portions of the footprint is still in relative good conditions (although heavily grazed), but half had already been transformed by illegal structures (settlement). Remaining natural veld is utilised for livestock grazing by the local community.

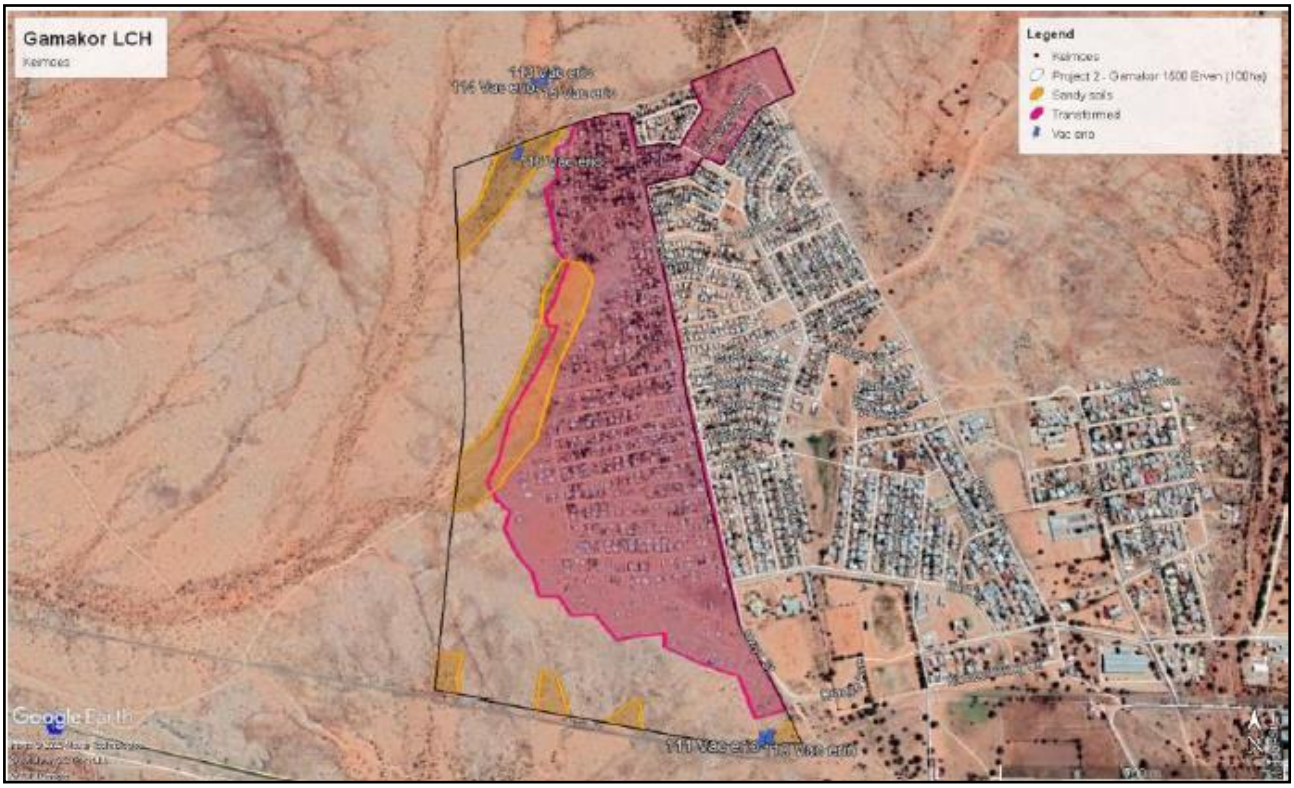

Figure II. Site description relative to level of transformation and disturbance. Source: Botanical Assessment (Botes, 2020).

Alternatives

Site Alternative

The proposed site is the only viable site available at this stage and the only one that will be investigated in this application. Housing is a constant need in the municipality, with other sites possibly earmarked for residential development that will not form part of this application. The current land use, namely the existing Gamakor Settlement, is in line with the nature of the proposed development. The construction of the proposed housing development in another location would increase the construction footprint and therefore, the impact on the environment.

Site Alternative 1 (Preferred)

The proposed site is the only viable site available and was the only site location that was investigated in this application. Housing is a constant need in the municipality, with other sites possibly earmarked for residential development that will not form part of this application.

Layout Alternatives

Various layout alternatives will be investigated during the Environmental Impact Assessment Report. These will be compiled with input from the municipality and its requirements, as well as input and/or recommendations of the various specialists, as well as input from Interested and Affected Parties, including the community. These layouts took into consideration the drainage lines, identified during the FIA

Alternative 1

Alternative 1 (**Appendix 2A**) is the first of 5 concept layouts initially proposed. This layout included 1556 erven, with an extent of 104ha, which included:

- Residential Zone I - 1556 units,
- Institutional Zone II – one (1) unit (1200m^2), and
- Public Open Space – 1 unit (1.06ha)

This alternative was considered a viable option as it provided a sufficient number of housing opportunities. It was initially the municipalities preferred layout. However, due to existing services and infrastructure, as well as identified environmental sensitive areas, this layout needed to be amendment (see Alternative below).

Alternative 2

Alternative 2 (**Appendix 2B**) is the second of 5 concept layouts initially proposed. This layout included 1503 erven, over an extent of 104ha, which included:

- Residential Zone I – 1503 units (average size per unit = 300-320m^2) where units will not be constructed outside areas of environmental sensitivity;
- Institutional Zone II – four (4) units (average size per unit = 1900m^2),

Although this alternative was still considered a viable option, it was not preferred as it did not fully consider the previously identified environmental sensitive areas (namely the drainage lines). The proposed layout of residential differs from Alternative 1. Residential units were also proposed along the western section of the development footprint.

Alternative 3

Alternative 3 (**Appendix 2C)** was the third concept layout proposed. This layout includes 1511 erven, over a 104ha extent:

- Residential Zone I – 1511 units (average size per unit = 300-320m^2) where units will not be constructed in areas of environmental sensitivity;
- Institutional Zone II – three (3) units (average size per unit = 1900m^2).

Although this alternative was still considered a viable option, it was not preferred as it still did not fully consider the previously identified environmental sensitive areas (namely the drainage lines and required buffers).

Alternative 4

Alternative 4 (**Appendix 2D)** was the fourth concept layout proposed. This layout includes 1501 erven, over a 104ha extent:

- Residential Zone I – 1501 units (average size per unit = 300-320m^2) where units will not be constructed outside areas of environmental sensitivity;
- Institutional Zone II – three (3) units (average size per unit = 1900m^2).

Although this alternative was still considered a viable option, it was not preferred as it still did not fully consider the previously identified environmental sensitive areas (namely the drainage lines and required buffers). This layout did not incorporate Open Space Zones

Alternative 5 (Preferred Layout)

Alternative 5 (**Appendix 2E)** was the final layout proposed and is the Applicant's Preferred Layout. This layout includes 1500 erven, over a 104ha extent:

- Residential Zone I – 1500 units (average size per unit = ~300-320m^2) where units will not be constructed in areas of environmental sensitivity. Primary Use: Dwelling House
- Business Zone I – 31 units. Primary Use: Hotels, guest houses, places of refreshment, shops, business premises, dwelling units, residential building, place of amusement, places of worship including funeral parlours with chapels, places of instruction, dry cleaners, public garages, parking, car wash, social halls.
- Institutional Zone I – two (2) land units will be established in accordance with the requirements of the Guidelines for Human Settlement Planning and Design. Primary land use right: Institutions, dwelling units, places of public worship, places of instruction, canteen.,
- Institutional Zone II – seven (7) units (average size per unit = ~1900m^2),
- Open Space Zone I – one (1) unit, where open space refers to land set aside or to be set aside for the use by a community as a recreation area;
- Authority Zone I – one (1) unit, and
- Undetermined Zone – two (2) units.

This Alternative is the preferred layout as this layout incorporated the drainage lines present within the proposed site as well as other types of zones (e.g. authority zones), promoting the community's access to services. Although these Alternative Layouts are similar, the availability of new information from various stakeholders, such as the municipal infrastructure departments in relation to existing services infrastructure, specialist reports, and the engineering services report, that had a considerable impact on the layout and requirements for additional land uses/ changes to proposed land uses by the local municipality and specific spacing of these land uses. This alternative is also considered as a viable option and is also the Municipality's preferred layout since it provides sufficient erven and housing opportunities, as well as providing for Municipal and Government land use opportunities, more Open Space and sufficient buffer zones recommended by the *Botanical and Freshwater specialists*.

No-Go Alternative

This is the option of not developing the proposed housing development. Currently no formal Agricultural activities are taking place on the proposed site for development, currently zoned as Agricultural. However, the site is located adjacent to the established and existing Gamakor Settlement. Although the no-go development may result in no potential negative environmental impacts, the direct and indirect socio-economic benefits (such as housing shortages as well as loss of potential employment and skills-development opportunities) of not constructing the residential development will not be realised. The need for additional housing in the Kai !Garib Local Municipality will not be realised. As described in *Section 2.1*, the population in the Gamakor area and its surrounds is predicted to increase, which may lead to illegal settlements being constructed in areas adjacent to the existing Gamakor Settlement.

Tasks to be undertaken during the EIA Phase

The following tasks must still be undertaken during the EIA phase of the process:

- Distribute and/or make the Draft EIR available to registered Interested and Affected Parties for viewing and comment
- Receive comments on Draft EIR. All comments received and responses to the comments will be incorporated into the Final Environmental Impact Report (EIR).

- Preparation of a FINAL EIR for submission to DENC for consideration and decision-making.

Specialist Studies

The following specialist studies were undertaken as part of this Environmental Impact Assessment:

- Botanical Impact Assessment (**Appendix 6A**)
- Heritage Impact Assessment (**Appendix 6B**)
- Freshwater Assessment (**Appendix 6C**)
- Geo-technical Assessment (**Appendix 6D**)

Botanical Impact Assessment

According to the Botanical Impact Assessment (**Appendix 6A**), the proposed site for development is located within the Bushmanland Arid Grassland, a vegetation type classified as Least Threatened. Vegetation structure on site was comprised of two types, namely;

(i) Shallow quartz rich rocky soils comprised of a sparse, low shrubland dominated by white grass species (such as *Salsola tuberculate* and *Justicia australis*) with *Aloe claviflora* frequently occurring on site.

(ii) Deeper sandy soils (associated with identified watercourses (Figure III) comprised of denser and larger shrub and tree layer dominated by *Parkinsonia africana* and *Senegalia mellifera*.

The following key findings were identified:

- The proposed activity will result in a permanent footprint enlargement of the existing housing scheme by approximately 100 ha. However, the proposed footprint joins up with the existing urban edge and should not have any significant additional impact on connectivity.
- The proposed site for development is located within the Bushmanland Arid Grassland, a Least Threatened vegetation type.
- As per the 2016 Northern Cape Critical Biodiversity Map (CBA), the proposed development footprint is located within a terrestrial CBA (Figure 12). The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole (Holness & Oosthuysen, 2016). The NCCBA maps were used to guide the identification of potential significant sites. Unfortunately, there are no logical alternative sites available to the Keimoes Municipality, which will not impact on the CBA.
- Protected plant species, namely three (3) *Vachellia erioloba* (Camel Thorn) trees (NFA protected) and five (5) NCNCA protected plant were noted on site. The Botanical Specialist recommended the protection of the Camel Thorn trees and search and rescue of *Aloe* and *Boscia* individuals within the development footprint (Table 5).

As the proposed site for development is in a degraded status, the cumulative impact is expected to be **Medium**, but this can be reduced to **Low** by mitigation. The botanical specialist concluded that, "*with the available information, it is recommended that the project be approved, with the proposed mitigation actions*".

Heritage Impact Assessment

As per the Heritage Impact Assessment (**Appendix 6B**), the following key findings were identified;

One incidence of lithics was recorded within the development footprint. This included four pieces of MSA/Early LSA debitage/flakes scattered ex situ in a heavily disturbed area. made from the highly utilised banded ironstone formation (BIF). Lithic traces were present within the development footprint however, the significance of these traces were classified as low and the impact of the development on these resources insignificant. No other heritage of value was identified during the assessment. These traces included two (2) occurrences of lithics where the first occurrence was in the south of the development footprint on Farm Kousas No. 459 Portion 0 and consisted of four pieces of MSA/Early LSA debitage/flakes scattered *ex situ* in a heavily disturbed area. The second recorded occurrence was an isolated chunk situated outside the development footprint. All the recorded lithics were made from the highly utilised banded ironstone formation, popular throughout the area (Morris 2012). The cultural material shows various degrees of weathering and may either be representative of the Early Later Stone Age, or a mere mixture of LSA and MSA artefacts (Lombard 2011).

No formal or informal graves were identified. No formal or informal graves were identified in the study area. The local municipal cemetery lies well outside the development impact zone, to the north-east (**Figure 11 of Appendix 6B**). The area was classified as having zero palaeontological significance.

Freshwater Impact Assessment

According to the Freshwater Impact Assessment (**Appendix 6C**), the proposed housing scheme at Keimoes stretches over mostly dry drainage lines, which are tributaries of the Orange River. As per the Freshwater Impact Assessment, the most significant feature of the study area, influencing topography is the seasonal drainage line that runs from northeast to southwest through the northern part of the property. This watercourse drains towards the Friesdale Spruit and is a tributary of the Orange River (Figure 18). The sub-catchment, associated with the proposed site for development has an approximate length of 26km, width of 16.8km and covers an area of approximately 31 000ha. The dry drainage lines have been created and maintained by large floods where severe rainfall may result in significant runoff, which has the potential to damage infrastructure.

As per the Freshwater Impact Assessment (**Appendix 6C**), negative impacts, such as sewage spills, associated with the WWTW have been reported. The specialist has recommended the construction of an additional pond in order to contain spills instead of allowing raw sewage to enter the drainage line, passing through the housing areas. That is if the entire works in not in need of upgrading. According to the Freshwater Impact Assessment, anthropogenic activities have the ability to impact ecosystem drivers or responses resulting in a *knock-on effect* on the other, interconnected drivers and responses. This, in turn, impacts ecosystem services. The WULA and the EIA must provide mitigation measured for these impacts.

The driver of the mostly dry drainage lines is the occasional flood that follows sudden and intense rainfall events. This is followed by periods of prolonged droughts and intense summer heat that prevents the development of any viable aquatic habitat. The absence of adequate rainfall events, along with shallow groundwater, has resulted in the vegetation structure present along the drainage lines. It must be noted that the proposed development will entirely alter the drainage lines. However, due to the low ecosystem function of the drainage lines, aquatic habitat is unlikely to be significantly impacted by the proposed development.

As per the Freshwater Assessment, the conservation of drainage lines along the Lower Orange River requires attention from the competent authority, and other relevant stakeholders. As numerous tributaries have been negatively impacted by various types of developments, the remaining drainage

lines must be identified, prioritized and adequately conserved. Only specified practices with no or limited impacts should be allowed in these sub-catchments and their drainage lines.

The Freshwater Specialist concluded that the drainage lines have only limited value as water resources and environmental assets as per the scoring matrix. However, to limit the impact on the identified drainage lines, recommended mitigation measures must be implemented.

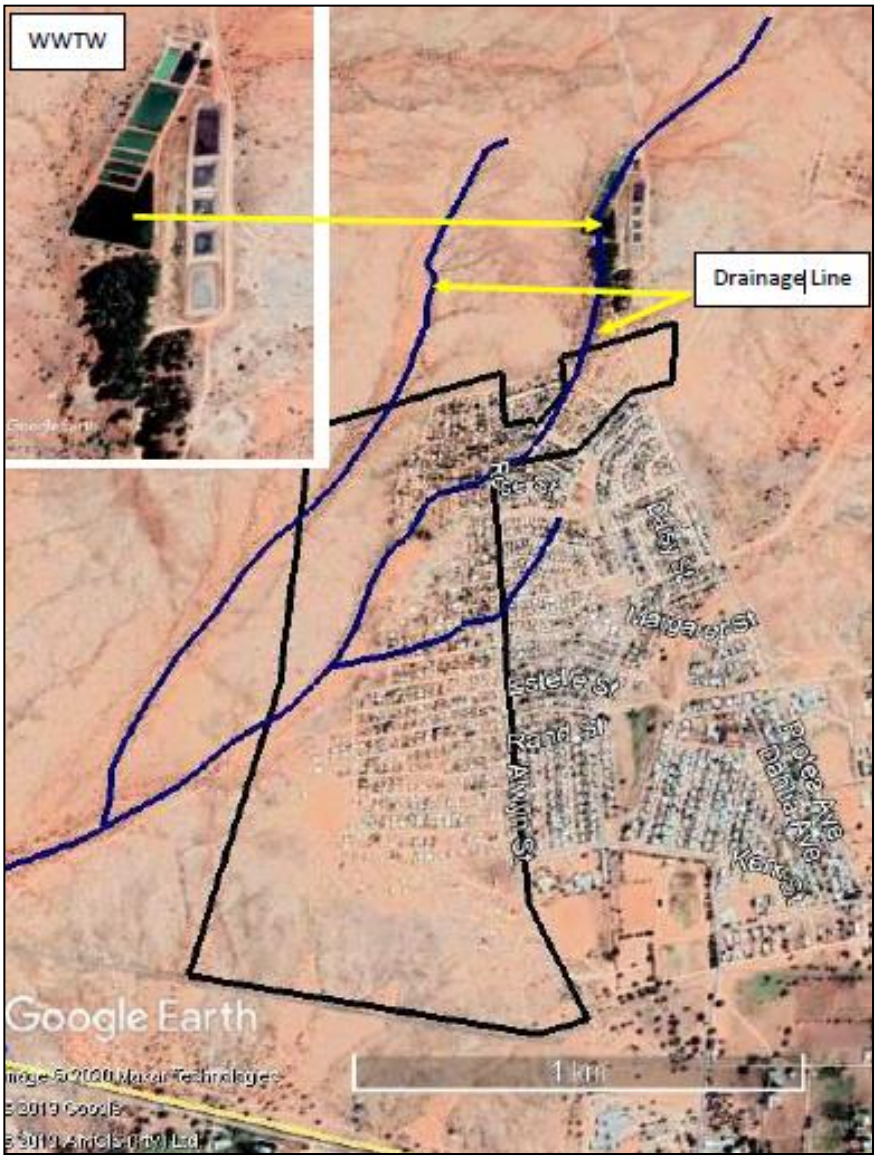

Figure III. Drainage lines associated with the proposed Gamakor Development. Source: Freshwater Impact Assessment, (WATSAN, 2020).

Geo-technical Assessment

As per the Geotechnical Investigation (**Appendix 6D**), the soil profile is comprised of colluvium (maximum depth of 800mm and is generally compressible), alluvium (present in drainage gullies –

extended to a maximum depth of 2700mm and is highly compressible due to its loose to very-loose consistency), pebblestone marker (only a minor occurrence but is negligibly erodible and compressible), residual charnockite (underlies the colluvium and is negligibly erodible and compressible), residual granite-gneiss (negligibly erodible and compressible), and Mokalanen Formation (namely Hardpan calcrete and Nodular calcrete).

Perched water was encountered at two sampling sites at depths of 1500mm and 1400mm – which was attributed to the presence of existing major drainage lines present within the footprint of the site (Figure III). Presence of perched water at these two particular sampling sites may be a permanent problem whereas only after inundation events in the minor drainage lines. As per the Geotechnical Investigation, permanent groundwater is expected to occur at approximately 20 to 30m in fractures restricted to a zone directly below the water table. However, the presence of permanent water does not influence the geotechnical conditions of the site.

Excavation of material for pipeline installing may be impacted should the trench need to be excavated to a depth below 1000mm (due to presence of bedrock) as approximately 5% of the excavation may be classified as hard, requiring drilling and/ or blasting. Depths below 1000mm (i.e. increase to 1500mm) will result in 37% of the excavation being classified as hard. Depth of bedrock layer differs between Geotechnical Zones (I-VII) and must be considered during construction activities. The 5% slope in the southern section of the proposed site is considered favourable for urban development however, the combination of the slope and presence of rocky outcrops result in less favourable conditions for such developments.

The Geotechnical specialist concluded that the foundations must be designed by a suitably qualified and experienced professional engineer. Refer to Appendix 6D for more information regarding recommendations.

Conclusion

The specialist studies and the information provided within the EIA Report, indicates that the proposed Gamakor Housing development does not pose any significant impacts and can be implemented with appropriate mitigation, recommendations, and conditions (such as the recommended construction of a new WWTW, detailed and recommended in the Draft Engineering Services Report). As per the specialist assessments, site visits, and comments received from registered I&APs, the status of the WWTW and illegal dumping remain a key issue which must be addressed with the implementation of a proper waste management plan. The proposed project will increase the pressure placed on existing municipal services and therefore, if a waste management plan is not effectively implemented, the current lack of sewage treatment (refer to Appendix 4B) and solid waste removal may exacerbate the existing negative impacts, such as more frequent sewage spillages, on the receiving environment and on socioeconomic development in the Gamakor area and the surrounding area.

In terms of the need and desirability of the proposed residential development, housing is a national need, especially in the Kai !Garib Local Municipality. The proposed development represents a significant step towards service delivery and housing objectives within the municipality and within a broader provincial and national context. The development will not only meet the pressing needs of adequate housing within the municipality but will also be in support of the municipal IDP objectives. These objectives include providing housing for the poor, decreasing the Municipality's housing backlog, as well as fulfilling the Constitutional mandate to provide adequate housing and basic services to citizens.

The proposed location is considered to be the only viable option. The proposed site is adjacent to the existing residential area of Gamakor, allowing accessibility and linking to the existing services infrastructure. The surrounding land use, namely the existing Gamakor settlement, is in line with the proposed development, which is one of the reasons why this location was selected by the local authority for the purposes of this project. As per the Services Section (*refer to Section 6*), the site is accessible by various existing roads.

There are no physical characteristics of these properties or environmental constraints which would exclude the site from development. However, as per the Botanical Assessment, numerous nationally and provincially protected plant species are present within the development footprint (Appendix 6A). Moreover, the site is located within a CBA and thus, mitigation measures recommended by the Botanical Specialist must be implemented. Prior to any of these plant species being disturbed, damaged, removed, relocated, or destroyed, a permit from the relevant authority is required and must be applied for. In terms of alternatives, **Alternative 5** is the preferred alternative. This alternative is considered a viable option and is also the Municipality's preferred layout since it provides the optimal number of erven and housing opportunities, as well as providing for Municipal and Government land use opportunities, and more Open Space. This Alternative adequately addressed environmental sensitive areas as identified by the Specialists.

The "no-go" option, which is the option of not developing the proposed housing development. Currently, the area earmarked for development is disturbed, with numerous cases of illegal dumping. Although the no-go development might result in no potential negative environmental impacts, especially on the vegetation on the site earmarked for development, the direct and indirect socio-economic benefits of not constructing the residential development will not be realised. The need for additional housing opportunities in the area will not be realised.

According to the Botanical Impact Assessment (**Appendix 6A**), the proposed development will result in the permanent transformation of approximately 100ha of natural veld for human settlement. According to the impact assessment, with good environmental control, the development is likely to result in a **medium** impact on the environment.

However, with the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat;
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities;
- Loss of local biodiversity and threatened plant species; or
- Loss of ecosystem connectivity.

According to the Specialist, the development is likely to result in a **medium** impact on the environment. The botanical specialist concluded that, "*with the available information, it is recommended that the project be approved, with the proposed mitigation actions*". Because of the location and the degraded status of the site, the cumulative impact is expected to be **medium** however this can be reduced to **low** by the implementation of the proposed mitigation measures.

As per the Heritage Impact Assessment (**Appendix 6B**), no significant heritage resources were identified within the proposed site for development. Moreover, no archaeological, historical or cultural sites, or paleontological resources (where the site has zero paleontological significance) will be impacted on negatively by the proposed development.

According to the Freshwater Assessment (**Appendix 6C**), an anthropogenic activity may impact any of the ecosystem drivers or responses. This may have a *knock-on effect* on other, interconnected drivers and responses – ultimately impacting ecosystem services. The Freshwater Specialist concluded that the drainage lines have only limited value as water resources and environmental assets (see Appendix 6C). However, in order to limit the impact on the identified drainage lines, recommended mitigation measures must be implemented.

According to the Geotechnical Assessment (**Appendix 6D**), no significant limiting conditions were present within the proposed site for development however, recommendations for founding and construction, excavations, and soil corrosivity must be considered. The Geotechnical specialist concluded that the foundations must be designed by a suitably qualified and experienced professional engineer. Refer to **Appendix 6D** for more information regarding recommendations.

Considering all the information, it is envisaged that this proposed Gamakor Housing Development will have a low negative impact on the environment (after mitigation measures have been implemented). The socio-economic benefits resulting from the proposed development are expected to greatly outweigh any negative impacts, especially when the mitigation measures have been implemented. It be noted that a proper waste management plan, addressing the proposed construction of the new WWTW and solid waste removal, must be added as a condition to the granting of the environmental authorisation. This waste management plan must be implemented to effectively address the expected increase in pressure on existing services, especially regarding the functionality and capacity of the existing WWTW (refer to **Appendix 4B**)

It is therefore recommended that the proposed Gamakor Housing Development (**Alternative 5**) be supported and be authorised with the necessary conditions of approval, subject to the implementation of the recommended enhancement, mitigation measures contained in Section 8 and the EMPr, and the compilation and effective implementation of a waste management plan.

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APPENDICES

ACRONYMS

BGIS	Biodiversity Geographic Information System
CBA	Critical Biodiversity Area
DEA	Department of Environmental Affairs
DEAT	Department of Environmental Affairs and Tourism
DENC	Department of Environment and Nature Conservation (Northern Cape)
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMP	Environmental Management Programme
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
NCNCA	Northern Cape Nature Conservation (Act 9 of 2009)
NEMA	National Environmental Management Act (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004)
NFA	National Forests Act (NFA) of 1998 (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NID	Notice of Intent to Develop
NWA	National Water Act
OESA	Other Ecological Support Area
PIA	Palaeontological Impact Assessment
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
TIA	Traffic Impact Assessment
WULA	Water Use Licence Application

1. INTRODUCTION

1.1 BACKGROUND

Consideration is being given to the development of a new township, consisting of low income housing, on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Gordonia Road, Kai !Garib Municipality, situated within the ZF Mgcawu District Municipality, Northern Cape. This comprises of the formalization of erven and development of low-cost housing in the Gamakor community, located within Keimoes.

The study area is comprised of:

- Portion 0 Of Farm Kousas No. 459
- Portion 128 Of Farm Kousas No. 459
- Erf 1470
- Erf 1474
- Erf 1480

The project entails the formalisation of approximately 1500 erven for the community of Gamakor, Keimoes. The site is zoned as Agricultural Zone I and Undetermined. A Spatial Planning Land Use Application ("SPLUMA") application has been submitted for the rezoning and subdivision of land use change (Appendix 4A). This involves the rezoning to various land uses, namely Residential Zone IV, Open Space Zone I, and Transport Zone II, for the community of Gamakor, and subdivision of 1500 erven. The project also includes the construction of associated infrastructure such as water, electricity, sewage, and solid waste removal. The total area to be developed measures approximately one hundred and four hectares (104ha).

The Final Scoping Report and Plan of Study for this EIA were submitted to the Department of Environment and Nature Conservation (DENC) on the 30th July 2020.

1.2 SCOPE OF WORK

The scope of this study has been determined with reference to the requirements of the relevant environment legislation (e.g. National Environmental Management Act, Act No. 107 of 1998) and undertaken in terms of the Integrated Environmental Management Information Series on Environmental Impact Reporting (2004) issued by DEAT and the Information Document on Requirements with respect to the EIA Process (January 2003), issued by DENC.

The basic scope of work includes:

- Review of all information;
- Participating in the progress of the development proposal;
- Scoping (identification of significant issues);
- Assessment of anticipated impact;
- Identification of suitable mitigation measures to reduce negative impacts and enhance positive impacts; and
- Submission for decision.

One of the crucial aims of an EIA is to ensure that the demands of sustainable development (defined as development which meets the needs of the current generation without compromising the ability of

future generations to meet their own needs[2]) are met on the project level as well as within the context of the greater area. This EIA is therefore being undertaken with sustainable development as a goal. The assessment will look at the impacts of the proposed development on the environment and assess the significance of these impacts, as well as propose mitigation measures, as required, to reduce anticipated impacts to acceptable levels.

1.3 ASSUMPTIONS AND LIMITATIONS

The assumption is made that the information on which this report is based (i.e. specialist studies, project information, information given by the applicant and client, as well as mapping tools including *CapeFarmMapper* and *BGIS*) is correct.

Future management of the site is essential, and the assumption is made that the mitigation measures recommended by the specialists, stipulated in the EMPr as well as this EIR, will be implemented on a long-term basis. This has a major bearing on the reliability of the predictions of significance of impact.

1.4 DESCRIPTION OF THE PROPOSED ACTIVITY

Consideration is being given to the development of a new township, consisting of low income housing, at Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Gordonia Road, Kai !Garib Municipality, situated within the ZF Mgcawu District Municipality, Northern Cape. Kai !Garib Municipality is proposing the formalization and development of low cost housing in the Gamakor community located within Keimoes. The study area is comprised of Portion 0 Of Farm Kousas No. 459, Portion 128 Of Farm Kousas No. 459, Erf 1470, Erf 1474, and Erf 1480.

The project entails the formalisation of approximately 1500 erven (Alternative 5 – Preferred Layout) for the community of Gamakor, Keimoes. The proposed site for development is currently zoned as Agricultural Zone I and Undetermined. A Spatial Planning Land Use Application (“SPLUMA”) application has been submitted for the rezoning and subdivision of land use change for rezoning to various land uses, namely Residential Zone IV, Open Space Zone I, and Transport Zone II (Appendix 4A). The project also includes the construction of associated infrastructure such as water, electricity, sewerage, and solid waste removal. The total area for development is approximately 104ha in extent.

The proposed site is located at the following location: 28°41'47.38"S; 20°56'50.73"E.

[2] As defined by the International Institute for Sustainable Development (IISD). Accessed at: https://www.iisd.org/about-iisd/sustainable-development.

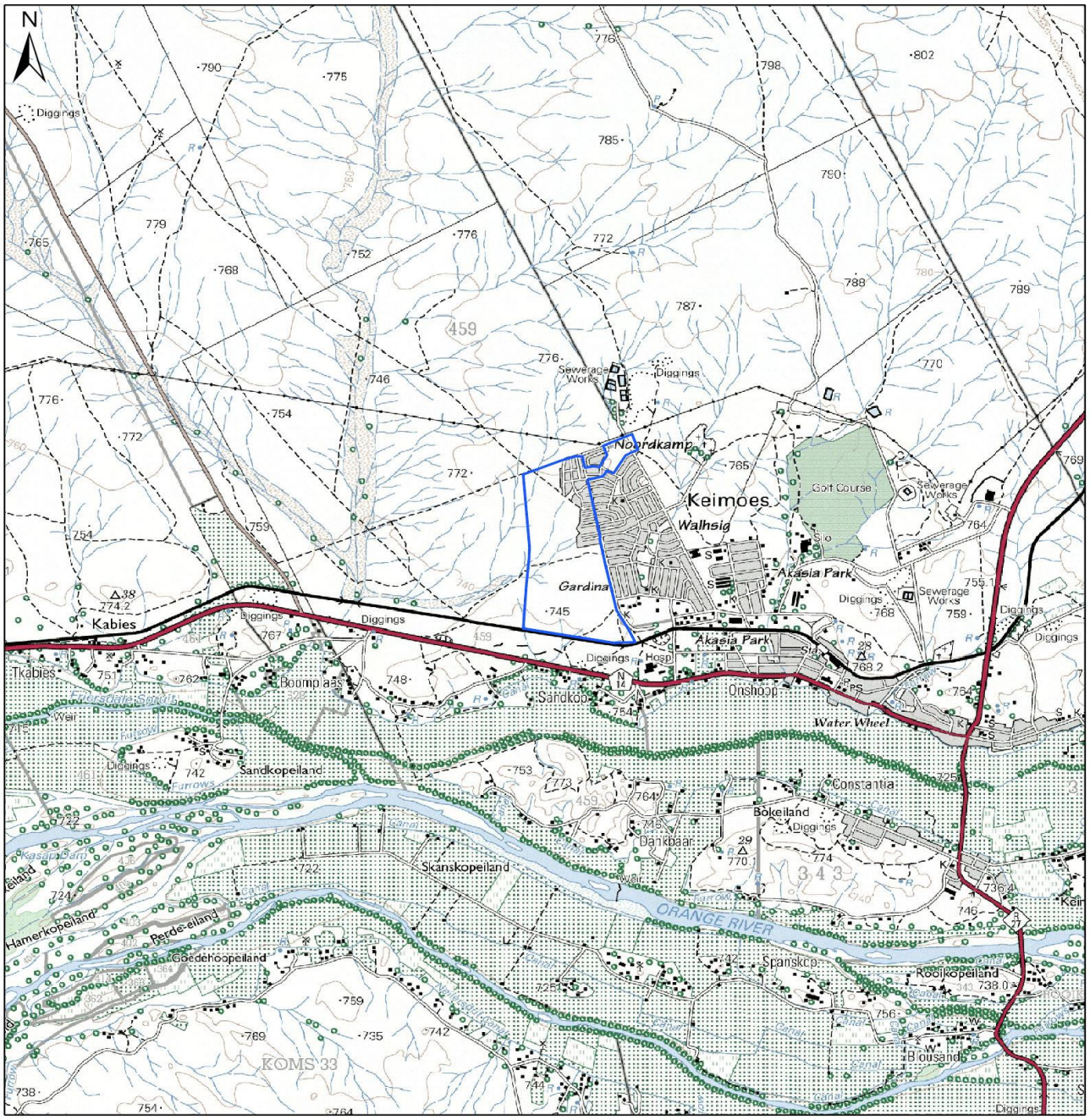

Figure 1: Locality Plan (1: 50 000 Map). Source: CapeFarmMappers, 2020.

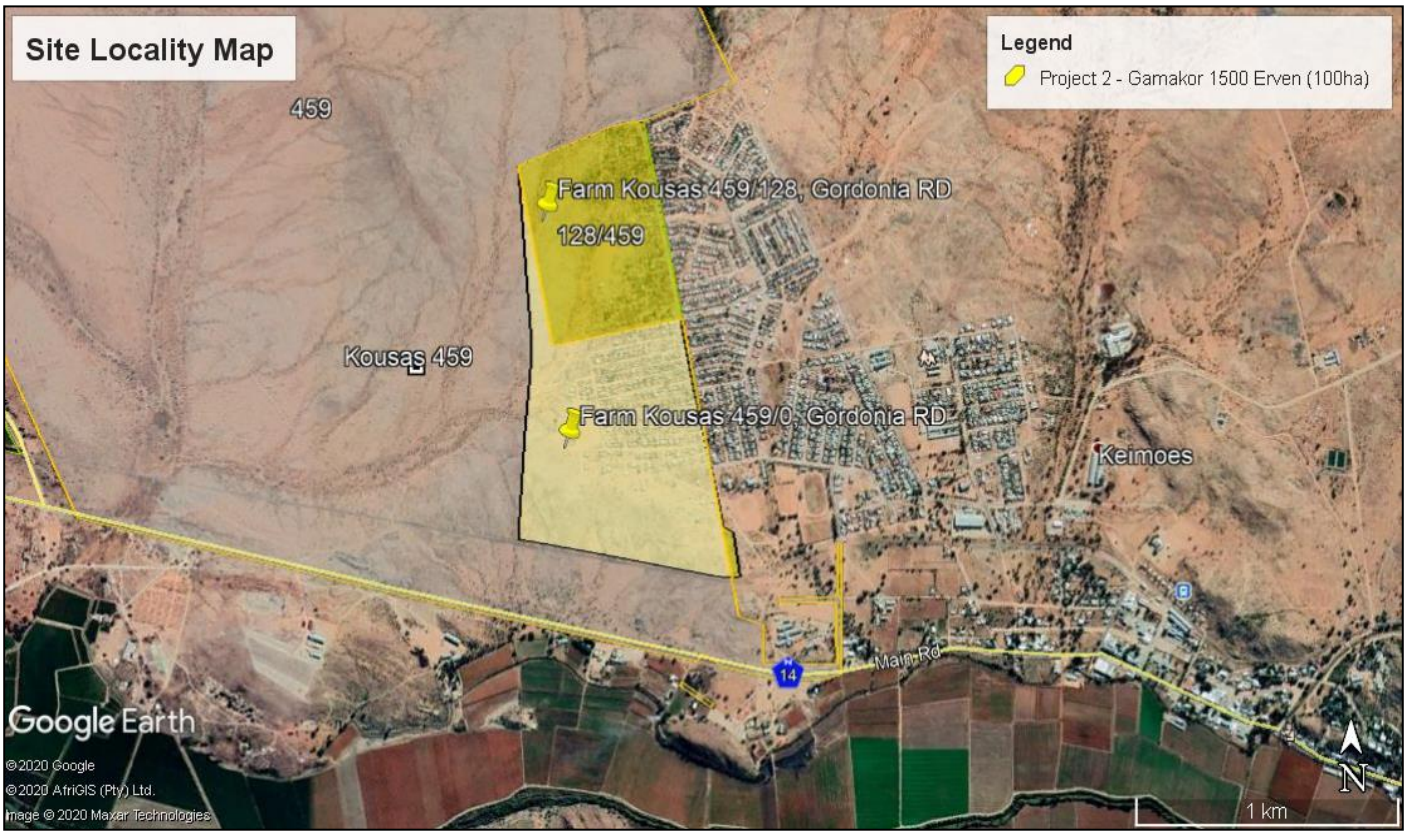

Figure 2: Overview of proposed site for development. Source: Google Earth, 2020.

2. NEED AND DESIRABILITY

In terms of the National Environmental Management Act, as amended, EIA 2014 regulations the Scoping/EIA report must provide a description of the need and desirability of the proposed activity. The consideration of "need and desirability" in EIA decision-making requires the consideration of the strategic context of the development proposal along with the broader societal needs and the public interest.

The need for and the desirability of a proposed development forms a key component of any EIA application. The consideration of proposed developments in the context of the various spatial planning tools, as well as policies applicable to the study area, form an integral part of the present environmental processes. The "need and desirability" was determined by considering the broader community's needs and interests as reflected in Integrated Development Plans (IDPs), Spatial Development Frameworks (SDF), and/ or Environmental Management Frameworks (EMFs) applicable to the proposed site for development.

While the concept of need and desirability relates to the *type* of development being proposed, essentially, the concept of need and desirability can be explained in terms of the general meaning of its two components in which *need* refers to *time* and *desirability* to *place* – i.e. is this the right time and is it the right place for locating the type of land-use/activity being proposed? Need and desirability can be equated to *wise use of land* – i.e. the question of what the most sustainable use of land is. The impact of development on people's health and well-being, as well as its impact on natural and cultural areas, and therefore its desirability, has been assessed in this report.

2.1 NEED

Housing is a national need, including in the Kai Garib Local Municipality.

According to the Kai Garib Municipality, the proposed development represents a significant step towards service delivery and housing objectives within the municipality and the broader Keimoes area. As such, this initiative is a positive step towards better governance and service delivery and will benefit the broader Keimoes community. Furthermore, this development will not only meet the pressing needs of adequate housing within the municipality but will also be in line to support the municipal IDP objectives of (i) providing housing for the poor, (ii) decreasing the city's housing backlog, and (iii) fulfil the Constitutional mandate to provide adequate housing and basic services to citizens.

According to the Kai !Garib Municipality's Integrated Development Plan (IDP 2020-21), … *there is a pressing need for houses, especially low-cost houses, as well as serviced plots within all of the communities within the Kai !Garib area. However, it is quite satisfying to see that a great deal of progress was made in the delivering brick houses to communities since 1994. Unfortunately, the communities need for houses exceed the speed at which houses are built on individual erven.*

According to the Census 2011 (Stats SA), 88.4 % of the population live in formal dwellings where 43.1% of households are comprised of houses which they own and have fully paid off. However, according to service delivery data from the Municipality, the number of informal settlements is growing overnight and the demand for service provision in these areas pose great challenges.

The demand for housing in the Kai !Garib Municipality includes the total number of households in the municipal area. The Municipality had a total of 6 500 very formal dwellings and 9 720 formal dwellings whereas the number of informal dwellings increased from 6 500 (in 2012) to approximately 9 698 units (currently). This highlights the growing backlog of housing required within the Kai !Garib Municipality and the need for housing within the Municipality.

2.2 DESIRABILITY

The following factors determine the desirability of the area for the proposed residential development.

2.2.1 LOCATION AND ACCESSIBILITY

The proposed location is considered a viable option as the proposed site for development is located adjacent to the existing Gamakor Settlement, allowing accessibility and linkage to the existing services infrastructure (refer to Draft Engineering Services Report – **14B**). The main environmental issues, as detailed in the Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21[3], include sanitation and sewerage (associated with the informal settlements), littering, river pollution, and lack of sufficient cemeteries. Sanitation has been identified as a key challenge by the Kai !Garib Municipality, where the current state of sewerage infrastructure in many settlements, including Keimoes, have reached capacity and pose health risks to the affected communities. Therefore, the socio-economic, as well as the environmental issues, must be incorporated in determining the desirability of the location of the site. Due to the existing settlement, namely the Gamakor Settlement, the proposed development will expand the housing footprint in the immediate area. The proposed development will tie into existing services, reducing costs and environmental impact associated with the construction. As per the Draft Engineering Services Report, the current WWTW is under capacity and therefore cannot service the current Gamakor community. Moreover, as per the IDP (2020/21), the sewerage systems within the formal areas of Keimoes, Kakamas and Kenhardt are currently under strain and need to be upgraded.

Other than the drainage lines, identified within the proposed development footprint, no physical characteristics of these properties or environmental constraints would exclude the site from development.

2.2.2 COMPATIBILITY WITH THE SURROUNDING AREA

The proposed site is directly adjacent to the existing residential area of the Gamakor Settlement. As stated above, this would provide accessibility and allow the proposed development to link to the existing services infrastructure. Although sections of the site are undeveloped, the area surrounding the existing residential area is highly disturbed, with numerous incidences of informal settlements (refer to Figure II) and illegal dumping (including general and hazardous waste). Due to the close proximity of the existing Settlement, costs and environmental impacts, associated with the impact of development on the surrounding areas would be avoided as the proposed development will tie in with existing services and similar land uses.

2.3 INTEGRATED PLANNING

According To the Department of Environmental Affairs: Integrated Environmental Management Guideline: Guideline on Need and Desirability (2017), when considering how the development may

[3] Kai !Garib Municipality Integrated Development Plan (IDP), 2020-21. Accessed at: http://www.kaigarib.gov.za/idp-2020-2021/

affect or promote justifiable economic and social development, the relevant spatial plans must be considered, including Municipal Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) and Environmental Management Frameworks (EMF).

According to the Northern Cape Provincial Spatial Development Framework (2019) (NCPSDF), as part of the Spatial Development Strategies for Infrastructure Investment and related objectives it is a set objective that, amongst others, the housing backlog within the province must be eradicated. It is furthermore indicated that, as part of policy alignment with the Spatial Planning Categories, adequate, safe and affordable housing (amongst other objectives) must be met by 2030.

3. LEGAL REQUIREMENTS

The current assessment is being undertaken in terms of the National Environmental Management Act (Act 107 of 1998, NEMA), to be read with section 24 (5): NEMA EIA Regulations 2014. However, the provisions of various other Acts must also be considered within this EIA.

The legislation that is relevant to this study is briefly outlined below.

3.1 THE CONSTITUTION OF THE REPUBLIC OF SOUTH AFRICA

The Constitution of the Republic of South Africa (Act 108 of 1996) states that everyone has a right to a non-threatening environment and that reasonable measure are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

3.2 NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998)

The National Environmental Management Act (Act 107 of 1998) (NEMA), as amended, makes provision for the identification and assessment of activities that are potentially detrimental to the environment and which require authorization from the relevant authorities based on the findings of an environmental assessment. NEMA is a national act, which is enforced by the Department of Environmental Affairs (DEA). These powers are delegated in the Northern Cape to the Department of Environment and Nature Conservation (DE&NC).

On the 04 December 2014 the Minister of Water and Environmental Affairs promulgated regulations in terms of Chapter 5 of the NEMA, namely the EIA Regulations 2014. These were amended on 07 April 2017 (GN No. 326, No. 327 (Listing Notice 1), No. 325 (Listing Notice 2), No. 324 (Listing Notice 3) in Government Gazette No. 40772 of 07 April 2017). Listing Notice 1 and 3 are for a Basic Assessment and Listing Notice 2 for a full Environmental Impact Assessment.

According to the regulations of Section 24(5) of NEMA, authorisation is required for the following listed activities for the proposed Gamakor Housing Development:

<u>Government Notice R327 (Listing Notice 1) listed activities:</u>

9 The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water;

(i) with an internal diameter of 0,36 metres or more; or

(ii) with a peak throughput of 120 litres per second or more;

excluding where;
a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or
b) where such development will occur within an urban area.

10 The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge, or slimes

(i) with an internal diameter of 0,36 metres or more; or
(ii) with a peak throughput of 120 litres per second or more;

excluding where;

c) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or
d) where such development will occur within an urban area.

12 The development of;

(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres;
(ii) infrastructure or structures with a physical footprint of 100 square metres or more;

where such development occurs;

(a) within a watercourse;
(b) in front of a development setback; or
(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;

19 The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;
(a) will occur behind a development setback;
(b) is for maintenance purposes undertaken in accordance with a maintenance management plan; or
(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies.

24 The development of a road -
(i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or
(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;

but excluding a road—
(a) which is identified and included in activity 27 in Listing Notice 2 of 2014;
(b) where the entire road falls within an urban area; or
(c) which is 1 kilometre or shorter**.**

28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:

(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or

(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;

excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.

Government Notice **R325** (Listing notice 2) listed activities:

15 The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for;

(i) the undertaking of a linear activity; or

(ii) maintenance purposes undertaken in accordance with a maintenance management plan.

Government Notice **R324** (Listing notice 3) listed activities:

4 The development of a road wider than 4 metres with a reserve less than 13.5 metres

12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.

14 The development of;

(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 10 square metres;

(ii) infrastructure or structures with a physical footprint of 10 square metres or more;

where such development occurs;

(a) within a watercourse;

(b) in front of a development setback; or

(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;

Excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;

The environmental process is being undertaken in distinct phases, refer to **Figure 3**. An Application Form has been submitted to Department of Environment and Nature Conservation (DE&NC). On acknowledgment from DE&NC, the Scoping Process was undertaken to identify potential issues.

The Final Scoping Report and Plan of Study for EIA were submitted to the DE&NC on the 30th July 2020 which an acknowledgment of receipt was issued by the DENC (Appendix 1A).

The principles of environmental management as set out in section 2 of NEMA have been taken into account. The principles pertinent to this activity include:

- People and their needs will be placed at the forefront while serving their physical, psychological, developmental, cultural and social interests. The activity seeks to provide additional housing, employment and economic development opportunities, which are a local and national need – *the proposed activity is expected to have a beneficial impact on people, especially developmental and social benefits, as well providing additional housing, employment and economic development opportunities.*
- Development will be socially, environmentally and economically sustainable. Where disturbance of ecosystems, loss of biodiversity, pollution and degradation, and landscapes and sites that constitute the nation's cultural heritage cannot be avoided, are minimised and remedied. The impact that the activity will potentially have on these will be considered, and

mitigation measures will be put in place - *potential impacts have been identified and considered, and any further potential impacts will be identified during the public participation process. Mitigation measures have been recommended by the various specialist assessment, and are included in the EMP*.

- Where waste cannot be avoided, it will be minimised and remedied through the implementation and adherence of the Environmental Management Programme (EMP) – *the EMP is included in the EIR as Appendix 9*.
- The use of non-renewable natural resources will be responsible and equitable.
- The negative impacts on the environment and on people's environmental rights will be anticipated, investigated and prevented, and where they cannot be prevented, will be minimised and remedied – *potential negative impacts have been identified and considered, and any further potential impacts will be identified during the public participation process. Mitigation measures have been recommended by the various specialist assessment, and are included in the EMP*.
- The interests, needs and values of all interested and affected parties will be taken into account in any decisions through the Public Participation Process – *refer to Section 7.4 below and Appendix 3*.
- The social, economic and environmental impacts of the activity will be considered, assessed and evaluated, including the disadvantages and benefits - *refer to Section 10 below*
- The effects of decisions on all aspects of the environment and all people in the environment will be taken into account, by pursuing what is considered the best practicable environmental option.

EIA (SCOPING AND ENVIRONMENTAL IMPACT REPORT (S&EIR) PROCESS

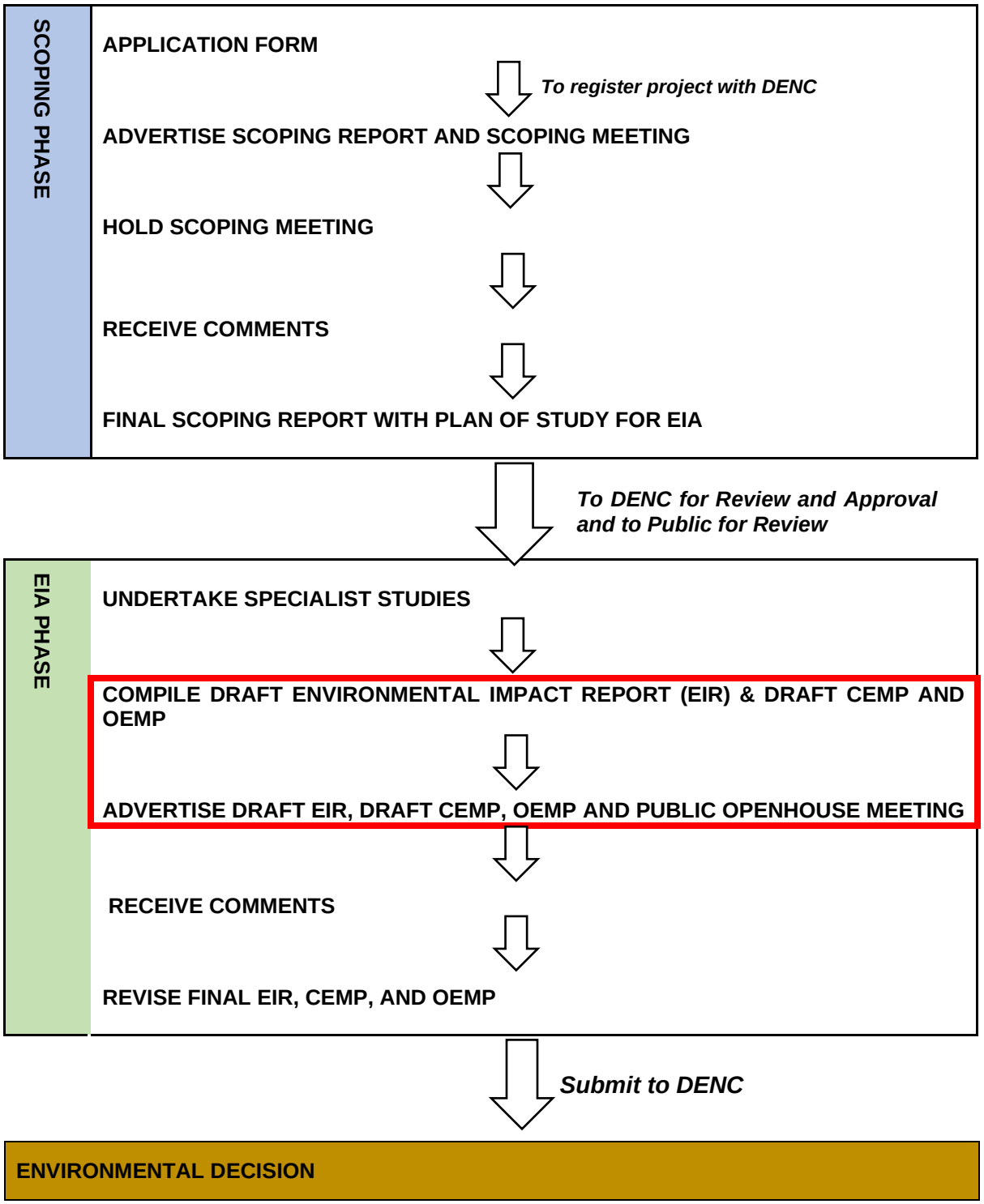

Figure 3: The EIA Process. Currently, this process is in the 'EIA Phase – Compile draft Environmental Impact Report (EIR) and draft CEMP and OEMP', as outlined in red.

3.3 NATIONAL HERITAGE RESOURCES ACT

The protection and management of South Africa's heritage resources are controlled by the National Heritage Resources Act (Act No. 25 of 1999). South African National Heritage Resources Agency (SAHRA) is the enforcing authority.

In terms of Section 38 of the National Heritage Resources Act, SAHRA will require a Heritage Impact Assessment (HIA) where certain categories of development are proposed. Section 38(8) also makes provision for the assessment of heritage impacts as part of an EIA process and indicates that if such an assessment is found to be adequate, a separate HIA is not required.

The National Heritage Resources Act requires relevant authorities to be notified regarding this proposed development, as the following activities are relevant:

- *any development or other activity which will change the character of a site exceeding 5 000 m² in extent;*
- *the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length*

Furthermore, in terms of Section 34(1), no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the SAHRA, or the responsible resources authority. Nor may anyone destroy, damage, alter, exhume or remove from its original position, or otherwise disturb, any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority, without a permit issued by the SAHRA, or a provincial heritage authority, in terms of Section 36 (3). In terms of Section 35 (4), no person may destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object, without a permit issued by the SAHRA, or the responsible resources authority.

3.4 EIA GUIDELINE AND INFORMATION DOCUMENT SERIES

The following are the latest guidelines and information Documents that have been consulted:

- Department of Environmental Affairs and Development Planning's (DEA&DP) *Environmental Impact Assessment Guideline and Information Document Series (Dated: March 2013)*:
  - ✓ *Guideline on Transitional Arrangements*
  - ✓ *Generic Terms of Reference for EAPs and Project Schedules*
  - ✓ *Guideline on Alternatives*
  - ✓ *Guideline on Public Participation*
  - ✓ *Guideline on Exemption Applications*
  - ✓ *Guideline on Appeals*
  - ✓ *Guideline on Need and Desirability*

- Department of Environmental Affairs and Tourism (DEAT*) Integrated Environmental Management Information Series.*

3.5 NATIONAL WATER ACT

Besides the provisions of NEMA for this EIA process, the proposed development may also require authorizations under the National Water Act (Act No. 36 of 1998). The Department of Water Affairs, who administer that Act, will be a leading role-player in the EIA.

According to the Freshwater Impact Assessment (**Appendix 6C**), the NWA guides the management of water in South Africa as a common resource. The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact on water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard.

Defined water use activities require the approval of DWS in the form of a General Authorisation or Water Use Licence authorisation. Government Notice No. 665 of 6 September 2013 provides for General Authorisations for certain specified water use activities in terms of the disposal of wastewater which then do not require a licensing process. There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

Section 22(3) of the National Water Act allows for a responsible authority (DWS) to dispense with the requirement for a Water Use Licence if it is satisfied that the purpose of the Act will be met by the grant of a licence, permit or authorisation under any other law.

Potential water use activities that are of relevance to the proposed Housing Development are:

- Section 21(c): Impeding or diverting the flow of water in a watercourse;
- Section 21(f): Discharge of waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit;
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource; and
- Section 21(i): Altering the bed, banks, course or characteristics of a watercourse.

3.6 NATIONAL ENVIRONMENTAL MANAGEMENT: BIODIVERSITY ACT

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) is part of a suite of legislation falling under NEMA, which includes the Protected Areas Act, the Air Quality Act, the Integrated Coastal Management Act and the Waste Act. Chapter 4 of NEMBA deals with threatened and protected ecosystems and species and related threatened processes and restricted activities. The need to protect listed ecosystems is addressed (*Section 54*).

3.7 NATIONAL FORESTS ACT

The National Forests Act, 1998 (Act 84 of 1998) (NFA) makes provisions for the management and conservation of public forests.

In terms of section 15(1) of the National Forests Act, 1998, no person may -

(a) cut, disturb. damage or destroy any protected tree; or
(b) posses, collect. remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, or any forest product derived from a protected tree, except-
    (i) under a license granted by the Minister; or
    (Ii) in terms of an exemption from the provisions of this subsection published by the Minister in the Gazette.

3.8 NORTHERN CAPE CONSERVATION ACT, ACT 09 OF 2009

On the 12th of December 2011, the new Northern Cape Nature Conservation Act 9 of 2009 (NCNCA) came into effect, which provides for the sustainable utilization of wild animals, aquatic biota and plants. Schedule 1 and 2 of the Act give extensive lists of specially protected and protected fauna and flora species in accordance with this act. The NCNCA is a very important Act in that it placed a whole new emphasis on a number of species not previously protected in terms of legislation.

It also put a new emphasis on the importance of species, even within vegetation classified as “Least Threatened” (in accordance with GN 1002 of 9 December 20011, promulgated in terms of the National Environmental Management Biodiversity Act 10 of 2004). Thus, even though a project may be located within a vegetation type or habitat previously not considered under immediate threat, special care must still be taken to ensure that listed species (fauna & flora) are managed correctly.

As per the comment received (dated 01 April 2020) from the Department of Agriculture, Forestry, and Fisheries (DEFF), if authorisation is granted for the development, no protected tree may be damaged or disturbed without a valid Forest Act License from the Department of Environment, Forestry and Fisheries. In addition, trees with active bird nest or other significant biodiversity features, may not be damaged or disturbed without a valid Fauna Permit from the provincial Department of Environment and Nature Conservation under the Northern Cape Nature Conservation Act (NCNCA), Act 9 of 2009 (if affected).

3.8 SPATIAL PLANNING AND LAND USE MANAGEMENT ACT, ACT 16 OF 2013

The Spatial Planning and Land Use Management Act 16 of 2013 (**SPLUMA**) is a national law that was passed by Parliament in 2013. SPLUMA provides a framework for spatial planning and land use management in South Africa.

The subject area falls under the jurisdiction of the local municipality and the appropriate zoning and subdivision would need to be allocated in order to permit the development of the land for the intended purpose.

Consideration of the Northern Cape Provincial Development Spatial Development Framework and the Northern Cape Provincial Growth and Development Strategy was taken. The SPLUMA has been submitted and is attached as Appendix 4A.

4. ALTERNATIVES

Various layout alternatives have been investigated. These alternatives have been compiled with input from the municipality and its requirements, as well as input and/or recommendations of the various specialists and Interested and Affected Parties (I&APs), including the community. These layouts took into consideration the drainage lines, identified during the Freshwater Impact Assessment (Appendix 6C).

Various layout alternatives were proposed and have been considered during the Scoping and EIA phase and are described below.

4.1.1 ALTERNATIVE 1

Alternative 1 (**Appendix 2A**) is the first of 5 concept layouts initially proposed. This layout included 1556 erven, with an extent of approximately 104ha, which included:

- Residential Zone I - 1556 units,
- Institutional Zone II – one (1) unit (1200m^2), and
- Public Open Space – 1 unit (1.06ha)

This alternative was considered a viable option as it provided a sufficient number of housing opportunities. It was initially the municipalities preferred layout. This concept accommodates most of the existing residential structures, as a result relocating houses will be avoided. Stormwater run-off can be channeled by the proposed road networks. The spacing between the existing residential structures does not allow for the uniform distribution of residential properties of 250m² in extent, but rather constitute to properties exceeding 350m² in size. The road network comprises of narrow roads, due to the existing position of residential structures. The existing properties furthermore does not allow for the adequate linkage to the road network of Keimoes, due to the locale of structures on crucial junctions. The existing informal houses does not allow for a hierarchy of roads and this is evident by the narrow through road that runs from north to south. Moreover, due to existing services and infrastructure, as well as identified environmental sensitive areas, this layout needed to be amendment (see Alternative below).

4.1.2 ALTERNATIVE 2

Alternative 2 (**Appendix 2B**) is the second of 5 concept layouts initially proposed. This layout included 1503 erven, over an extent of approximately 104ha, which included:

- Residential Zone I – 1503 units (average size per unit = 300-320m^2) where units will not be constructed outside areas of environmental sensitivity;
- Institutional Zone II – four (4) units (average size per unit = 1900m^2),

Although this alternative was still considered a viable option, it was not preferred as it did not fully consider the previously identified environmental sensitive areas (namely the drainage lines). The proposed layout of residential differs from Alternative 1. Residential units were also proposed along the western section of the development footprint. A sensible road network, comprising of different road hierarchy has been created. The main focus of this layout is the future linkage with the N14 national road, however linkages to the internal road network of Keimoes are optimal. The internal road network of the area does not only promote better traffic movement, but also accommodates storm water more efficiently. Upon adjustment of the extent of the residential properties, alignment with the sub-economical housing scheme of COGHSTA will be achieved. The provision of other land uses normally

associated with residential communities are placed on strategic locations throughout the layout. However, this Alternative which is based on the existing permanent structures will result in the relocation of the majority of the informal structures. Therefore, this layout was amended (see Alternative below).

4.1.3 ALTERNATIVE 3

Alternative 3 (**Appendix 2C)** was the third concept layout proposed. This layout includes 1511 erven, over a 104ha extent:

- Residential Zone I – 1511 units (average size per unit = 300-320m^2) where units will not be constructed in areas of environmental sensitivity;
- Institutional Zone II – three (3) units (average size per unit = 1900m^2).

This layout consisted of a functional road network layout, comprising of different road hierarchy which was created. The main focus of this layout is the future linkage with the road network of Keimoes, thereby completing the road network envisaged for Keimoes by prior housing establishment projects. However, the future linkage with the N14 national road takes a backseat in this layout (and does not form part of this application), however the linkage thereof remains a possibility. The internal road network of the area does not only promote better traffic movement, but also accommodates stormwater more efficiently. This layout is in alignment with the sub-economical housing scheme of COGHSTA, with the extent of most of the properties aligning with the minimum threshold of 250m^2. The provision of other land uses normally associated with residential communities have been placed on strategic locations throughout the layout. Although this alternative was still considered a viable option, it was not preferred as the use of a coherent planning layout that was based on the existing permanent structures will result in the relocation of the majority of the informal structures. The size of properties of most of the residents of Gamakor will be reduced, however this should be seen in the light of procurement of ownership. Therefore, this layout was amended (see Alternative below).

4.1.4 ALTERNATIVE 4

Alternative 4 (**Appendix 2D)** was the fourth concept layout proposed. This layout includes 1501 erven, over a 104ha extent:

- Residential Zone I – 1501 units (average size per unit = 300-320m^2) where units will not be constructed outside areas of environmental sensitivity;
- Institutional Zone II – three (3) units (average size per unit = 1900m^2).

This layout is in alignment with the sub-economical housing scheme of COGHSTA, with the extent of most of the properties aligning with the minimum threshold of 250m^2. The provision of other land uses normally associated with residential communities have been placed on strategic locations throughout the layout. Although this alternative was still considered a viable option, it was not preferred as it still did not fully consider the previously identified environmental sensitive areas (namely the drainage lines and required buffers). This layout did not adequately incorporate Open Space Zones.

4.1.5 ALTERNATIVE 5 (PREFERRED LAYOUT)

Alternative 5 (**Appendix 2E)** was the final layout proposed and is the Applicant's Preferred Layout. This layout includes 1500 erven, over approximately 104ha extent:

- Residential Zone I – 1500 units (average size per unit = ~300-320m^2) where units will not be constructed in areas of environmental sensitivity. Primary Use: Dwelling House

- Business Zone I – 31 units. Primary Use: Hotels, guest houses, places of refreshment, shops, business premises, dwelling units, residential building, place of amusement, places of worship including funeral parlours with chapels, places of instruction, dry cleaners, public garages, parking, car wash, social halls.
- Institutional Zone I – two (2) land units will be established in accordance with the requirements of the Guidelines for Human Settlement Planning and Design. Primary land use right: Institutions, dwelling units, places of public worship, places of instruction, canteen.,
- Institutional Zone II – seven (7) units (average size per unit = ~1900m^2),
- Open Space Zone I – one (1) unit, where open space refers to land set aside or to be set aside for the use by a community as a recreation area;
- Authority Zone I – one (1) unit, and
- Undetermined Zone – two (2) units.

This Alternative is the preferred layout as this layout incorporated the drainage lines present within the proposed site as well as other types of zones (e.g. authority zones), promoting the community's access to services. Although these Alternative Layouts are similar, the availability of new information from various stakeholders, such as the municipal infrastructure departments in relation to existing services infrastructure, specialist reports, and the engineering services report, that had a considerable impact on the layout and requirements for additional land uses/ changes to proposed land uses by the local municipality and specific spacing of these land uses. This alternative is also considered as a viable option and is also the Municipality's preferred layout since it provides sufficient erven and housing opportunities, as well as providing for Municipal and Government land use opportunities, more Open Space and sufficient buffer zones recommended by the *Botanical and Freshwater specialists*.

4.1 OTHER ALTERNATIVES

Site Alternatives

The proposed site is the only viable site available at this stage and the only one that will be investigated in this application. Housing is a constant need in the municipality, with other sites possibly earmarked for residential development that will not form part of this application. The current land use, namely the existing Gamakor Settlement, is in line with the nature of the proposed development. The construction of the proposed housing development in another location would increase the construction footprint and therefore, the impact on the environment and surrounding area.

Activity Alternatives

Activity alternatives are also limited with no feasible alternatives besides residential development to assess. Due to the need for housing in the Kai !Garib Local Municipality, the housing development and associated infrastructure on the property is therefore the only activity considered.

4.2 NO-GO ALTERNATIVE

This is the option of not developing the proposed housing development.

Currently no formal Agricultural activities are taking place on the proposed site for development, currently zoned as Agricultural. However, the site is located adjacent to the established and existing Gamakor Settlement.

Although the no-go development may result in no potential negative environmental impacts, the direct and indirect socio-economic benefits (such as housing shortages as well as loss of potential employment and skills-development opportunities) of not constructing the residential development will not be realised. The need for additional housing in the Kai !Garib Local Municipality will not be realised. As described in *Section 2.1*, the population in the Gamakor area and its surrounds is predicted to increase, which may lead to illegal settlements being constructed in areas adjacent to the existing Gamakor Settlement.

5. SITE DESCRIPTION

5.1 LOCATION

Consideration is being given to the development of a new township, consisting of low income housing, on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Gordonia Road, Kai !Garib Municipality, situated within the ZF Mgcawu District Municipality, Northern Cape. This comprises of the formalization of erven and development of low-cost housing in the Gamakor community, located within Keimoes.

The study area is comprised of:

- Portion 0 Of Farm Kousas No. 459
- Portion 128 Of Farm Kousas No. 459
- Erf 1470
- Erf 1474
- Erf 1480

The project entails the formalisation of approximately 1500 erven for the community of Gamakor, Keimoes. The site is zoned as Agricultural Zone I and Undetermined. A Spatial Planning Land Use Application ("SPLUMA") application has been submitted for the rezoning and subdivision of land use change (Appendix 4A). This involves the rezoning to various land uses, namely Residential Zone IV, Open Space Zone I, and Transport Zone II, for the community of Gamakor, and subdivision of 1500 erven. The project also includes the construction of associated infrastructure such as water, electricity, sewage, and solid waste removal. The total area to be developed measures approximately 104ha.

Areas of the proposed site for development have been transformed via the erection of informal households (refer to Figure II) whereas undeveloped areas include sand soils (associated with drainage lines identified within the site footprint – Appendix 6C) and are vacant.

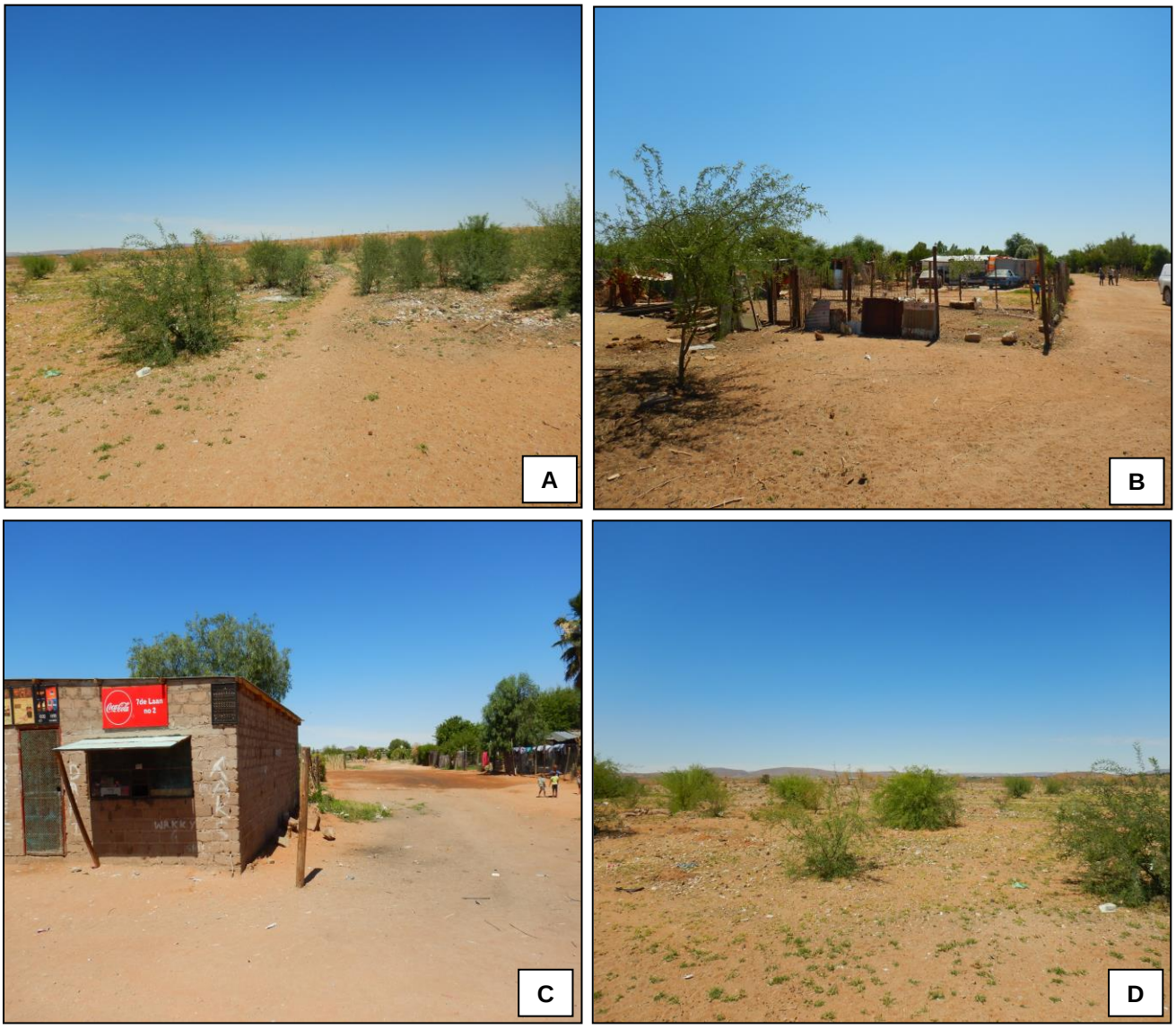

Figure 4: Overview of site characteristics. (A) General view of part of the proposed site, looking south-west. A number of alien trees are found on site; (B) General view of part of the proposed site, looking north-west. The existing informal structures can be seen in the background; (C) General view of the site as viewed from Alwyn Street, looking in a western direction; (D) General view of part of the proposed site, looking south-west. Numerous alien trees are observed on site during the site visit.

Table 1. GPS coordinates of the proposed Gamakor Housing Development site.

Coordinates of corner points of study area	Point	Latitude (S) (DDMMSS)			Longitude (E) (DDMMSS)		
	1	28°	41'	26.44"	20°	56'	38.53"
	2	28°	41'	21.18"	20°	56'	54.14"
	3	28°	41'	21.10"	20°	56'	56.20"
	4	28°	41'	44.49"	20°	57'	1.58"
	5	28°	41'	45.12"	20°	57'	1.44"
	6	28°	42'	5.62"	20°	57'	6.46"
	7	28°	42'	10.05"	20°	57'	8.76"
	8	28°	42'	14.79"	20°	57'	12.02"
	9	28°	42'	10.91"S	20°	56'	38.54"
	10	28°	41'	47.52"	20°	56'	40.42"

The GPS coordinates of the site are as follows (refer to map below):

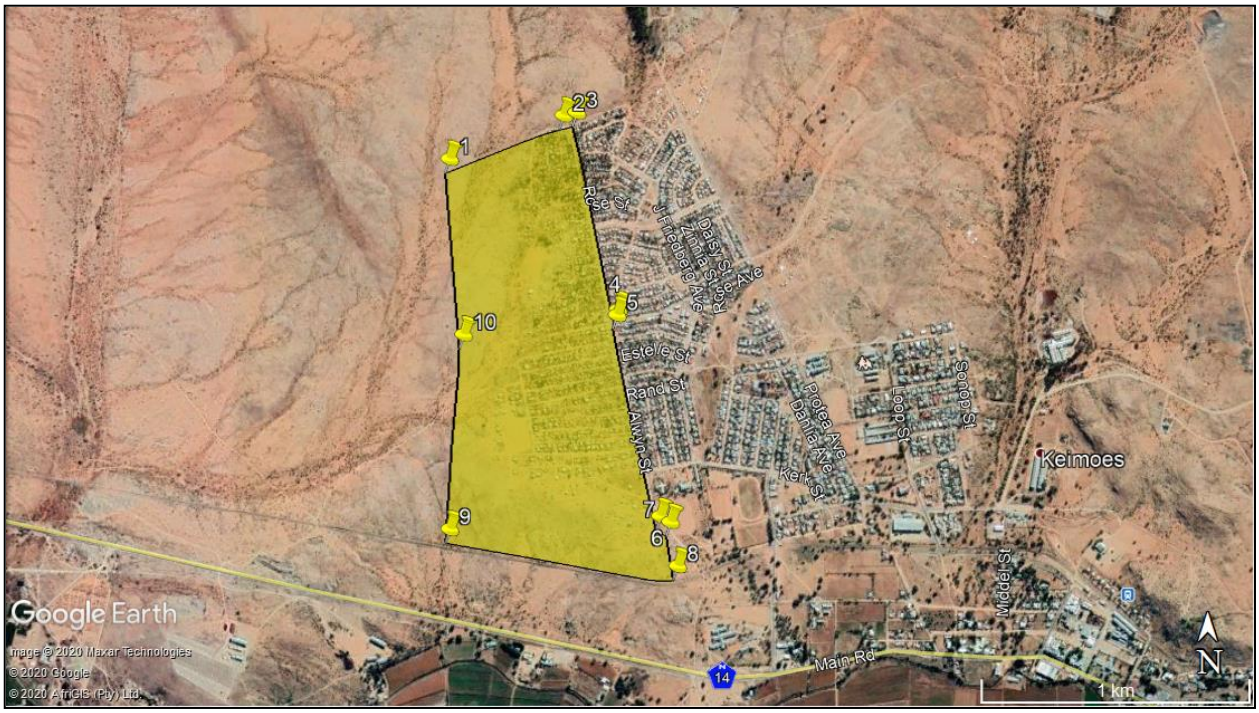

Figure 5: Coordinates of corner points of the Gamakor study area.

5.2 VEGETATION

The proposed development footprint is located within the Bushmanland Arid Grassland (Figure 6), a vegetation type classified as *Least Threatened (LT)* as per the National list of ecosystems that are threatened and in need of protection (GN. 1002 of 9 Dec. 2011). Ecosystem types classified as Least Threatened are not considered to be of conservation concern.

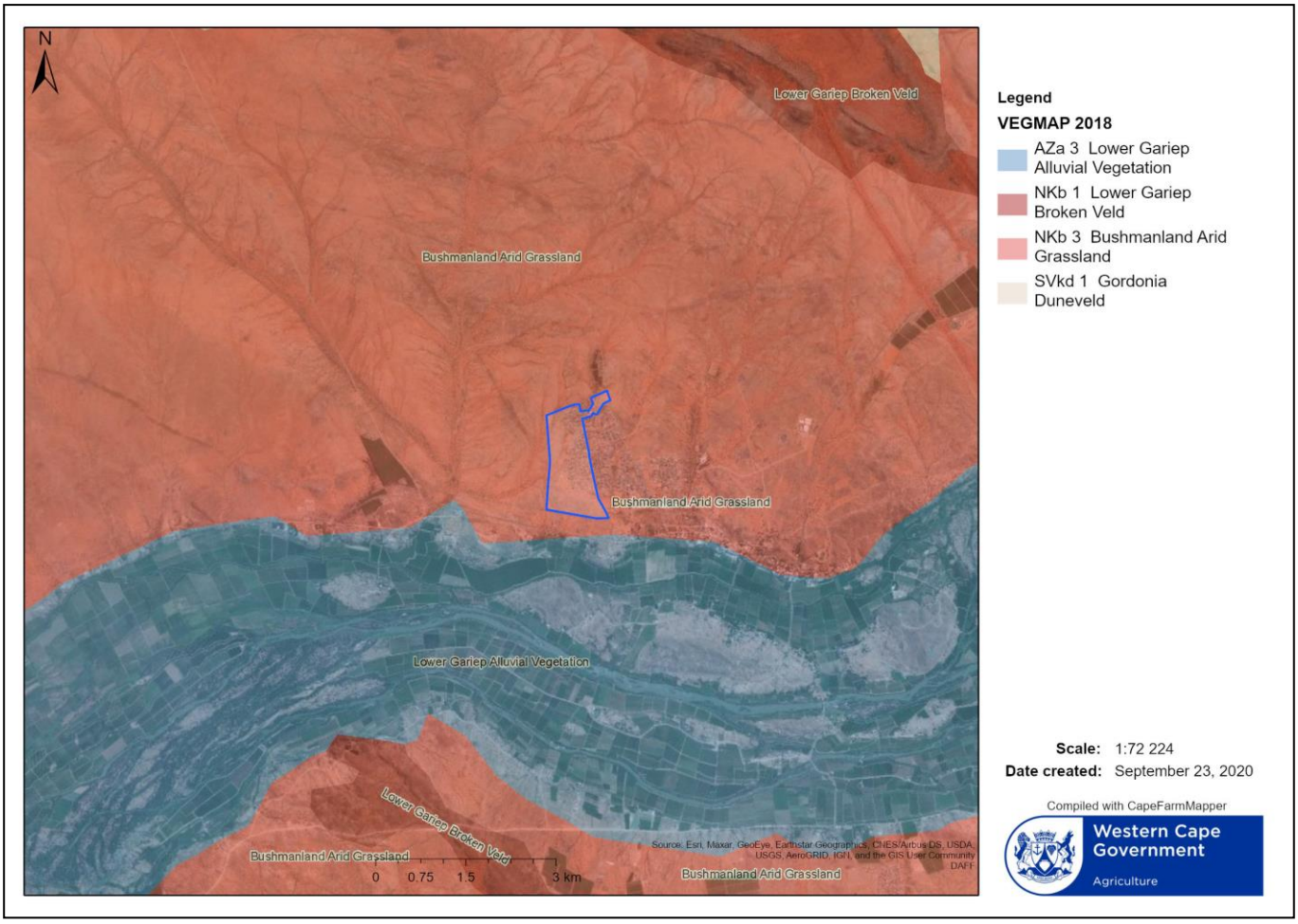

Figure 6. Vegetation type associated with the site proposed for the Gamakor Housing Development. Source: CapeFarmMapper, 2020.

The proposed activity is expected to result in a permanent footprint of approximately 100ha of veld where the level of disturbance varies throughout the site. Moreover, approximately half of the proposed site earmarked for development is already transformed (Figure II). In general, the natural systems associated with the proposed footprint have been impacted however, the western portion of the site is still largely natural although it is under constant urban-related pressures (e.g. informal settlements).

Vegetation encountered on site included sparse, low shrubland as the absence of rain, along with grazing by domestic livestock, resulted in the absence of the white grassy layer (*Stipagrostis* spp.) characteristic of the Bushmanland Arid Grassland vegetation type. Moreover, due to the arid nature (associated with factors including low rainfall) of the region (and the unpredictability of rainfall) the carrying capacity of the veld is very low and overgrazing has negatively impacted the vegetation types (with destruction of natural vegetation commonly observed in close proximity to the existing settlement). In addition, a large portion (mostly the eastern section) of the footprint was already transformed as a result of informal settlement and housing (Figure II). Within the remainder of the natural veld, two (2) plant communities were observed, closely associated with variations in soil type and depth. They were:

(1) On the shallow quartz rich rocky soils a very sparse (semi-desert) low shrubland were observed, dominated by *Salsola tuberculata* and *Justicia australis*, with *Aloe claviflora* also very common. As per the Botanical Assessment, most of the remaining natural veld is associated with shallow quartz rich rocky soils. Please note that because of the unpredictability and infrequency of the rainfall the vegetation associated with true quartz fields (e.g. Knersvlakte) will never be able to develop in this area. The vegetation can be described as a low (<50 cm in height) sparse to very sparse shrubland, low in species composition (not a great variety of species encountered). The shrubland was dominated *Salsola tuberculata* and *Justicia australis* (=*Monechma genistifolium*), with *Aloe claviflora* (Kraalaalwyn), *Mesembryanthemum subnodosum* (often a disturbance indicator) also relatively common. Other species in the upper layer included: *Barleria lichtensteiniana, Cynanchum viminale, Kleinia longiflora, Parkinsonia africana, Rhigozum trichotomum, Senegalia mellifera* and the aerial hemiparasite *Tapinanthus oleifolius*. In the lower layer (<20 cm) species like *Acanthopsis disperma* (Halfmensie), *Aptosimum spinescens* (Doringviooltjie), *Blepharis mitrata* and *Tetraena* simplex were observed. Disturbance indicators like *Galenia africana* (Kraalbos) and *Salsola kali* (tumble weed) were also observed in the disturbed or transformed areas.

(2) On the deeper sandy soils in the slight depressions associated with the seasonal watercourses, a denser and larger shrub and tree layer was encountered, dominated by *Parkinsonia africana* and *Senegalia mellifera*. Within the slightly lower lying depressions associated with seasonal drainage lines, deeper sandy soils were encountered, which also supported a denser and larger shrub / small tree layer dominated by *Parkinsonia africana* and *Senegalia mellifera*. Unfortunately, the alien invasive *Prosopis* tree was also common in some of these areas. The following species were observed: *Asparagus* cf. *cooperi*, *B. foetida* (occasionally), *Euphorbia braunsii, Justicia australis, Kleinia longifolia, Lycium bosciifolium, Rhigozum trichotomum* and *Vachellia erioloba* (three individuals within the proposed footprint).

Most of the eastern portion of the footprint is already transformed as a result of informal settlement. The purpose of this application is to formalise this area into a formal urban development.

5.3 FRESHWATER

According to the Freshwater Impact Assessment (**Appendix 6C**), the proposed housing scheme at Keimoes stretches over mostly dry drainage lines, which are tributaries of the Orange River. As per the Freshwater Impact Assessment, the most significant feature of the study area, influencing topography is the seasonal drainage line that runs from northeast to southwest through the northern part of the property, draining towards the Friesdale Spruit (Figure III). This drainage line is a tributary of the Orange River.

The sub-catchment, associated with the proposed site is relatively large, is approximately 26km in length

and 16.8km wide and covers approximately 31 000ha. Although scarce, the dry drainage lines are maintained by large floods where severe rainfall events (i.e. 40mm in 24hours) could generate an estimated runoff of 12 400 000m^3, damaging infrastructure. Wide floodplains were previously created by the mobilization of sand during these flooding events.

The Freshwater Specialist concluded that the drainage lines have only limited value as water resources and environmental assets as per the scoring matrix. However, in order to limit the impact on the identified drainage lines, recommended mitigation measures must be implemented.

5.4 GEOLOGY

The proposed Gamakor site earmarked for development is located within the Keimoes Suite and Vaalputs Granite (Figure 7).

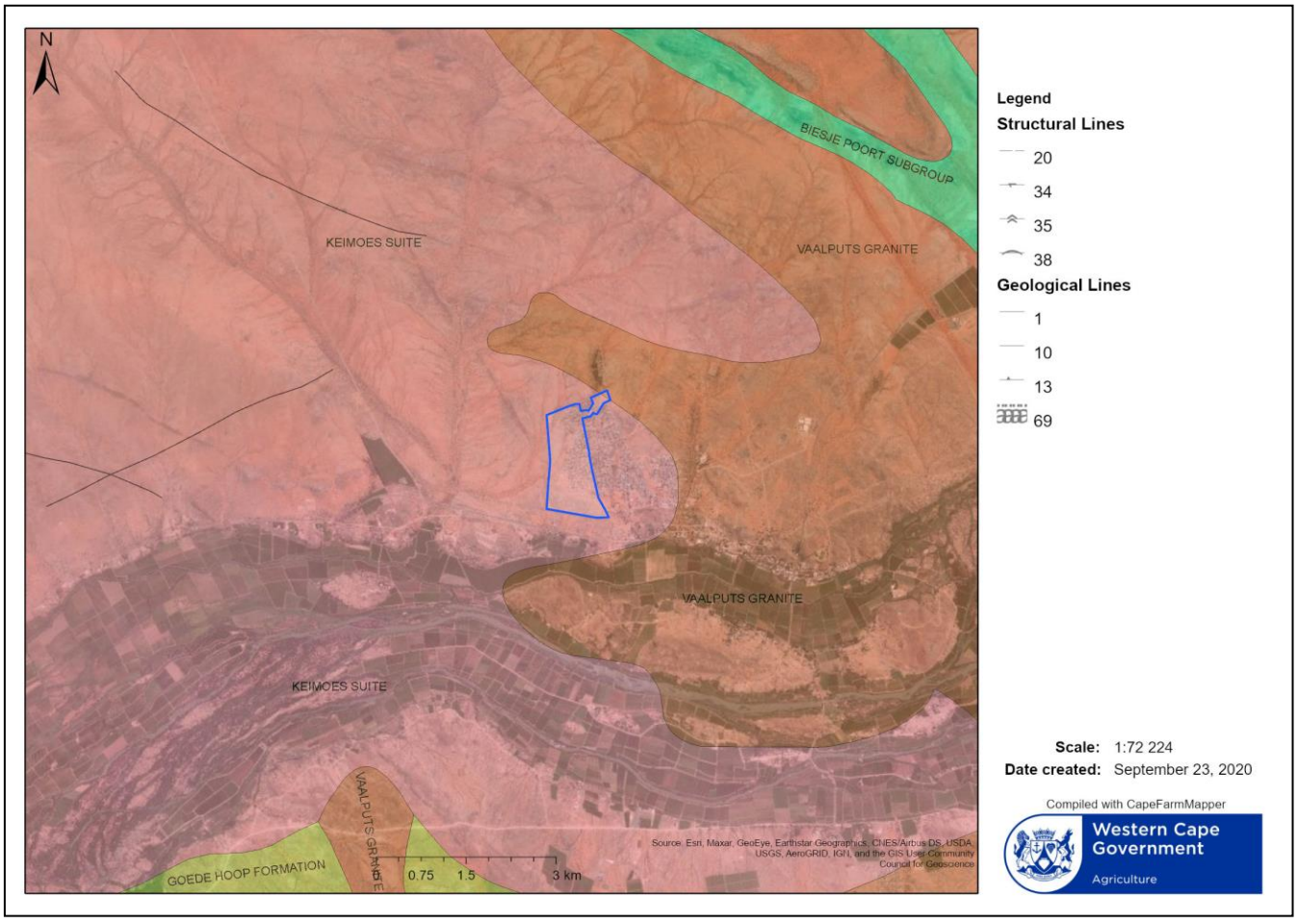

Figure 7. Geological features associated with the Gamakor site.

As per the Geotechnical Investigation (Appendix 6D), the soil profile is comprised of colluvium (maximum depth of 800mm and is generally compressible), alluvium (present in drainage gullies – extended to a maximum depth of 2700mm and is highly compressible due to its loose to very-loose consistency), pebblestone marker (only a minor occurrence but is negligibly erodible and compressible), residual charnockite (underlies the colluvium and is negligibly erodible and compressible), residual granite-gneiss

(negligibly erodible and compressible), and Mokalanen Formation (namely Hardpan calcrete and Nodular calcrete).

5.3 GEOHYDROLOGY

According to the Geo-technical Investigation (**Appendix 6D**), groundwater is expected to occur at depths of 20m and 30m in fractures restricted to a zone directly below the water table. However, the presence of permanent water has no influence on the geotechnical conditions on site.

Perched water was encountered at two sampling sites at depths of 1500mm and 1400mm – which was attributed to the presence of existing major drainage lines present within the footprint of the site (Figure III). Presence of perched water at these two particular sampling sites may be a permanent problem whereas only after inundation events in the minor drainage lines.

5.4 CLIMATE

All regions with a rainfall of less than 400 mm per year are regarded as arid. Keimoes receives on average approximately 84 mm of rain per year (mainly during autumn). Keimoes receives the lowest rainfall (0 mm) in June and the highest (27 mm) in March. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Keimoes range from 19.8°C in June to 33°C in January. On average, the coldest nights can be expected during July with night-time temperatures averaging 3°C.

5.5 SOCIO-ECONOMIC CONTEXT

Kai !Garib Local Municipality

Socio-economic issues prioritized by communities within the Municipality include, but are not limited to, (i) lack of basic services (e.g. adequate sewerage systems, access to potable water, and access to electricity), lack of housing (where contributing factors include poverty and level of unemployment within the municipality), and (iii) the level of unemployment as a whole (leading to crime, drug and alcohol abuse, lack of socio-economic development within the municipality).

According to the Kai !Garib Municipality Integrated Development Plan (IDP 2020 – 2021), approximately 70 500 people live within the Municipality (housing approximately 0.1% of South Africa's population). Population growth within the Municipality increased at an average rate of 0.87% per annum from 2008 – to – 2018, approximately half the growth rate of ZF Mgcawu District Municipality (~1.53%) and South Africa (~1.57%) (Table 3). The population is estimated to increase from 70 500 (in 2018) to 73 900 in 2023. The population projection of the Kai !Garib Local Municipality shows an estimated average growth rate of approximately 0.9% from 2018 to 2023. This is however slightly lower compared with the predicted annual population increase in the ZF Mgcawu District Municipality (1.2%), Northern Cape Province (1.3%), and South Africa (1.3%).

Table 2. Population within the Kai !Garib Local Municipality and estimated population growth over time.

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2018	70,500	266,000	1,250,000	57,400,000	*26.5%*	*5.6%*	*0.12%*
2019	71,100	269,000	1,270,000	58,100,000	*26.4%*	*5.6%*	*0.12%*
2020	71,800	273,000	1,290,000	58,900,000	*26.3%*	*5.6%*	*0.12%*
2021	72,400	276,000	1,300,000	59,600,000	*26.2%*	*5.6%*	*0.12%*
2022	73,100	279,000	1,320,000	60,400,000	*26.2%*	*5.5%*	*0.12%*
2023	73,900	282,000	1,340,000	61,100,000	*26.2%*	*5.5%*	*0.12%*
Average Annual growth							
2018-2023	***0.95%***	***1.21%***	***1.33%***	***1.27%***			

Source: Kai !Garib IDP (2020/21).

As per the Kai !Garib IDP, if the number of households is growing at a faster rate than that of the population it means that the average household size is decreasing, and vice versa (Table 4). In 2018, the Kai !Garib Local Municipality comprised of 18 400 households. This equates to an average annual growth rate of 0.24% in the number of households from 2008 to 2018. With an average annual growth rate of 0.87% in the total population, the average household size in the Kai !Garib Local Municipality is by implication increasing. This is confirmed by the data where the average household size in 2008 increased from approximately 3.6 individuals per household to 3.8 persons per household in 2018. The average annual growth rate in the number of households for all the other population groups has increased with 0.09%.

Table 3. Number of households present in the Kai !Garib Local Municipality.

	Kai !Garib	ZF Mgcawu	Northern Cape	National Total	Kai !Garib as % of district municipality	Kai !Garib as % of province	Kai !Garib as % of national
2008	17,900	61,300	287,000	13,400,000	*29.3%*	*6.2%*	*0.13%*
2009	17,400	61,800	288,000	13,700,000	*28.2%*	*6.1%*	*0.13%*
2010	17,100	62,500	291,000	13,900,000	*27.3%*	*5.9%*	*0.12%*
2011	16,800	63,800	298,000	14,200,000	*26.4%*	*5.6%*	*0.12%*
2012	17,100	65,300	306,000	14,500,000	*26.2%*	*5.6%*	*0.12%*
2013	17,400	66,900	314,000	14,700,000	*26.0%*	*5.5%*	*0.12%*
2014	17,500	67,800	319,000	15,000,000	*25.8%*	*5.5%*	*0.12%*
2015	17,500	68,500	323,000	15,400,000	*25.6%*	*5.4%*	*0.11%*
2016	17,800	69,800	331,000	15,700,000	*25.5%*	*5.4%*	*0.11%*
2017	18,100	71,500	341,000	16,100,000	*25.3%*	*5.3%*	*0.11%*
2018	18,400	73,000	349,000	16,400,000	*25.2%*	*5.3%*	*0.11%*
Average Annual growth							
2008-2018	***0.24%***	***1.76%***	***1.96%***	***2.02%***			

Source: Kai !Garib IDP (2020/21).

The demographic profile of the Kai !Garib Local Municipality is detailed in Table 5. These data, and other data within the Kai !Garib IDP, suggest that many people migrate into Kai !Garib who were looking for better opportunities from surrounding areas and abroad.

Table 4. Demographic profile of Kai !Garib Local Municipality.

	African		White		Coloured		Asian	
	Female	Male	Female	Male	Female	Male	Female	Male
00-04	497	492	107	157	1,840	1,880	63	58
05-09	226	218	116	139	2,020	2,070	45	39
10-14	209	214	140	110	2,090	2,180	51	57
15-19	679	1,020	109	133	2,110	2,070	21	22
20-24	1,880	2,690	127	115	1,890	2,040	26	16
25-29	1,450	2,080	124	140	1,760	1,850	49	21
30-34	1,060	1,770	156	126	1,920	1,800	45	23
35-39	686	1,380	183	217	1,640	1,510	40	47
40-44	407	842	139	160	1,300	1,250	15	53
45-49	273	590	164	131	1,290	1,100	26	30
50-54	137	339	211	177	1,190	1,160	17	24
55-59	91	250	183	206	1,020	951	10	7
60-64	82	114	190	135	1,040	642	9	9
65-69	69	80	172	140	634	552	9	5
70-74	34	57	170	130	520	377	8	7
75+	55	75	279	150	579	387	5	7
Total	**7,830**	**12,200**	**2,570**	**2,360**	**22,800**	**21,800**	**439**	**426**

Source: Kai !Garib IDP (2020/21).

Table 5. Social and Economic Aspect

Anticipated CAPEX value of the project on completion	±R3 109 225.00 (for planning and surveying i.e. township establishment)
What is the expected annual income to be generated by or as a result of the project?	±R20 000 000.00 estimated from generation of rates and taxes.
New skilled employment opportunities created in the construction phase of the project	Construction phase of the project yet to commence. However, it is expected that new skilled employment opportunities will be created for local community during physical construction of infrastructure (i.e. top structure & installation of basic civil services)
New skilled employment opportunities created in the operational phase of the project	None
New un-skilled employment opportunities created in the construction phase of the project	Estimated ±100 employment opportunities
New un-skilled employment opportunities created in the operational phase of the project	None
What is the expected value of the employment opportunities during the operational and construction phase?	± R3 500.00 per employee per month
What percentage of this value that will accrue to previously disadvantaged individuals?	±85%
The expected current value of the employment opportunities during the first 10 years	Unknown at this stage
What percentage of this value that will accrue to previously disadvantaged individuals?	To be confirmed

Although no direct operational job opportunities are expected, indirect job opportunities may be provided with the provision of business zoned properties.

5.6 HERITAGE FEATURES

According to the Heritage Impact Assessment (HIA) (**Appendix 6B**), the study area consists of rocky klipveld with surface scatters of Quartz, Quartzite, Banded Ironstone Formation (BIF), and Sandstone and Calcrete deposits with visible Quartzite outcrops to the north of the site. Minor sand patches to the north and east of the site footprint. There is a slight slope across the site towards the south-west.

Two occurrences of lithics were recorded during the site investigation. One incidence of lithics was recorded within the development footprint. This included four pieces of MSA/Early LSA debitage/flakes scattered *ex situ* in a heavily disturbed area. These pieces were made from the highly utilised banded ironstone formation (BIF). The first occurrence is in the south of the development footprint on Farm Kousas No. 459 Portion 0 and consist of four pieces of MSA/Early LSA debitage/flakes scattered *ex situ* in a heavily disturbed area. The second recorded find is an isolated chunk situated outside the development footprint. All the recorded lithics were made from the highly utilised banded ironstone formation, popular throughout the area (Morris 2012). The cultural material shows various degrees of weathering and may either be representative of the Early Later Stone Age, or a mere mixture of LSA and MSA artefacts (Lombard 2011). The identified archaeological materials are of low significance, as the archaeological sample is small and without context, and therefor of little scientific value. No formal or informal graves were identified whereas the Gamakor cemetery is situated well outside the development footprint. The area was classified as having a zero palaeontological significance.

6. SERVICES

Due to the nature and size of the proposed development, an investigation into the status and availability of existing bulk services to supply the development was required. Bvi Consulting Engineers compiled a Bulk Services Report (**Appendix 4B**), investigating the status of existing services that were identified to potentially supply the proposed area on the external services for the proposed development.

A brief description of the bulk services is given below.

6.1 WATER

As per the Draft Engineering Services Investigation Report (prepared by Bvi Engineers, dated May 2020), the existing bulk water infrastructure of the Keimoes area is as follows:

- A raw water river pump station;
- A 450mm diameter raw water supply line;
- A conventional water treatment plant;
- Three bulk distribution supply zones:
    - Residential area and informal settlements north of the railway line, serviced by a 2.5ML reservoir which is supplied by a 250mm diameter uPVC bulk supply line.
    - CBD area services by a 1.7ML reservoir and a dedicated supply line; and
    - Malanshoek serviced by a 180kl reservoir supplied by a 74mm diameter supply line.

Demands of the Existing Gamakor Settlement

The existing water demands will be divided into two portions for this investigation, namely:

- *Supply Zone A*: Total demand supplied by the extraction pump station and the Water Treatment Plant; and 2); and
- *Supply Zone B*: Total demand supplied by the existing 2.5 ML concrete reservoir.
    - For Supply Zone A, the Total Average Annual Daily Demand (TAADD) for all areas of Keimoes that are fed by the Keimoes Water Treatment Plant are included.
    - For Supply Zone B, the TAADD for all areas of fed by the 2.5 ML Reservoir, which include Extension 6 and 7 and the schools in that area.
    - For both supply zones, a loss factor of 10% was applied to the Average Annual Daily Demand (AADD) to get to a TAADD amount and a further 10% for the losses at the Water Treatment Plant.

Demands of the Future Gamakor Settlement

For future demands, the same supply zones are used, with the following additions to the demands:

- Gamakor 1500 erven development.
- Possible future developments were also identified.

The TAADD for both supply areas are tabulated below:

Table 6. Total Annual Average Daily Demand for Supply Zone A and Supply Zone B. Source: Draft Engineering Services Report (Appendix 4B).

Area	TAADD (kL/day)
Gamakor Development Demands	1 035
Total Future Demand for Supply Zone A	3 176
Total Future Demand for Supply Zone B	3 041

As per the Engineering Services Report, the proposed upgrade of Water Treatment Plant supply line and storage capacity are required to be upgraded to meet future water supply demands (Table 8).

Table 7. Bulk water infrastructure requirements. Source: Draft Engineering Services Report (Appendix 4B)

Water Infrastructure	Current Capacity	Existing Requirements	Future Requirements
Bulk Raw Water Supply	150 l/s	76.9 l/s	114.1 l/s
Water Treatment Plant	90-95 l/s	55.8 l/s	82.7 l/s
WTP to Reservoir Supply - Pumps	55 l/s	35.3 l/s	90.2 l/s
WTP to Reservoir Supply – Supply Line	250mm Dia.	250mm Dia.	450mm Dia.
Storage Capacity	2.5 ML	2 ML	5.3 ML

As per the Draft Engineering Services Report, the recommended upgrades to service future demands include:

- The proposed construction of a new 3ML concrete storage reservoir to the north of Keimoes (Figure 9);
- Construction of a new 4.2km rising main to supply the proposed 3ML concrete reservoir with potable water. The rising main will require that the supply from the WTW pump station be increased. It is proposed that one of the pumps will have to be replaced with a larger pump. The pump will be sized for a nominal flow of 327m³/h and 45 m of head.
- Installation of a new 450mm diameter bulk water distribution main to the Gamakor development.
- Repairs at the WTW, including the repair of mechanical and electrical components and the control system.

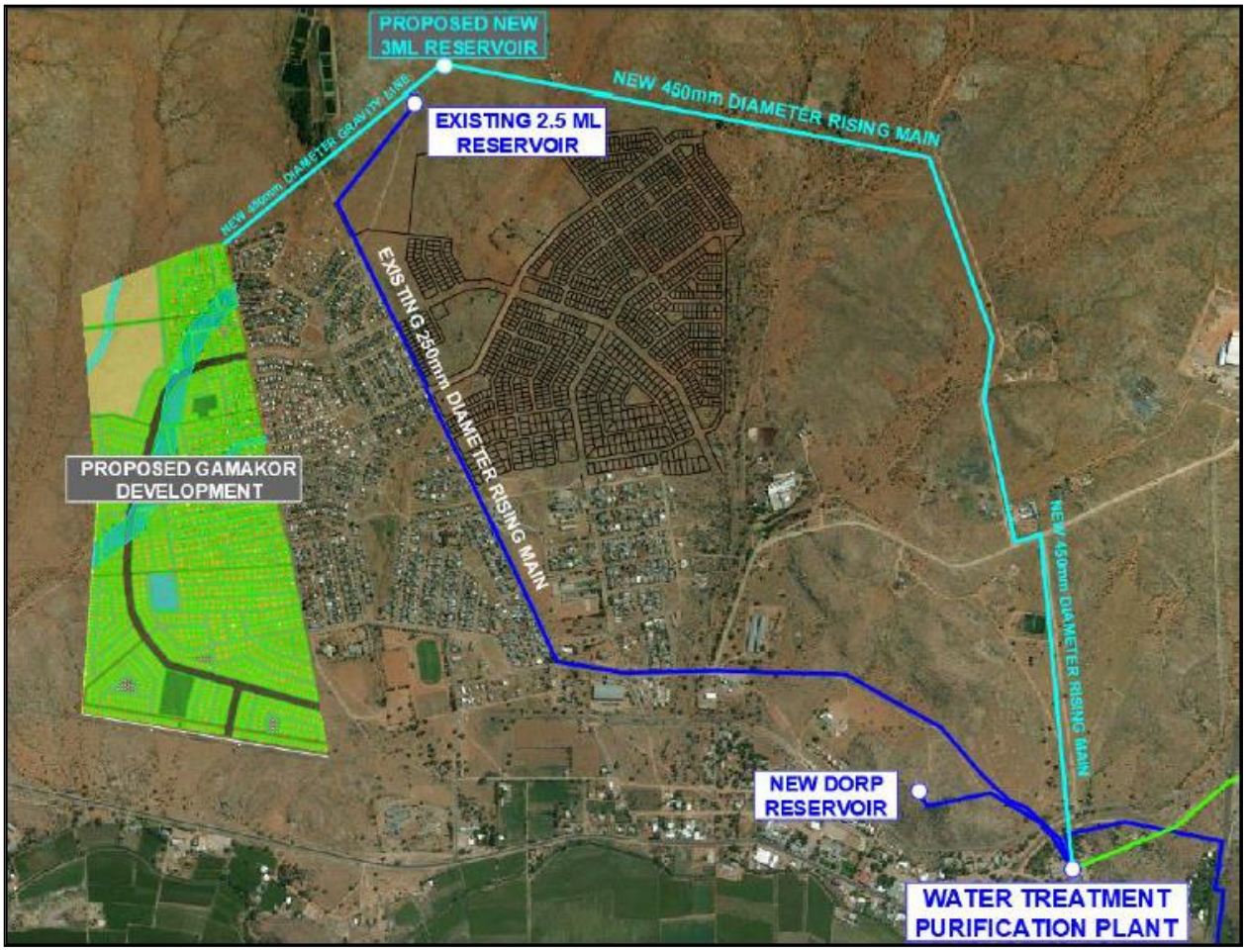

Figure 8. Recommended bulk water supply infrastructure to service future calculated demand. Source: Draft Engineering Services Report (Appendix 4B).

6.2 SEWERAGE

As per the Draft Engineering Services Report (**Appendix 4B**), the only areas of the existing Gamakor Settlement include Extension 6 and Extension 7 (Figure 10) as well as two schools and a school hostel. The rest of Keimoes is served by septic tanks that are emptied by honey sucker trucks periodically. The effluent from the septic tanks are transport and disposed of at the existing oxidation ponds, where it is treated.

Figure 9. Existing sewage infrastructure servicing the existing Gamakor settlement.

According to the Draft Engineering Services Report (Appendix 4B), the following information was obtained regarding sanitation services:

- Sewage from Extension 6 neighbourhood gravitates to the Ext. 6 pump station (Figure 10).
- From there the sewer is pumped through a 160mm diameter PVC pipeline (red line) to the Ext. 7 pump station.
- Sewer from the Extension 7 neighbourhood gravitates to Ext. 7 pump station. Two small pump stations in Extension 7 lifts the sewer over the watershed and gravitates towards the Ext. 7 pump station.
- Sewer from Extension 7, along with the sewer from the Ext. 6 pump station, is pumped through a 150mm diameter A/S pipeline to a booster pump station.
- The booster pump station lifts the sewer from the Ext.7 pump station through a 150mm diameter A/S pipeline to the oxidation ponds (yellow line).
- The existing Wastewater Treatment Works (WWTW), located at 28°41'02.40" S; 20°57'07.92"E, consists of two sets of oxidation ponds which are being operated in parallel;
- The capacity of these ponds for effective wastewater treatment is 628m^3 per day.
- The ponds are 300m away from the nearest residences and less than 600m away from nearest proposed residences within the Gamakor area, posing a public health risk. Guidelines indicated a minimum of 2km away from residencies.
- The treatment capacity of the oxidation ponds can effectively handle only 50% of the current sewer volume.

As per the Draft Engineering Services Report, the Average Daily To estimate the sewage effluent generated by the development the following assumptions were made:

- The sewer flows were calculated assuming 60% of the AADD water consumption. The results were also checked against the unit hydrograph method was used to estimate both existing and future sewer flows relevant to the development, as detailed in the Neighborhood Planning and Design Guide. The two methods approximated very similar flows;
- A peak day factor of 1.1 and an additional 30% to allow for extraneous flows (storm water infiltration, etc.) was used during the estimates.
- Allowance has been made for groundwater infiltration (roughly 15%) as well as 30% spare capacity for storm water ingress.
- The Average Daily Wet Weather Flow (ADWWF) was calculated at 1 117kL/day.
- With regards to the current capacity of sewer infrastructure, the WWTW (oxidation ponds) are under capacity.

Estimated future ADWWF for the proposed Gamakor development is 540kL/day (above the existing 1 117kL/day ADWWF and excluding other future developments). Therefore, the Draft Engineering Services Report (Appendix 4B) recommended the following:

- The current waste water treatment plant infrastructure (oxidation ponds) can only treat 50% of the current sewer outflows. In addition to the capacity problems, the oxidation ponds are only 300 meters away from Extension 7. It is therefore recommended that a new wastewater treatment works (WWTW) be constructed. A 2.5ML (based on a future ADWWF of 2 413 kL/day) oxidation pond system is proposed.
- Due to concerns about the future expansion of Keimoes, it is proposed that the new WWTW be located 2.5km away from the Gamakor development. The WWTW will also have to be located at a low elevation relative to Keimoes in order to minimize pumping costs. The proposed location of the WWTW is shown in Figure 8 at No. 3. The entire Keimoes will be accommodated at the new location in the future.
- The Gamakor development area drains to the south-west (90%) and to the south-east (10%). Sewer from the Gamakor area will therefore drain to two pump stations, namely:
    - Gamakor East Pump Station (No. 1 on Figure 8 in Appendix 4B), which will collect sewer from the 10% of the Gamakor Area, portions of the Extension 6 & 7 areas and about half of the newly planned 1200 stands. From there, the sewer is pumped directly through a 250mm diameter dedicated pump line to the new WWTW.
    - Gamakor West Pump Station (No. 2 on Figure 8 in **Appendix 4B**), which will collect sewer from Gamakor and two small areas in Extension 7 and will be pumped from there via a new 250mm diameter rising main to the WWTW.
- A new pump line will also need to be constructed between Extension 6 Pump Station (PS) and Gamakor East Pump Station. Extension 6 PS will then pump sewer collected from part of Extension 6 into Gamakor East PS. These proposed upgrades to the sewer system will allow most pump stations within Keimoes to be decommissioned resulting in very low pumping costs and will pose less health risks to the community.

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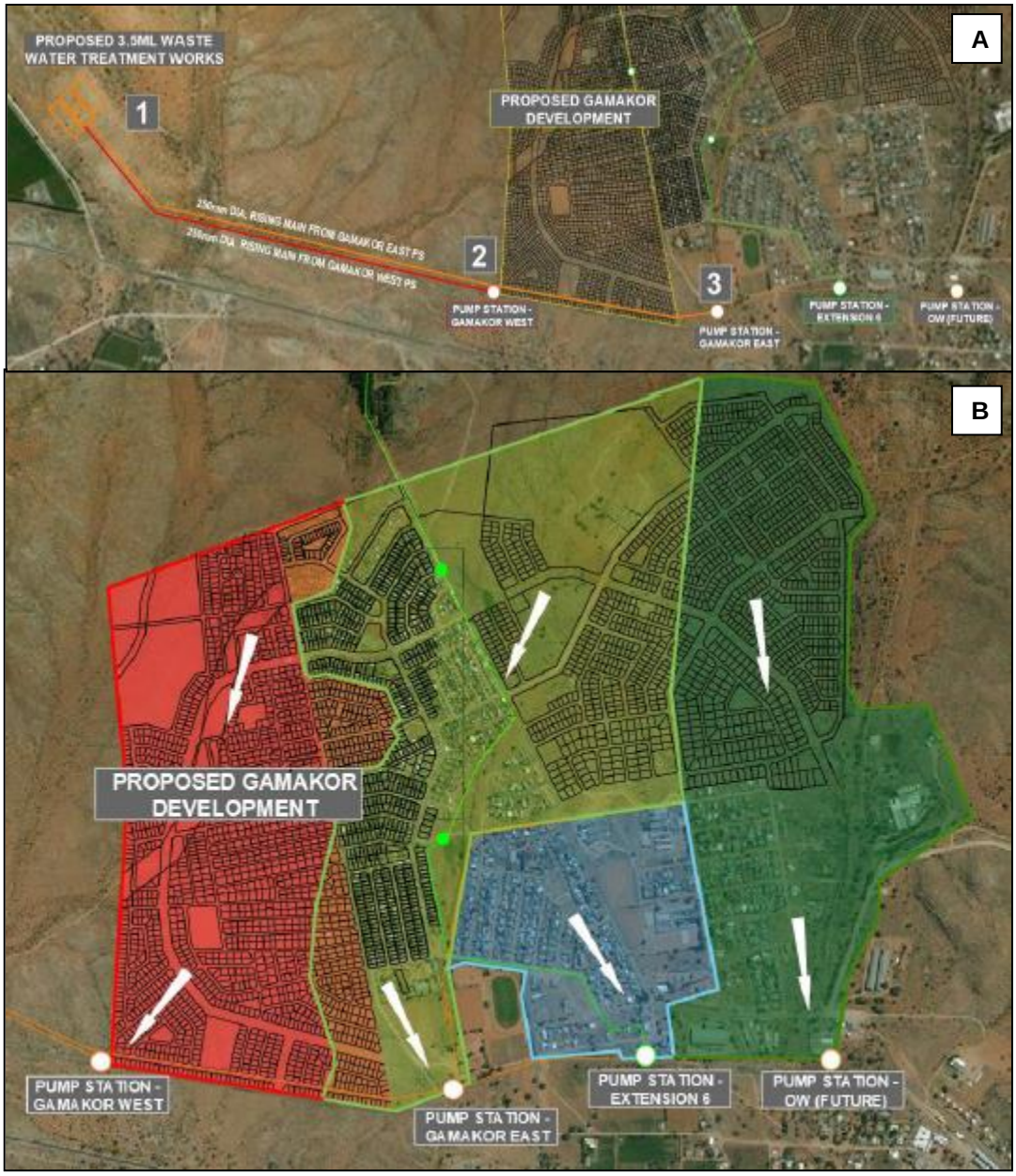

Figure 10. Proposed sewerage pipeline layout (A) and drainage regions (B). Source: Engineering Services Report, May 2020.

6.3 ROADS

Access to the development will be from the existing Residential Collector Streets (Class 4b), namely:

- Alwyn Street – Main access to the development
- Estelle Street
- Carnation Street
- Rose Street

No problems are foreseen regarding roads and access.

6.4 STORMWATER

As detailed in the Draft Engineering Services Report (Appendix 4B), the guiding principle for stormwater management is that the peak run-off from the post-developed site should not exceed that of the pre-developed site for the full range of storm return periods (1:2 to 1:50). Stormwater measurements must be incorporated into the site development plan to attenuate the post-development flows to pre-development rates – these measures include, but are not limited to, controlled overland flows, above-ground attenuation storage (if required) and berms at the higher end of the site (if required). Measures mitigating the pooling of water must be implemented, areas susceptible to erosion must be identified and subsequently protected.

6.5 SOLID WASTE (REFUSE) REMOVAL

Refuse removal will be take place via the Municipal waste stream and disposed of at the nearest registered, municipal bulk solid waste disposal site.

6.6 ELECTRICITY

As per the Draft Engineering Services Report (Appendix 4B), the expected electricity load of the proposed development will initially be 1.8MVA (as per INEP guidelines). The servicing of this load formed the basis of the electricity supply component of the Draft Engineering Services Report.

According to the Draft Engineering Services Report (Appendix 4B), the following information was obtained regarding Electricity Supply:

- The availability of the bulk electrical connection to Keimoes is currently capped at 5MVA, the information received from the Municipality's Electrical department is that the town maximum demand is currently running at average between 4.8-4.9MVA.
- The Municipality indicated that they are currently engaging with Eskom to upgrade the bulk supply available to 10MVA.
- "Keimoes Nommer2" Load Centre, located in Industrial Weg, is the existing electrical network for the Keimoes Suburbs and Industrial which in turn is connected to the Eskom Oasis Substation. .
- Load Centre "Keimoes Nommer1operates at 2.9MVA and Load Centre "Keimoes Nommer2" at 2MVA according to information received from Kai !Garib Municipality.

It was concluded that the expected 1.8MVA load can be accommodated for by the current load centres without requiring the upgrade of feeders from the Eskom Oasis Substation. However, the Eskom bulk availability connection capacity to the town must be upgraded to 10MVA by the Municipality.

7. PROCESS TO DATE

The section below outlines the various tasks undertaken to date, the members of the team involved in the project, as well as the Public Participation Process.

6.1 TASKS UNDERTAKEN TO DATE

Table 8. Tasks undertaken in the EIA to date

DATE	TASK
SCOPING PHASE	
February 2020	Initial public participation, including newspaper advertisements, posters, letter drops, BID and notification letters to identified interested and affected parties.
March 2020	Submit Application Form to DE&NC
March 2020 (received August 2020)	Received acknowledgement from DE&NC
March 2020	Distribution of notification letters and the Draft Scoping Report to Registered Interested and Affected Parties
July 2020	60-day comment period ends.
July 2020	Compile the Final Scoping Report
30th July 2020	Submit Final Scoping Report to DE&NC.
TBC	Acceptance of Scoping report and Plan of Study for EIA (Appendix 1B)
ENVIRONMENTAL IMPACT ASSESSMENT REPORT PHASE (THIS PHASE)	
Completed	Undertake Specialist Studies where required
October 2020	Draft Environmental Impact Report compiled and made available for viewing and comment to Registered Interested and Affected Parties (this report)

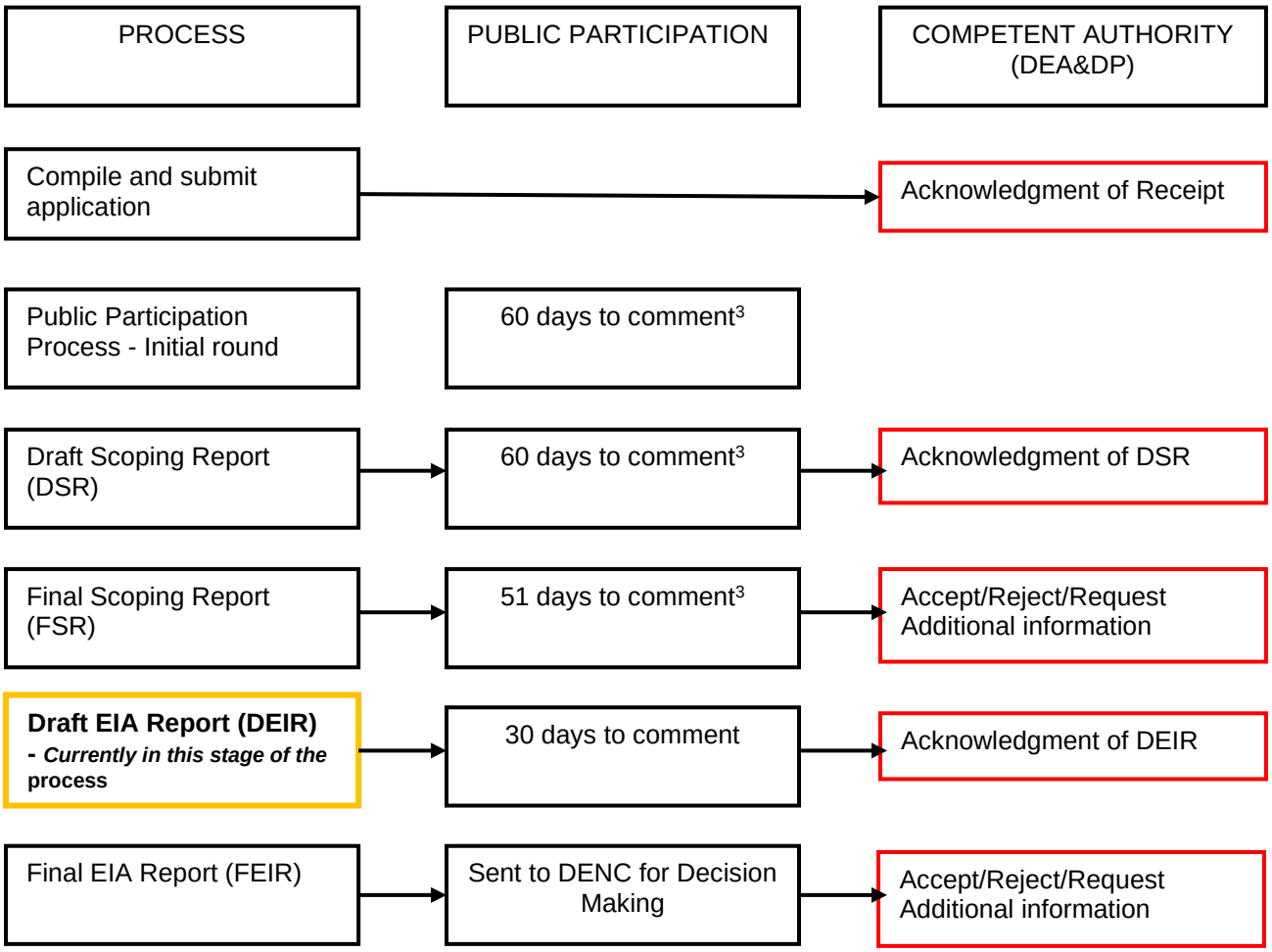

Figure 11. Summary of the EIA process and public participation process. The red indicates the stages where the competent authority will be consulted during the process.

6.2 TASKS TO BE UNDERTAKEN DURING THE EIA PHASE

The following tasks must still be undertaken during the EIA phase of the process:

- Submit Draft Environmental Impact Report (EIR) (*this document*) for public comment based on specialist information.
- Advertise Draft EIR for public comment
- Distribute and/or make the Draft EIR available for viewing and comment
- Receive comments on Draft EIR. All comments received and responses to the comments will be incorporated into the Final Environmental Impact Report (EIR)
- Preparation of a FINAL EIR for submission to DE&NC for consideration and decision-making.

Please refer to Figure 14 to see where the public participation process is present in the environmental impact assessment. The Interested and Affected Parties were given the opportunity to comment on the Draft Final Scoping Report and will be given the opportunity to comment on the Draft EIR (this report). The figures also indicate what timeframes are applicable to what stage in the process. If required, meetings with key stakeholders will be held.

At the end of the comment period, the Draft EIR will be revised in response to feedback received from I&APs. All comments received and responses to the comments will be incorporated into the Final EIR. The Final EIR will then be submitted to DE&NC for consideration and decision-making.

Correspondence with I&APs will be via post, telephone, email, and newspaper advertisements.

Should it be required, this process may be adapted depending on input received during the on-going process and as a result of public input. DE&NC will be informed of any changes in the process.

6.3 PROFESSIONAL TEAM

The following professionals are part of the project team.

Table 9. Members of the professional team

DISCIPLINE	SPECIALIST	ORGANISATION
Environmental Consultants	Anthony Mader / Bernard de Witt	**EnviroAfrica**
Town Planners	Len Fourie / JP Theron	**MacroPlan Town and Regional Planners**
Consulting Engineers	S.P van Blerk / F.D. Maritz	**Bvi Engineers**
Botanist	Peet Botes	**PB Consult**
Heritage	Jan Englebrecht	**Ubique Heritage Consultants**
Freshwater	Dr Dirk van Driel	**Watsan Africa**
Geo-technical Consultants	Frans Breytenbach	**Cedar Land Geotechnical Consult (Pty) Ltd**

6.4 PUBLIC PARTICIPATION

A Public Participation Process was undertaken in accordance with the requirements of the NEMA Environmental Impact Assessment Regulations: Guideline and Information Document Series. *Guidelines on Public Participation 2013* and the NEMA EIA Regulations 2014 (amended). Issues and concerns raised during the Scoping phase are dealt within this report. Please note that the public participation processes are in line with the new (and subsequent) Directions, published by the Department of Environment, Forestry, and Fisheries (DEFF) on the 5th June 2020[4]. However, as per conditions stipulated in the latest circular, the required extension to public participation ended on the 18th August 2020. In light of this, a 30-day comment period will be given to I&APs for comment on the Draft EIR.

7.4.1 PUBLIC PARTICIPATION UNDERTAKEN DURING SCOPING PHASE:

Interested and Affected Parties (I&APs) have been and will be identified throughout the process. Landowners adjacent to the proposed site, relevant organs of state, organizations, ward councillors and the Local and District Municipality were added to this database. A complete list of organisations and individual groups identified to date is shown in **Appendix 3.**

Public Participation will be conducted for the proposed development in accordance with the requirements outlined in Regulation 41 of the NEMA EIA Regulations 2014. The issues and concerns raised during the scoping phase will be dealt with in the EIA phase of this application.

As such each subsection of Regulation 41 contained in Chapter 6 of the NEMA EIA Regulations 2014 will be addressed separately to thereby demonstrate that all potential Interested and Affected Parties (I&AP's) were notified of the proposed development.

R54 (2) (a):

R41 (2) (a) (i): The site notices (A2 and A3 sizes) were placed at different locations around the project site as well as at the municipality office in town. (please refer to **Appendix 3D**). Posters were placed in conspicuous areas such as the entrance to the development and areas receiving the majority of foot traffic.

The posters contained all details as prescribed by R41(3) (a) & (b) and the size of the on-site poster was at least 60cm by 42cm as prescribed by section R41 (4) (a).

R41 (2) (a) (ii): N/A. There is no alternative site.

R41 (2) b):

R41 (2) (b) (i): N/A. The Applicant is the landowner

[4]As per section 4 of the 'Directions Regarding Measures to Address, Prevent and Combat the Spread of COVID-19 Relating to National Environmental Management Permits and Licenses', published on the 5th June 2020 by the Department of Environment, Forestry and Fisheries (DEFF). These new directions state that any notice given after the 5th June 2020 requires an extended 30-day comment period in addition to the legislated 30-day comment period (total of 60-day comment period). If PP was conducted before the 27th March 2020, the formal comment period between 27th March and 5th June 2020 are null and void and therefore, restarted on the 6th June 2020. The initial comment period must be extended by additional 21 days (total of 51 day). Please note that we are still waiting for directives from DEFF on application timelines. These Directives published on the 5th June 2020 apply to Level 3 Lockdown Period and are subject to change. **Please note, conditions in this Directive ceased on the 18th August 2020.**

R41 (2) (b) (ii): The background information document (**Appendix 3A**) was given to residents adjacent to the proposed site for development via letter drops (**Appendix 3C**).

R41 (2) (b) (iii): An initial notification letter was sent to Mr Victor Sacco, the Councillor for Ward 6 (the ward in which the site is situated) (please refer to **Appendix 3C** for proof of notification letters sent). A notification letter, notifying I&APs of the release of the Draft Scoping Report.

R41 (2) (b) (iv): An initial notification letter was sent to the Kai !Garib Municipality as the municipality is the Applicant. A notification letter, notifying the I&AP of the release of the Draft Scoping Report, was sent to the Applicant.

R54 (2) (b) (v): Initial notification letter (please refer to **Appendix 3C** for proof of notification letters sent) will be sent to the following organs of state having jurisdiction in respect of any aspect of the activity:

- Department of Water and Sanitation
- Department of Agriculture and Land Reform
- Department of Roads and Public Works
- Department of Agriculture, Forestry and Fisheries
- Department of Cooperative Governance, Human Settlements and Traditional Affairs
- SANRAL
- Department of Environment and Nature Conservation
- South African Heritage Resources Agency
- Department of Mineral Resources
- Department of Education
- Department of Defence

A notification letter, notifying the I&AP of the release of the Draft Scoping Report, was sent to the following Registered I&APs:

- Northern Cape Department of Agriculture and Land Reform;
- Department if Cooperative Governance, Human Settlements and Traditional Affairs;
- Department of Roads and Public Works;
- Directorate Forestry Management;
- Department of Water and Sanitation;
- SANRAL;
- South African Heritage Resource Agency;
- Department of Social Development;
- Economic Development and Tourism - Northern Cape;
- Department: Transport, Safety and Liaison;
- Eskom

R41 (2) (c) (i): An advertisement was placed in the local newspaper, Kalahari Bulletin, on the 17th January 2019 (please refer to **Appendix 3B** for proof of advertisement).

R41 (2) (d): N/A

R41 (6):
R41 (6) (a): All relevant facts in respect of the application were made available to potential I&AP's.

R41 (6) (b): I&AP's were given more than a 60-day[3] registration and comment period during the first round of public participation.

R42 (a), (b), (c) and R43(2): A register of interested and affected parties was opened, maintained and is available to any person requesting access to the register in writing (please refer to **Appendix 3F** for the list of Interested and Affected Parties).

Please find attached in **Appendix 3**:

- Proof of Notice boards, advertisements and notices that were sent out
- List of registered interested and affected parties
- Summary of issues raised by interested and affected parties

7.4.2 PUBLIC PARTICIPATION UNDERAKEN DURING THE EIA PHASE:

A number of groups and individuals were identified as Interested and Affected Parties during the initial Public Participation Process. A complete list of organisations and individual groups identified to date, as well as those I&APs that have registered are shown in **Appendix 3F.**

Full copies of the EIR will be sent to all Registered I&APs, and will be notified of the EIR by means of notification letters (via preferred method of communication), informing them of the availability of the Draft EIR and will be invited to comment. The EIR will be made available for a 30-day comment period[3].

At the end of the comment period, the EIR will be revised in response to feedback received from I&APs. All comments received and responses to the comments will be incorporated into the Final EIR in the form of a Comments and Response Table. The Final EIR will then be submitted to D:E&NC for decision.

Should it be required, this process may be adapted depending on input received during the ongoing process and as a result of public input. Both DENC and registered I&APs will be informed of any changes in the process.

7.4.3 INTERESTED AND AFFECTED PARTIES

Interested and Affected Parties (I&APs) have been notified by means of advertisements in a local newspapers (Kalahari Bulletin), letters, site notices, smses (WinSMS), and/or emails sent to registered I&APs on the project database.

A list of I&APs is included as **Appendix 3F**.

8. ENVIRONMENTAL ISSUES AND POTENTIAL IMPACTS

Environmental issues were raised through informal discussions with the project team, specialists, and authorities, as well as by Interested and Affected Parties during the public participation period of the Scoping Report. All issues raised were addressed and assessed in the specialist reports and services report and forms part of this EIR. Any additional issues raised during the public participation will be listed and addressed in the Final EIR.

The following potential issues have been identified:

8.1. BIODIVERSITY

8.1.1 BOTANICAL

A Botanical Impact Assessment (Appendix 6A) was conducted to determine if there is any sensitive or endangered vegetation on the proposed site. Due to the size of the development (approximately 100ha), there will be a significant loss of vegetation during the construction phase of the project.

The Botanical Impact Assessment describes and assesses the botanical sensitivity of the area. The terms of reference for this study required a baseline analysis of the flora of the property, including the broad ecological characteristics of the site.

The botanical assessment includes the following:

- The significance of the potential impact of the proposed project, alternatives, and related activities – with and without mitigation – on biodiversity pattern and process at the site, landscape, and regional scales.
- Recommended actions that should be taken to prevent or, if prevention is not feasible, to mitigate impacts.

8.1.2 FAUNA

No fauna other than livestock was observed during the site visit. The location of the proposed site for development, human-induced impacts (e.g. livestock grazing, clearance of land for subsistence farming, etc) contributes to a disturbance factor which has likely driven most wild animals away from the area. Because of the long-term impact of human settlement on the larger areas and especially because of the close proximity of the proposed development areas to the existing Gamakor Housing Development, a comprehensive faunal survey was not deemed necessary. As per the Freshwater Assessment, no endangered animal was observed in or near the drainage line.

As per the comment received (dated 01 April 2020) from the Department of Agriculture, Forestry, and Fisheries (DEFF), if authorisation is granted for the development, no protected tree may be damaged or disturbed without a valid Forest Act License from the Department of Environment, Forestry and Fisheries. In addition, trees with active bird nest or other significant biodiversity features, may not be damaged or disturbed without a valid Fauna Permit from the provincial Department of Environment and Nature Conservation under the Northern Cape Nature Conservation Act (NCNCA), Act 9 of 2009 (if affected).

6.1 HERITAGE

The possible impact on heritage resources has been identified as a possible environmental impact as a result of the construction of the residential development and associated infrastructure.

A Heritage Impact Assessment (Appendix 6B) has been conducted on the site.

The terms of reference for the heritage and archaeological study were as follows:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

Also, the HIA/AIA should comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency.

6.2 FRESHWATER ASSESSMENT

Freshwater ecosystems were identified on desktop analysis, and due to the size and nature of the development and the unknown source of standing water within the development site, a freshwater impact assessment was conducted (Appendix 6C). Any potential impacts to the Orange River will also be investigated.

The terms of reference for the Freshwater assessment are as follows:

- Literature review and assessment of existing information
- Site Assessment of the proposed activities and impact on the associated freshwater systems. This will include an assessment of the freshwater ecological condition, using river health indices such as in-stream and riparian habitat integrity, aquatic macro-invertebrates and riparian vegetation to determine set back lines and geomorphological condition of the streams, which will then determine the overall Ecostatus of the streams and provide data that will inform the Water Use Licence Application of the project.
- Describe ecological characteristics of freshwater systems and compile report based on the data and information collected in the previous two tasks, describe ecological characteristics of the freshwater systems, comment on the conservation value and importance of the freshwater systems and delineate the outer boundary of the riparian zones/riverine corridors.
- Evaluate the freshwater issues on the site and propose mitigation measures and measures for the rehabilitation of the site as well as setback lines for future development.
- Compilation of the documentation for submission of the water use authorisation application (WULA) to the Department of Water and Sanitation (if deemed necessary).

6.3 GEO-TECHNICAL ASSESSMENT

A Geo-technical assessment was required to provide information related to the soil types, soil potential, soil stability, subsoil structure, suitability of the area to support the proposed structures and recommendation for foundations.

The Geo-technical assessment is included as **Appendix 6D**.

6.4 VISUAL IMPACT

The potential impact on the sense of place of the proposed residential development has also been considered. However, due to the nature of the activity, the surrounding land-uses and the proximity to other existing residential area (namely the existing Gamakor Settlement), and that the sense of place is not expected to be significantly altered by the proposed residential development, no further studies were conducted.

6.5 OTHER ISSUES AND IMPACTS

The proposed Gamakor Housing Development has the following additional impacts:

6.5.1 ENERGY REQUIREMENTS

Construction energy requirements:
The proposed development involves the construction of approximately 1500 erven. Subsequently, the initial energy requirements of the project will basically be limited to the use of small power tools, plant such as mixers etc. typically to be powered by portable on-site generators.

Operational phase energy requirements:
According to the Draft Engineering Services Report (**Appendix 4B**),

The availability of the bulk electrical connection to Keimoes is currently capped at 5MVA, the information received from the Municipality's Electrical department is that the town maximum demand is currently running at average between 4.8-4.9MVA. The Municipality indicated that they are currently engaging with Eskom to upgrade the bulk supply available to 10MVA. "Keimoes Nommer2" Load Centre, located in Industrial Weg, is the existing electrical network for the Keimoes Suburbs and Industrial which in turn is connected to the Eskom Oasis Substation. The Load Centre "Keimoes Nommer1" operates at 2.9MVA and Load Centre "Keimoes Nommer2" at 2MVA according to information received from Kai !Garib Municipality.

It was concluded that the expected 1.8MVA load can be accommodated for by the current load centres without requiring the upgrade of feeders from the Eskom Oasis Substation. However, the Eskom bulk availability connection capacity to the town must be upgraded to 10MVA by the Municipality.

6.1.1 WATER REQUIREMENTS

Construction water requirements:

Water requirements during the construction phase are unknown at this stage, but it is estimated that a maximum amount in the order of 100 - 150 kiloliter per day will be required for construction purposes, depending on phasing of construction.

Operational phase water requirements:

According to Draft Engineering Services Investigation Report (**Appendix 4B**), the Future Annual Average Daily Demand for the Gamakor Development would be 1035kL/day (see section 6.1).

6.1.1 NATURE AND QUANTITY OF RAW MATERIALS

This project comprises the construction of approximately 1500 residential and other structures. Subsequently several thousands of cubic meters of crushed stone, sand and cement will be utilized together with reinforcing steel, wood and other material used in the construction of residential units, schools, businesses etc, as input materials during construction. Exact quantities can only be determined once detailed designs of the structures have been completed. This development is not expected to utilize any raw materials during the operational phase, besides water usage.

6.1.1 WASTE TYPES, QUANTITIES AND DISPOSAL METHODS

Construction Phase

As this is a “greenfields” project, there are no existing structures to be demolished. It is therefore envisaged that very little building rubble and waste will be generated during construction. Typically, losses of raw materials due to transport, stockpiling on site and conveyance losses amount to approximately 5% of the volumes required. It is not known how much solid waste will be generated during the construction period. This waste will however typically be builder’s rubble, concrete debris, timber from used shutters, etc. The waste will be stockpiled on site and periodically disposed of at the nearest licensed landfill site by the contractor. A designated spoil site will be investigated for stockpiling of material.

The large amounts of litter presently on site will also need to be consolidated, removed from site, and disposed of at the nearest approved municipal waste disposal site.

Operational Phase

Since the development is generally a residential development, general residential household waste will be generated. Refuse removal should be via the Municipal waste stream and disposed of at the nearest municipal bulk solid waste disposal site.

6.1.2 EMPLOYMENT OPPORTUNITIES

Please refer to Section 5.7 and Table 1 for the anticipated employment opportunities expected from the proposed development.

9. SPECIALIST STUDIES

Based on the issues raised by the I&APs and the project team, specialist studies were undertaken to provide information to address the concerns and assess the impacts of the proposed development alternatives on the environment. The specialists were provided with set criteria for undertaking their assessments, to allow for comparative assessment of all issues. These criteria are detailed in the Terms of Reference to each specialist and summarised below.

7.1 CRITERIA FOR SPECIALIST ASSESSMENT OF IMPACTS

These criteria are based on the EIA Regulations, published by the Department of Environmental Affairs and Tourism (April 1998) in terms of the Environmental Conservation Act No. 73 of 1989.

These criteria include:

- **Nature of the impact**
  This is an appraisal of the type of effect the construction, operation and maintenance of a development would have on the affected environment. This description should include what is to be affected and how.
- **Extent of the impact**
  Describe whether the impact will be: local extending only as far as the development site area; or limited to the site and its immediate surroundings; or will have an impact on the region, or will have an impact on a national scale or across international borders.
- **Duration of the impact**
  The specialist should indicate whether the lifespan of the impact would be short term (0-5 years), medium term (5-15 years), long terms (16-30 years) or permanent.
- **Intensity**
  The specialist should establish whether the impact is destructive or benign and should be qualified as low, medium or high. The specialist study must attempt to quantify the magnitude of the impacts and outline the rationale used.
- **Probability of occurrence**
  The specialist should describe the probability of the impact actually occurring and should be described as improbable (low likelihood), probable (distinct possibility), highly probable (most likely) or definite (impact will occur regardless of any prevention measures).

The impacts should also be assessed in terms of the following aspects:

- **Status of the impact**
  The specialist should determine whether the impacts are negative, positive or neutral (“cost – benefit” analysis). The impacts are to be assessed in terms of their effect on the project and the environment. For example, an impact that is positive for the proposed development may be negative for the environment. It is important that this distinction is made in the analysis.
- **Accumulative impact**
  Consideration must be given to the extent of any accumulative impact that may occur due to the proposed development. Such impacts must be evaluated with an assessment of similar

developments already in the environment. Such impacts will be either positive or negative, and will be graded as being of negligible, low, medium or high impact.

- **Degree of confidence in predictions**
  The specialist should state what degree of confidence (low, medium or high) is there in the predictions based on the available information and level of knowledge and expertise.

Based on a synthesis of the information contained in the above-described procedure, the specialist was required to assess the potential impacts in terms of the following significance criteria:

- **No significance**: the impacts do not influence the proposed development and/or environment in any way.
- **Low significance**: the impacts will have a minor influence on the proposed development and/or environment. These impacts require some attention to modification of the project design where possible, or alternative mitigation.
- **Moderate significance**: the impacts will have a moderate influence on the proposed development and/or environment. The impact can be ameliorated by a modification in the project design or implementation of effective mitigation measures.
- **High significance**: the impacts will have a major influence on the proposed development and/or environment.

The final impact assessment report should at least include the following sections:

- Executive Summary
- Introduction and Description of Study
- Methodology
- Results
- Assessment of Impacts (including mitigation measures to reduce negative impacts and measures to enhance positive impacts and the completion of impact tables)
- Discussion
- Recommendations (Pre-Construction, Construction and Operational Phases)
- Conclusion

9.2 BRIEFS FOR SPECIALIST STUDIES TO BE UNDERTAKEN AS PART OF THE EIA

9.2.1 BOTANICAL ASSESSMENT

Peet Botes (PB Consult) was appointed and undertook the Botanical Assessment on the proposed site – **Appendix 6A**.

The terms of reference for this study include the following:

- Evaluate the proposed site(s) in order to determine whether any significant botanical features will be impacted as a result of the proposed development.
- Determine and record the position of any plant species of special significance (e.g. protected tree species, or rare or endangered plant species) that should be avoided or that may require “search & rescue” intervention.
- Locate and record sensitive areas from a botanical perspective within the proposed development footprint that may be interpreted as obstacles to the proposed development.
- Make recommendations on impact minimization should it be required

- Consider short- to long-term implications of impacts on biodiversity and highlight irreversible impacts or irreplaceable loss of species.

9.2.2 HERITAGE IMPACT ASSESSMENT

Jan Engelbrecht of the Ubique Heritage Consultants was appointed to compile the Heritage Impact Assessment (HIA) – **Appendix 6B**.

The terms of reference for the heritage impact study were:

- the identification and mapping of all heritage resources in the area affected;
- an assessment of the significance of such resources in terms of heritage assessment criteria set out in regulations;
- an assessment of the impact of the development on heritage resources;
- an evaluation of the impact of the development on heritage resources relative to the sustainable social and economic benefits to be derived from the development;
- if heritage resources will be adversely affected by the proposed development, the consideration of alternatives; and
- plans for mitigation of any adverse effects during and after completion of the proposed development.

Also, the HIA must comply with the requirements of NEMA, including providing the assumptions and limitations associated with the study; the details, qualifications and expertise of the person who prepared the report; and a statement of competency, as well the National Heritage Resources Act 25 of 1999 (NHRA).

9.2.3 FRESHWATER ASSESSMENT

Dr Dirk van Driel (Watsan Africa) was appointed and conducted the Freshwater Assessment for the proposed development – **Appendix 6C**.

The terms of reference for the Freshwater assessment are as follows:

- Literature review and assessment of existing information
- Site Assessment of the proposed activities and impact on the associated freshwater systems. This will include an assessment of the freshwater ecological condition, using river health indices such as in-stream and riparian habitat integrity, aquatic macro-invertebrates and riparian vegetation to determine set back lines and geomorphological condition of the streams, which will then determine the overall Ecostatus of the streams and provide data that will inform the Water Use Licence Application of the project.
- Describe ecological characteristics of freshwater systems and compile report based on the data and information collected in the previous two tasks, describe ecological characteristics of the freshwater systems, comment on the conservation value and importance of the freshwater systems and delineate the outer boundary of the riparian zones/riverine corridors.
- Evaluate the freshwater issues on the site and propose mitigation measures and measures for the rehabilitation of the site as well as setback lines for future development.
- Compilation of the documentation for submission of the water use authorisation application (WULA) to the Department of Water and Sanitation (if deemed necessary).

9.2.4 GEO-TECHNICAL ASSESSMENT

Cedar Land Geotechnical Consult (Pty) Ltd were appointed to conduct a Phase One Geo-technical Assessment of the proposed site - **Appendix 6D**.

The primary objective of this study was to provide information related to the soil types, soil potential, soil stability, subsoil structure, suitability of the area to support the proposed structures and recommendation for foundations. This information will primarily be used by the engineer during the construction phase.

10. ASSESSMENT OF ENVIRONMENTAL IMPACTS

The specialist studies detailed in Section 8 were undertaken to determine significance of the impacts that may arise from the proposed development. The findings of the specialist studies are summarised here. Full copies of the studies are included in **Appendices 6A – 6E**.

The following specialist studies were undertaken:

10.1 BOTANICAL ASSESSMENT

Peet Botes (PB Consult) was appointed and undertook the Botanical Assessment on the proposed site – The Botanical Impact Assessment is included as **Appendix 6A**.

10.1.1 KEY FINDINGS

According to the Botanical Impact Assessment (**Appendix 6A**), the proposed site for development is located within the Bushmanland Arid Grassland, a vegetation type classified as Least Threatened. Vegetation structure on site was comprised of two types, namely;

(iii) Shallow quartz rich rocky soils comprised of a sparse, low shrubland dominated by white grass species (such as *Salsola tuberculate* and *Justicia australis*) with *Aloe claviflora* frequently occurring on site.

(iv) Deeper sandy soils (associated with identified watercourses (Figure III) comprised of denser and larger shrub and tree layer dominated by *Parkinsonia africana* and *Senegalia mellifera*.

Moreover, most of the remaining natural veld is associated with shallow quartz rich rocky soils. Please note that because of the unpredictability and infrequency of the rainfall the vegetation associated with true quartz fields (e.g. Knersvlakte) will never be able to develop in this area. The vegetation can be described as a low (<50 cm in height) sparse to very sparse shrubland, low in species composition (not a great variety of species encountered). The shrubland was dominated *Salsola tuberculata* and *Justicia australis* (=*Monechma genistifolium*), with *Aloe claviflora* (Kraalaalwyn), *Mesembryanthemum subnodosum* (often a disturbance indicator) also relatively common. Other species in the upper layer included: *Barleria lichtensteiniana, Cynanchum viminale, Kleinia longiflora, Parkinsonia africana, Rhigozum trichotomum, Senegalia mellifera* and the aerial hemiparasite *Tapinanthus oleifolius*. In the lower layer (<20 cm) species like *Acanthopsis disperma* (Halfmensie), *Aptosimum spinescens* (Doringviooltjie), *Blepharis mitrata* and *Tetraena* simplex were observed. Disturbance indicators like *Galenia africana* (Kraalbos) and *Salsola kali* (tumble weed) were also observed in the disturbed or transformed areas.

Within the slightly lower lying depressions associated with seasonal drainage lines, deeper sandy soils were encountered, which also supported a denser and larger shrub / small tree layer dominated by *Parkinsonia africana* and *Senegalia mellifera*. Unfortunately, the alien invasive *Prosopis* tree was also common in some of these areas. The following species were observed: *Asparagus* cf. *cooperi*, *B. foetida* (occasionally), *Euphorbia braunsii, Justicia australis, Kleinia longifolia, Lycium bosciifolium, Rhigozum trichotomum* and *Vachellia erioloba* (three individuals within the proposed footprint).

Various impacts, namely lack of adequate rainfall events and grazing by domestic livestock, have resulted in the absence of the grassy layer, characteristic of the Bushmanland Arid Grassland, with the sparse low shrubland remaining.

The following key findings were identified:

- The proposed activity will result in a permanent footprint enlargement of the existing housing scheme by approximately 100 ha. However, the proposed footprint joins up with the existing urban edge and should not have any significant additional impact on connectivity.
- The proposed site for development is located within the Bushmanland Arid Grassland, a Least Threatened vegetation type.
- As per the 2016 Northern Cape Critical Biodiversity Map (CBA), the proposed development footprint is located within a terrestrial CBA (Figure 12). The Northern Cape CBA Map (2016) identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs), which, together with protected areas, are important for the persistence of a viable representative sample of all ecosystem types and species as well as the long-term ecological functioning of the landscape as a whole (Holness & Oosthuysen, 2016). The NCCBA maps were used to guide the identification of potential significant sites. Unfortunately, there are no logical alternative sites available to the Keimoes Municipality, which will not impact on the CBA.
- Protected plant species, namely three (3) *Vachellia erioloba* (Camel Thorn) trees (NFA protected) and five (5) NCNCA protected plant were noted on site. The Botanical Specialist recommended the protection of the Camel Thorn trees and search and rescue of *Aloe* and *Boscia* individuals within the development footprint (Table 5).

Table 10. List of indigenous (including protected plant species) and alien plant species present within the proposed development footprint.

No.	Species name	FAMILY	Status	Alien & invader species (AIS)
1.	*Acanthopsis disperma*	ACANTHACEAE	LC	
2.	*Aloe claviflora*	ASPHODELACEAE	LC NCNCA, Schedule 2 Protected (all species in this Family)	Apply for a NCNCA Flora permit (DENC)
3.	*Aptosimum spinescens*	SCROPHULARIACEAE	LC	
4.	*Asparagus cf. cooperi*	ASPARAGACEAE	LC	
5.	*Barleria lichtensteiniana*	ACANTHACEAE	LC	
6.	*Blepharis mitrata*	ACANTHACEAE	LC	
7.	*Boscia foetida*	BRASSICACEAE (CAPPARACEAE)	LC NCNCA, Schedule 2 Protected (all species in this Genus)	Apply for a NCNCA Flora permit (DENC)
8.	*Cynanchum viminale (=Sarcostemma viminale)*	APOCYNACEAE	NCNCA, Schedule 2 Protected (all species in this Family)	Apply for a NCNCA Flora permit (DENC)
9.	*Datura innoxia*	BRASSICACEAE	Alien weed	CARA Cat 1; NEMBA Cat 1b
10.	*Euphorbia braunsii*	EUPHORBIACEAE		
11.	*Galenia africana*	AIZOACEAE	LC Protected in terms of schedule 2 of the NCNCA	Apply for a NCNCA Flora permit (DENC)
12.	*Justicia australis (=Monechma genistifolium)*	ACANTHACEAE	LC	
13.	*Kleinia longiflora*	ASTERACEAE	LC	
14.	*Lycium bosciifolium*	SOLANACEAE	LC	
15.	*Mesembryanthemum subnodosum (=Psilocaulon subnodosum)*	AIZOACEAE	LC Protected in terms of schedule 2 of the NCNCA	Apply for a NCNCA Flora permit (DENC)
16.	*Parkinsonia africana*	FABACEAE	LC	
17.	*Prosopis species*	FABACEAE	Alien invasive plant species	CARA Cat 2; NEMBA Cat 3
18.	*Rhigozum trichotomum*	BIGONACEAE	LC	
19.	*Salsola kali*	AMARANTHACEAE	Naturalised invader	NEMBA Cat 1b
20.	*Salsola tuberculata*	AMARANTHACEAE		
21.	*Senegalia mellifera (=Acacia mellifera)*	FABACEAE	LC	
22.	*Tapinanthus oleifolius*	LORANTHACEAE	LC	
23.	*Tetraena simplex (=Zygophyllum simplex)*	ZYGOPHYLLACEAE	LC	
24.	*Vachellia erioloba*	FABACEAE	LC NFA protected species	Apply for a NFA Tree permit (DAFF)

- According to Van Wyk and Smith (2001), the proposed development will not impact on any recognised centre of endemism. The nearest centre of endemism is the Griqualand West Centre

which starts west of Delportshoop (approximately 50 km west of the proposed site). The proposed site does not fall within any recognised centre of endemism.

- The most significant feature identified by the Botanical Specialist were the seasonal drainage lines present within the development footprint, draining towards the Friesdale Spruit.
- The Botanical Specialist considered the terrestrial habitat to be moderately sensitive. This habitat was considered moderate sensitive due to the Least Threatened vegetation type, the site falling within a CBA, area has been disturbed due to grazing by livestock and human-related impacts, low floral diversity, no species habitats or features were observed, no red-listed species were encountered however, one protected tree species as per the NFA, and five provincially protected plant species (as per NCNCA) were present within the proposed site for development.

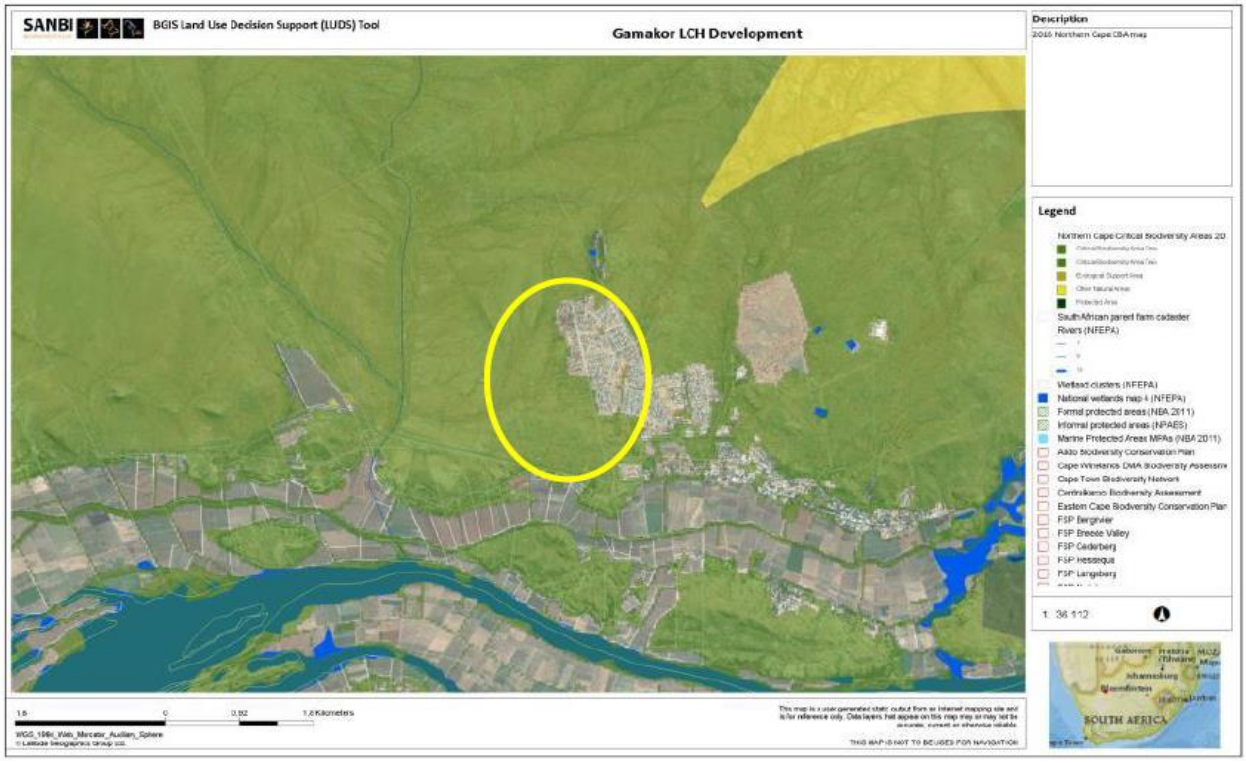

Figure 12. Critical Biodiversity Area (CBA) associated with the Gamakor study area (circled in yellow).

10.1.2 IMPACT ASSESSMENT

Direct impacts

According to the Botanical Impact Assessment (**Appendix 6A**), the main impacts associated with the proposed development will be:

- The permanent transformation of approximately 100ha of natural veld for human settlement (where the proposed site for development varies in level of disturbance where some areas have been disturbed and transformed by grazing by livestock and informal settlement);
- The potential impact on the associated CBA;
- The potential loss of protected (as per the NFA and NCNCA) plant species (see Table 5).

As the proposed site for development is in a degraded status, the cumulative impact is expected to be **Medium**, but this can be reduced to **Low** by mitigation.

10.1.3 MITIGATION MEASURES

The following mitigation measures are recommended by the Botanical Impact Assessment:

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must include the recommendations made in this report.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EA and the construction phase EMP and any other conditions pertaining to specialist studies.
- **Before any work is done** the development footprint and access routes must be clearly demarcated and approved by the ECO. The demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance.
- Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO.
- No *Vachellia erioloba* (Camel Thorn) trees may be removed or damaged (the three trees within the footprint must be protected).
- An effort should be made to transplant some of the *Aloe claviflora* plants as well as all viable (transplantable) *Boscia foetida* shrubs/trees.
- Indiscriminate clearing of any area outside of the construction footprint must be avoided.
- An integrated waste management approach must be implemented during construction.
    - Construction related general and hazardous waste may only be disposed of at Municipal approved waste disposal sites.
    - All rubble and rubbish should be collected and removed from the site to a suitable registered waste disposal site.
- Special attention must be given to alien and invasive control within the construction footprint. All alien invasive species within the footprint and at least 5 m to the side of the footprint must be removed responsibly.
    - Care must be taken with the eradication method to ensure that the removal does not impact or lead to additional impacts (e.g. spreading of the AIP due to incorrect eradication methods);
    - Care must be taken to dispose of alien plant material responsibly

As per the comment received (dated 01 April 2020) from the Department of Agriculture, Forestry, and Fisheries (DEFF), if authorisation is granted for the development, no protected tree may be damaged or disturbed without a valid Forest Act License from the Department of Environment, Forestry and Fisheries. In addition, trees with active bird nest or other significant biodiversity features, may not be damaged or disturbed without a valid Fauna Permit from the provincial Department of Environment and Nature Conservation under the Northern Cape Nature Conservation Act (NCNCA), Act 9 of 2009 (if affected).

10.1.4 CONCLUSION

The proposed development will result in the permanent transformation of approximately 100ha of natural veld for human settlement. According to the Botanical Specialist, the development is likely to result in a medium impact on the environment. As the site varies in the degree of disturbance/ transformation (refer to Figure II), the cumulative impact is expected to be Medium however, the specialist stated that this status can be reduced to Low by mitigation. The botanical specialist concluded that, "*with the available information, it is recommended that the project be approved, with the proposed mitigation actions*".

10.2 HERITAGE IMPACT ASSESSMENT

Jan Engelbrecht of the Ubique Heritage Consultants was appointed and conducted the Heritage Impact Assessment (HIA) of the proposed site. The HIA is included as **Appendix 6B**.

10.2.1 KEY FINDINGS

As per the Heritage Impact Assessment (**Appendix 6B**), the following key findings were identified;

1. One incidence of lithics was recorded within the development footprint. This included four pieces of MSA/Early LSA debitage/flakes scattered ex situ in a heavily disturbed area. made from the highly utilised banded ironstone formation (BIF). Lithic traces were present within the development footprint however, the significance of these traces were classified as low and the impact of the development on these resources insignificant. No other heritage of value was identified during the assessment. These traces included two (2) occurrences of lithics where the first occurrence was in the south of the development footprint on Farm Kousas No. 459 Portion 0 and consisted of four pieces of MSA/Early LSA debitage/flakes scattered *ex situ* in a heavily disturbed area. The second recorded occurrence was an isolated chunk situated outside the development footprint. All the recorded lithics were made from the highly utilised banded ironstone formation, popular throughout the area (Morris 2012). The cultural material shows various degrees of weathering and may either be representative of the Early Later Stone Age, or a mere mixture of LSA and MSA artefacts (Lombard 2011).
2. No formal or informal graves were identified. No formal or informal graves were identified in the study area. The local municipal cemetery lies well outside the development impact zone, to the north-east (**Figure 11 of Appendix 6B**).
3. Area has zero palaeontological significance.

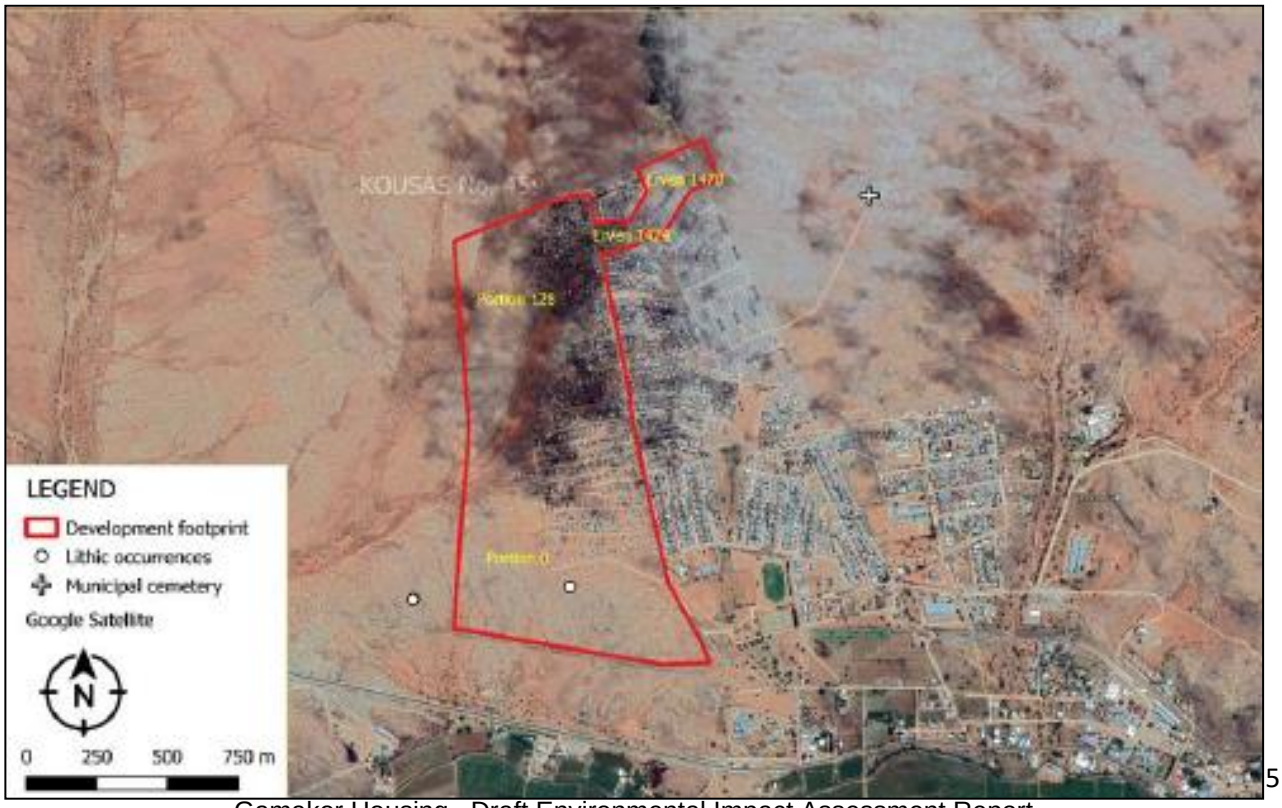

Figure 13. Location of lithic traces associated with the proposed site for the development of the Gamakor Housing. Source: Ubique (2019) – **Appendix 6B**.

The proposed Gamakor and Noodkamp low-cost housing development is underlain by Precambrian metamorphic and igneous basement rocks of the Namaqua-Natal Metamorphic Province (not fossiliferous) and superficial Late Cenozoic deposits and (largely not fossiliferous), both of which has a low to very low palaeontological sensitivity. And thus, the impact of the development on the Fossil heritage is considered to be low (Butler 2019; Almond & Pether 2008). Elize Butler from Banzai Environmental proposes exemption from doing a full paleontological study for this project (see *Appendix 1* of **Appendix 6B**).

10.2.2 IMPACT ASSESSMENT

According to the Heritage Impact Assessment (**Appendix 6B**):

- One incidence of lithics was recorded within the development footprint. This included four pieces of MSA/Early LSA debitage/flakes scattered ex situ in a heavily disturbed area which were made from the highly utilised banded ironstone formation (BIF). These lithics had a Field Rating IV C (Low significance);
- An isolated chunk was recorded outside the development footprint. This isolated chunk had a Field Rating IV C (Low significance)
- As per the Specialist, the proposed site for development has a zero palaeontological significance, therefore:
    - The Specialists concluded that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required.
    - It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area as the igneous rocks underlying the site are not fossiliferous.
    - It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler, 2019).
- It must be noted that although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find.

This HIA has identified no significant heritage resources on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Kai !Garib Municipality, Mgcawu District Municipality, Northern Cape as set out in the report. In the development footprint are no archaeological, historical or cultural sites, or paleontological resources will be impacted on negatively by the proposed development.

10.2.3 MITIGATION MEASURES

According to the Heritage Impact Assessment (**Appendix 6B**), based on the assessment of the potential impact of the development on the identified heritage, the following recommendations are made, taking into consideration any existing or potential sustainable social and economic benefits:

- **The lithic traces of low significance**: No further mitigation is required, and from a heritage point of view we recommend that the proposed development can continue.

- **Site has a zero palaeontological significance**: no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required. It is considered that the development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).
- It must be noted that although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted as per section 35(3) of the NHRA. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contacted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.

10.2.4 CONCLUSION

As per the Heritage Impact Assessment (**Appendix 6B**), no significant heritage resources were identified on Portions 0 and 128 of Farm Kousas No. 459, and Erven 1470, 1474 and 1480, Keimoes, Kai !Garib Municipality, Mgcawu District Municipality, Northern Cape as set out in the report. In the development footprint, no archaeological, historical or cultural sites, or paleontological resources will be negatively impacted on by the proposed development.

10.3 FRESHWATER ASSESSMENT

Dr Dirk van Driel (Watsan Africa) was appointed and conducted the Freshwater Assessment for the proposed development. The Freshwater Impact Assessment is included as **Appendix 6C**.

10.3.1 KEY FINDINGS

According to the Freshwater Impact Assessment (**Appendix 6C**), the proposed housing scheme at Keimoes stretches over mostly dry drainage lines, which are tributaries of the Orange River. As per the Freshwater Impact Assessment, the most significant feature of the study area, influencing topography is the seasonal drainage line that runs from northeast to southwest through the northern part of the property. This watercourse drains towards the Friesdale Spruit and is a tributary of the Orange River (Figure 18).

The sub-catchment, associated with the proposed site for development has an approximate length of 26km, width of 16.8km and covers an area of approximately 31 000ha. The dry drainage lines have been created and maintained by large floods where severe rainfall may result in significant runoff, which has the potential to damage infrastructure.

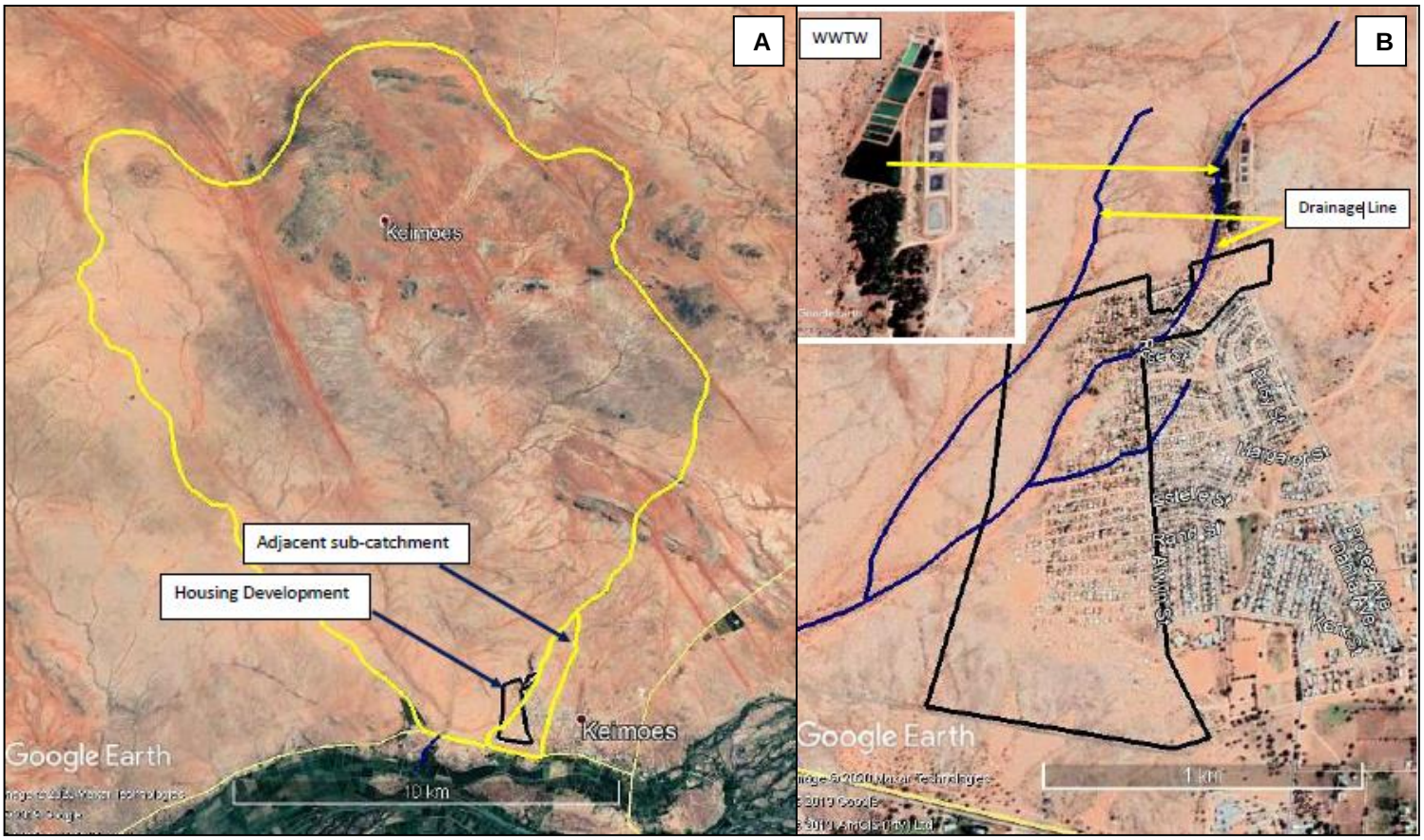

Figure 14. Sub-catchment (A) and drainage lines (B) associated with the proposed site for the Gamakor Housing Development. Source: WATSAN, (2020).

10.3.2 IMPACT ASSESSMENT

According to the Freshwater Assessment (**Appendix 6C**),

Due to the dry state of the drainage lines, biomonitoring could not be conducted on these watercourses. Therefore, biomonitoring (as per methodology described by Dickens and Graham (2002)) was carried out on the Lower Orange River. The sample site was selected based on its proximity to the proposed site for development. The river at the sampling points was fast flowing, $1ms^{-1}$ and more in the middle, slower on the sides. Vegetation structure, associated with the river, was dominated by *Arundo donax* (Spanish Reed) and *Salix* spp (Willow tree) – possibly *S. babylonica* (Figure 19 of **Appendix 6C**).

The oxygen (O_2) concentration (Table 2 of **Appendix 6C**) was relatively low on the day of sampling however the O_2 level was still high enough to support a range of aquatic organisms. The electrical conductivity (EC) indicated that the water had a low salinity. The pH was slightly alkaline but did not negatively impact the SASS5 score. The SASS5 score was 51 (Table 3 of **Appendix 6C**). The sample rendered an "A" classification (Figure 16 of **Appendix 6C**), which was higher compared with other samples taken along the Orange River.

The Present Ecological State (PES) was categorized as Class C and Class B for instream and riparian habitat, respectively (Table 7).

Table 11. Present Ecological State (PES) of instream drainage line (A) and adjacent drainage line. Source: WATSAN, (2020).

Instream	Score	Weight	Product	Maximum score
Water abstraction	24	14	336	350
Flow modification	18	13	234	325
Bed modification	18	13	234	325
Channel modification	17	13	221	325
Water quality	22	14	308	350
Inundation	19	10	190	250
Exotic macrophytes	22	9	198	225
Exotic fauna	15	8	120	200
Solid waste disposal	16	6	96	150
Total		100	1937	2500
% of total			77.5	
Class			C	
Riparian				
Water abstraction	24	13	312	325
Inundation	19	11	209	275
Flow modification	18	12	216	300
Water quality	22	13	286	325
Indigenous vegetation removal	22	13	286	325
Exotic vegetation encroachment	22	12	264	300
Bank erosion	23	14	322	350
Channel modification	17	12	204	300
Total			2099	2500
% of total			84.0	
Class			B	

Instream	Score	Weight	Product	Maximum score
Water abstraction	24	14	336	350
Flow modification	8	13	104	325
Bed modification	9	13	117	325
Channel modification	8	13	104	325
Water quality	10	14	140	350
Inundation	5	10	50	250
Exotic macrophytes	18	9	162	225
Exotic fauna	4	8	32	200
Solid waste disposal	4	6	24	150
Total		100	1069	2500
% of total			42.8	
Class			C	
Riparian				
Water abstraction	24	13	312	325
Inundation	5	11	55	275
Flow modification	8	12	96	300
Water quality	12	13	156	325
Indigenous vegetation removal	4	13	52	325
Exotic vegetation encroachment	18	12	216	300
Bank erosion	23	14	322	350
Channel modification	8	12	96	300
Total			1305	2500
% of total			52.2	
Class			C	

The specialist concluded that it is not expected that the proposed housing development will significantly lower the score at the sampling point. However, this can be significantly impacted by anthropogenic activities such as a large sewage spill during a high rainfall event.

As per the Freshwater Assessment, the proposed housing development is unlikely to alter the classification of the larger sub-catchment where the extent of the proposed development is unlikely to have a significant impact. However, anthropogenic activities such as the failure of the WWTW, resulting in major sewage spills thereby negatively impacting the receiving environment. It can be expected that the ranked classification of the smaller adjacent sub-catchment will be adjusted to a lower class, should the proposed development be constructed.

The proposed development will impact the aquatic environment. As per the Freshwater Assessment, the environmental authorities will have to decide if the little and degraded aquatic habitat that was and probably still is available on the site is worth saving, instead of giving the go-ahead for the proposed development. It is suggested that the already degraded aquatic habitat is not of adequate conservational value. The best that can be done is to ensure that the near-pristine drainage lines adjacent to the new housing scheme are not impacted.

As per the Freshwater Assessment, negative impacts, such as sewage spills, associated with the WWTW have been reported. The specialist has recommended the construction of an additional pond in order to contain spills instead of allowing raw sewage to enter the drainage line, passing through the housing areas. That is if the entire works in not in need of upgrading.

10.3.3 MITIGATION MEASURES

The following mitigation measures, as per the Freshwater Impact Assessment (**Appendix 6C**) must be implemented:

- The footprint of the proposed housing scheme should be kept as small as possible
- Construction vehicles and building material should be kept inside of the demarcated development area and not be allowed onto adjacent land.
- Loose sediments, rubble and building material should not be allowed to wash down the catchment during rainfall events.
- Litter collection systems should be installed in the drainage lines downstream of the new housing scheme. Litter that accumulates here should be regularly collected and disposed of properly on the municipal waste disposal site.
- Protection measures should be put in place to conserve those drainage lines of the larger sub-catchment that are relatively untouched and still in a reasonably good state.
- Trampling by cattle and goats, as well as humans, is always a concern in similar developments.
- Leaky sewerage and potable water provision systems can change the arid state of the drainage lines and surrounds. Leaks should be prepared as not to change the status of the aquatic environment.

10.3.4 CONCLUSION

According to the Freshwater Impact Assessment (**Appendix 6C**), anthropogenic activities have the ability to impact ecosystem drivers or responses resulting in a *knock-on effect* on the other, interconnected drivers and responses. This, in turn, impacts ecosystem services. The WULA and the EIA must provide mitigation measured for these impacts.

The driver of the mostly dry drainage lines is the occasional flood that follows sudden and intense rainfall events. This is followed by periods of prolonged droughts and intense summer heat that prevents the development of any viable aquatic habitat. The absence of adequate rainfall events, along with shallow groundwater, has resulted in the vegetation structure present along the drainage lines. It must be noted that the proposed development will entirely alter the drainage lines. However, due to the low ecosystem function of the drainage lines, aquatic habitat is unlikely to be significantly impacted by the proposed development.

As per the Freshwater Assessment, the conservation of drainage lines along the Lower Orange River requires attention from the competent authority, and other relevant stakeholders. As numerous tributaries have been negatively impacted by various types of developments, the remaining drainage lines must be identified, prioritized and adequately conserved. Only specified practices with no or limited impacts should be allowed in these sub-catchments and their drainage lines.

The Freshwater Specialist concluded that the drainage lines have only limited value as water resources and environmental assets as per the scoring matrix. However, to limit the impact on the identified drainage lines, recommended mitigation measures must be implemented.

10.4 GEO-TECHNICAL ASSESSMENT

Cedar Land Geotechnical Consult (Pty) Ltd were appointed to undertake the Geo-technical Assessment as part of the EIA process, and is included as **Appendix 6D**.

10.4.1 KEY FINDINGS

As per the Geotechnical Investigation (**Appendix 6D**), the soil profile is comprised of colluvium (maximum depth of 800mm and is generally compressible), alluvium (present in drainage gullies – extended to a maximum depth of 2700mm and is highly compressible due to its loose to very-loose consistency), pebblestone marker (only a minor occurrence but is negligibly erodible and compressible), residual charnockite (underlies the colluvium and is negligibly erodible and compressible), residual granite-gneiss (negligibly erodible and compressible), and Mokalanen Formation (namely Hardpan calcrete and Nodular calcrete).

Perched water was encountered at two sampling sites at depths of 1500mm and 1400mm – which was attributed to the presence of existing major drainage lines present within the footprint of the site (Figure III). Presence of perched water at these two particular sampling sites may be a permanent problem whereas only after inundation events in the minor drainage lines. As per the Geotechnical Investigation, permanent groundwater is expected to occur at approximately 20 to 30m in fractures restricted to a zone directly below the water table. However, the presence of permanent water does not influence the geotechnical conditions of the site.

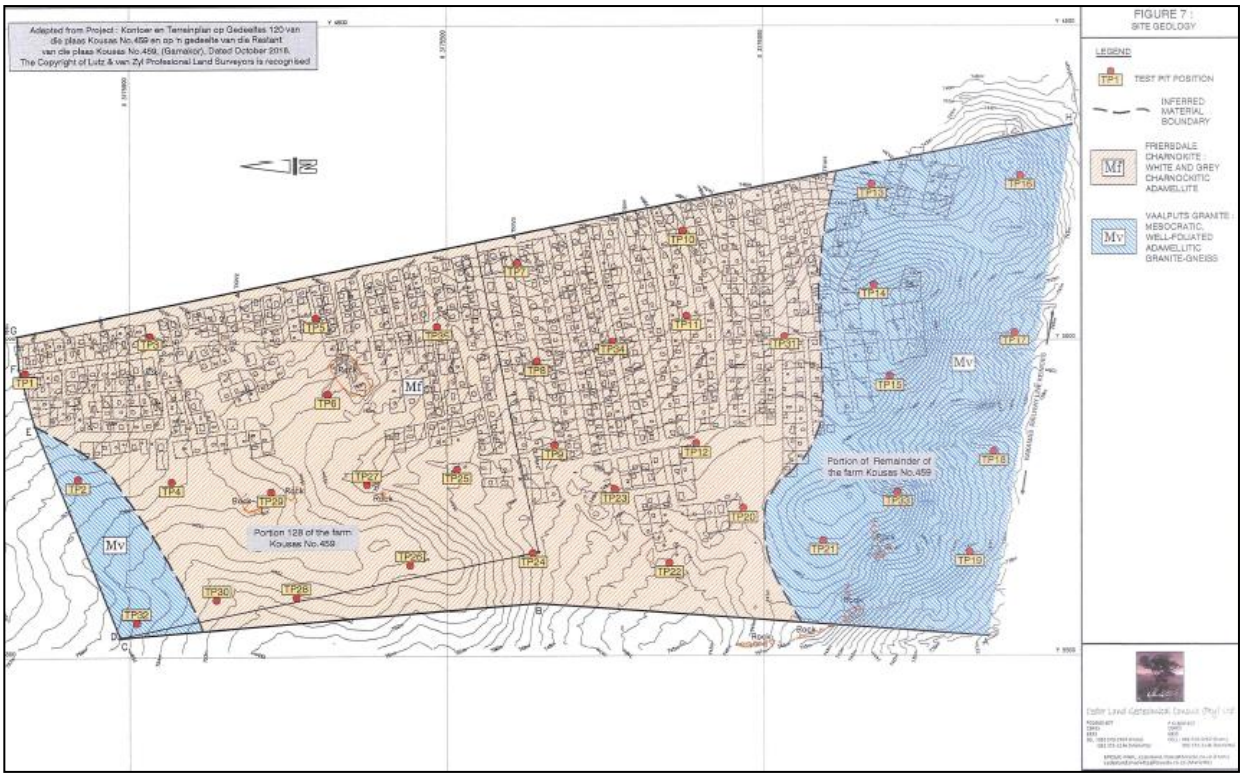

Figure 15. Geological investigation and identification of geological characteristics of proposed site for development and testing pits (TPs). Source: Geotechnical Investigation, (2020) – Attached as Appendix 6D. Adapted from Lutz & van Zyl Professional Land Surveyors.

Excavation of material for pipeline installing may be impacted should the trench need to be excavated to a depth below 1000mm (due to presence of bedrock) as approximately 5% of the excavation may be classified as hard, requiring drilling and/ or blasting. Depths below 1000mm (i.e. increase to 1500mm) will result in 37% of the excavation being classified as hard. Depth of bedrock layer differs between

Geotechnical Zones (I-VII) and must be considered during construction activities. The 5% slope in the southern section of the proposed site is considered favourable for urban development however, the combination of the slope and presence of rocky outcrops result in less favourable conditions for such developments.

10.4.2 RECOMMENDATIONS

According to the Geo-technical Assessment, the following recommendations are given per geotechnical zone (see Figure 5, **Appendix 6D**), as general guidelines to single storey structures of masonry design, in accordance with guidelines proposed by the NHBRC.

- Geotechnical Zone I: **R**
  Construction in this zone are restricted to two foundation design alternatives – namely conventional strip foundations or slab-on-the-ground foundations placed directly on the bedrock (granite-gneiss or charnockite). The slope across the land was less than 2%;

- Geotechnical Zone II: **R**
  Slope across the land is approximately 5%. Additional work will be required should slab-on-the-ground foundations be used. Therefore, the viable foundation option for construction in this zone is conventional strip foundations.

- Geotechnical Zone III: **S**
  The slope across the land was less than 2%. Proposed horizon for founding is slightly compressible and rapid settlement less than 10mm is expected. Two foundation alternatives are applicable, namely conventional strip foundations or slab-on-the-ground foundations placed directly on the medium dense to very dense residual soil or pedocretes;

- Geotechnical Zone IV: **S**
  The slope across the land is approximately 5%. Proposed horizon for founding is slightly compressible and rapid settlement less than 10mm is expected. Additional work will be required should slab-on-the-ground foundations (in order to establish a platform via the construction of an engineered fill or cutting) be used. Therefore, the viable foundation option for construction in this zone is conventional strip foundations.

- Geotechnical Zone V: **S1**
  The slope across the land was less than 2%. Proposed horizon for founding is moderately compressible and rapid settlement between 10mm – 20mm is expected. Structures can be founded on reinforced strip foundations or alternatively, loose overburden soil can be excavated and replaced with a compacted horizon supported lightly reinforced strip foundation.

- Geotechnical Zone VI: **S2**
  Proposed horizon for founding is highly compressible and rapid settlement in excess of 20mm is expected to occur. Structures can therefore be founded by reinforced strip foundations or concrete rafts.

- Geotechnical Zone VII: **S2**

The slope across the land is approximately 5%. Proposed horizon for founding is highly compressible and rapid settlement in excess of 20mm is expected to occur. The use of reinforced raft foundations will require additional works in the form of construction of an engineered fill or cutting to establish a level platform for construction. Structures can therefore be founded by reinforced strip foundations.

The Geotechnical specialist concluded that the foundations must be designed by a suitably qualified and experienced professional engineer. Refer to Appendix 6D for more information regarding recommendations.

7. SUMMARY OF IMPACTS

Please refer to Appendix 7 for a summary of the project impact assessment and significance, including a summary of mitigation measures.

Table 5 is a summary of all the impacts assessed in the specialists reports that are associated with the construction and operational phase for the preferred alternative.

Table 12. Summary of all impacts

Study	Impact	Significance No Mitigation	Significance With Mitigation
Botanical	**Geology & soils**: Potential impact on special habitats	Insignificant (Negative impact)	Insignificant (Negative impact)
	Land-use and cover: Potential impact on socio-economic activities.	Medium (Negative impact)	Low (Negative impact)
	Vegetation status: Loss of vulnerable or endangered vegetation and associated habitat.	Medium (Negative impact)	Low (Negative impact)
	Conservation priority: Potential impact on protected areas, CBA's, ESA's or Centre's of Endemism.	Medium (Negative impact)	Low (Negative impact)
	Connectivity: Potential loss of ecological migration corridors.	Low (Negative impact)	Low (Negative impact)
	Watercourses and wetlands: potential impact on natural watercourses and its ecological support areas.	Low (Negative impact)	Low (Negative impact)
	Protected & endangered plant species: Potential impact on threatened or protected plant species.	Medium (Negative impact)	Low (Negative impact)
	Invasive alien plant species: Potential invasive plant infestation as a result of the activities.	Low (Negative impact)	Low (Negative impact)
	Veld fire risk: Potential risk of veld fires as a result of the activities.	Insignificant (Negative impact)	Insignificant (Negative impact)
	Cumulative impacts: Cumulative impact associated with proposed activity.	Medium (Negative impact)	Low (Negative impact)
	The "No-Go" option: Potential	No Impact	No Impact

	impact associated with the No-Go alternative.		
Heritage	Two traces of lithic occurrences across the development footprint.	Low (No mitigation required)	
	The formal Gamakor town cemetery, situated outside of the development footprint.	Low (No mitigation required)	
Palaeontology	Due to the zero palaeontological significance of the area, no further palaeontological heritage studies, ground-truthing and/or specialist mitigation are required.	N/A	N/A
Freshwater	**Impact on Freshwater Resources** – Construction of dwellings around the drainage line. Impact on the drainage lines and associated ecosystem drivers.	Medium (Negative impact)	Low (Negative impact)
	Cumulative impact of sewage and solid waste ending up in the drainage line and Orange River.	Medium (Negative impact)	Low (Negative impact)
	Stormwater management: impact on drainage lines.	Low (Negative impact)	Low (Negative impact)
	Sewage collection and treatment: sewage contaminating the drainage line and Orange River	Medium (Negative impact)	Low (Negative impact)
	Urban solid waste: waste ending up in the river and polluting these rivers.	Low (Negative impact)	Low (Negative impact)
Socio-economic	Job Creation – Construction phase	Medium (Positive impact)	
Visual	Potential visual impact on the area	Low (Negative impact)	Low (Negative impact)
Dust	Potential impact of dust from construction activities	Low (Positive impact)	Low (Positive impact)

8. RECOMMENDATIONS

The following mitigation measures must be enforced if the proposed development were approved. These are also included in the Environmental Management Programme, EMPr (**Appendix 9**).

Construction Phase:
According to the Specialist Reports (**Appendix 6A-6D**), the following mitigation actions are recommended:

Botanical Component (Appendix 6A)

- All construction must be done in accordance with an approved construction and operational phase Environmental Management Plan (EMP), which must include the recommendations made in this report.
- A suitably qualified Environmental Control Officer must be appointed to monitor the construction phase in terms of the EA and the construction phase EMP and any other conditions pertaining to specialist studies.
- **Before any work is done** the development footprint and access routes must be clearly demarcated and approved by the ECO. The demarcation must include the total footprint necessary to execute the work, but must aim at minimum disturbance.
- Lay-down areas or construction sites must be located within already disturbed areas or areas of low ecological value and must be pre-approved by the ECO.
- No *Vachellia erioloba* (Camel Thorn) trees may be removed or damaged (the three trees within the footprint must be protected).
- An effort should be made to transplant some of the *Aloe claviflora* plants as well as all viable (transplantable) *Boscia foetida* shrubs/trees.
- Indiscriminate clearing of any area outside of the construction footprint must be avoided.
- An integrated waste management approach must be implemented during construction.
    - Construction related general and hazardous waste may only be disposed of at Municipal approved waste disposal sites.
    - All rubble and rubbish should be collected and removed from the site to a suitable registered waste disposal site.
- Special attention must be given to alien and invasive control within the construction footprint. All alien invasive species within the footprint and at least 5 m to the side of the footprint must be removed responsibly.
    - Care must be taken with the eradication method to ensure that the removal does not impact or lead to additional impacts (e.g. spreading of the AIP due to incorrect eradication methods);
    - Care must be taken to dispose of alien plant material responsibly

Heritage Component (Appendix 6B)

- The lithic traces on the landscape of the study area are of low significance and the impact of the development on these resources are inconsequential. No other heritage was identified. Therefore, no further mitigation is required, and from a heritage point of view we recommend that the proposed development can continue.
- Due to the zero palaeontological significance of the area, no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required. It is considered that the

development of the proposed development is deemed appropriate and feasible and will not lead to detrimental impacts on the palaeontological resources of the area as the igneous rocks underlying the site are not fossiliferous. It is therefore recommended that the project be exempt from a full Paleontological Impact Assessment (Butler 2019).

- Although all possible care has been taken to identify sites of cultural importance during the investigation of study areas, it is always possible that hidden or sub-surface sites could be overlooked during the assessment. If during construction, any possible discovery of finds such as stone tool scatters, artefacts, human remains, or fossils are made, the operations must be stopped, and a qualified archaeologist must be contacted for an assessment of the find. UBIQUE Heritage Consultants and its personnel will not be held liable for such oversights or for costs incurred as a result of such oversights.

Freshwater Component (Appendix 6C)

- The footprint of the proposed housing scheme should be kept as small as possible
- Construction vehicles and building material should be kept inside of the demarcated development area and not be allowed onto adjacent land.
- Loose sediments, rubble and building material should not be allowed to wash down the catchment during rainfall events.
- Litter collection systems should be installed in the drainage lines downstream of the new housing scheme. Litter that accumulates here should be regularly collected and disposed of properly on the municipal waste disposal site.
- Protection measures should be put in place to conserve those drainage lines of the larger sub-catchment that are relatively untouched and still in a reasonably good state.
- Trampling by cattle and goats, as well as humans, is always a concern in similar developments.
- Leaky sewerage and potable water provision systems can change the arid state of the drainage lines and surrounds. Leaks should be repaired to prevent the change in the status of the aquatic environment.

Operational Phase:

As per the Specialist Reports (**Appendix 6A-E**) and Draft Engineering Services Report (**Appendix 4B**), a new WWTW is recommended due to the current status, location (located within a drainage line), close proximity to households, and the inability of the existing WWTW to service the existing population of Gamakor and surrounding developments. The new WWTW would promote sustainable development, along with socioeconomic development, within the new Gamakor Development, and the surrounding developments which the WWTW would service. One of the crucial aims of an EIA is to ensure that the demands of sustainable development (defined as development which meets the needs of the current generation without compromising the ability of future generations to meet their own needs[1]) are met on the project level as well as within the context of the greater area. Therefore, as per the Specialists, the proposed WWTW would reduce environmental contamination through the adequate treatment of sewage generated by the existing and future developments. As per the Freshwater Assessment, the use of the existing WWTW for the proposed Gamakor development may exacerbate the current negative impacts associated with spillages and inability to adequately store and/ or treat sewage. Thus, a proper municipal waste management system is required.

9. CONCLUSIONS

The following specialist studies were undertaken as part of this Environmental Impact Assessment:

- Botanical Impact Assessment (**Appendix 6A**)
- Heritage Impact Assessment (**Appendix 6B**)
- Freshwater Assessment (**Appendix 6C**)
- Geo-technical Assessment (**Appendix 6D**)

The specialist studies and the information provided within the EIA Report, indicates that the proposed Gamakor Housing development does not pose any significant impacts and can be implemented with appropriate mitigation, recommendations, and conditions (such as the recommended construction of a new WWTW, detailed and recommended in the Draft Engineering Services Report). As per the specialist assessments, site visits, and comments received from registered I&APs, the status of the WWTW and illegal dumping remain a key issue which must be addressed with the implementation of a proper waste management plan. The proposed project will increase the pressure placed on existing municipal services and therefore, if a waste management plan is not effectively implemented, the current lack of sewage treatment (refer to Appendix 4B) and solid waste removal may exacerbate the existing negative impacts, such as sewage spillages, on the receiving environment along with socioeconomic development in the Gamakor area and the surrounding area.

In terms of the need and desirability of the proposed residential development, housing is a national need, especially in the Kai !Garib Local Municipality. The proposed development represents a significant step towards service delivery and housing objectives within the municipality and within a broader provincial and national context. The development will not only meet the pressing needs of adequate housing within the municipality but will also be in support of the municipal IDP objectives. These objectives include providing housing for the poor, decreasing the Municipality's housing backlog, as well as fulfilling the Constitutional mandate to provide adequate housing and basic services to citizens.

The proposed location is considered to be the only viable option. The proposed site is adjacent to the existing residential area of Gamakor, allowing accessibility and linking to the existing services infrastructure. The surrounding land use, namely the existing Gamakor settlement, is in line with the proposed development, which is one of the reasons why this location was selected by the local authority for the purposes of this project. As per the Services Section (*refer to Section 6*), the site is accessible by various existing roads.

There are no physical characteristics of these properties or environmental constraints which would exclude the site from development. However, as per the Botanical Assessment, numerous nationally and provincially protected plant species are present within the development footprint (Appendix 6A). Moreover, the site is located within a CBA and thus, mitigation measures recommended by the Botanical Specialist must be implemented. Prior to any of these plant species being disturbed, damaged, removed, relocated, or destroyed, a permit from the relevant authority is required and must be applied for.

In terms of alternatives, **Alternative 5** is the preferred alternative. This alternative is considered a viable option and is also the Municipality's preferred layout since it provides the optimal number of erven and housing opportunities, as well as providing for Municipal and Government land use opportunities, and more Open Space. This Alternative adequately addressed environmental sensitive areas as identified by the Specialists.

The “no-go” option, which is the option of not developing the proposed housing development. Currently, the area earmarked for development is disturbed, with numerous cases of illegal dumping. Although the no-go development might result in no potential negative environmental impacts, especially on the vegetation on the site earmarked for development, the direct and indirect socio-economic benefits of not constructing the residential development will not be realised. The need for additional housing opportunities in the area will not be realised.

According to the Botanical Impact Assessment (Appendix 6A), the proposed development will result in the permanent transformation of approximately 100ha of natural veld for human settlement. According to the impact assessment (see Table 7 of Appendix 6A), with good environmental control, the development is likely to result in a **medium** impact on the environment.

However, with the correct mitigation it is unlikely that the development will contribute significantly to any of the following:

- Significant loss of vegetation type and associated habitat;
- Loss of ecological processes (e.g. migration patterns, pollinators, river function etc.) due to construction and operational activities;
- Loss of local biodiversity and threatened plant species; or
- Loss of ecosystem connectivity.

According to the Specialist, the development is likely to result in a **medium** impact on the environment. The botanical specialist concluded that, “*with the available information, it is recommended that the project be approved, with the proposed mitigation actions*”. Because of the location and the degraded status of the site, the cumulative impact is expected to be **medium** however this can be reduced to **low** by the implementation of the proposed mitigation measures.

As per the Heritage Impact Assessment (**Appendix 6B**), no significant heritage resources were identified within the proposed site for development. Moreover, no archaeological, historical or cultural sites, or paleontological resources (where the site has zero paleontological significance) will be impacted on negatively by the proposed development.

According to the Freshwater Assessment (**Appendix 6C**), an anthropogenic activity may impact any of the ecosystem drivers or responses. This may have a *knock-on effect* on other, interconnected drivers and responses – ultimately impacting ecosystem services. The Freshwater Specialist concluded that the drainage lines have only limited value as water resources and environmental assets (see Appendix 6C). However, in order to limit the impact on the identified drainage lines, recommended mitigation measures must be implemented.

According to the Geotechnical Assessment (**Appendix 6D**), no significant limiting conditions were present within the proposed site for development however, recommendations for founding and construction, excavations, and soil corrosivity must be considered. The Geotechnical specialist concluded that the foundations must be designed by a suitably qualified and experienced professional engineer. Refer to **Appendix 6D** for more information regarding recommendations.

Considering all the information, it is envisaged that this proposed Gamakor Housing Development will have a low negative impact on the environment (after mitigation measures have been implemented). The socio-economic benefits resulting from the proposed development are expected to greatly outweigh any negative impacts, especially if the mitigation measures as recommended by the various specialists and detailed in Section 12 and the EMPr (Appendix 9) are implemented. It must be noted that a proper waste management plan, addressing the proposed construction of the new WWTW and solid waste removal,

must be added as a condition to the granting of the environmental authorisation. This waste management plan must be implemented to effectively address the expected increase in pressure on existing services, especially regarding the challenges associated with the existing WWTW. Refer to Services Section (Section 6) and Draft Engineering Services Report (**Appendix 4B**).

It is therefore recommended that the proposed Gamakor Housing Development (**Alternative 5**) be supported and be authorised with the necessary conditions of approval, subject to the implementation of the recommended enhancement, mitigation measures contained in Section 8 and the EMPr, and the compilation and effective implementation of a waste management plan.

10. DETAILS AND EXPERTISE OF THE EAP

Details of Environmental Assessment Practitioner, expertise and Curriculum Vitae

This Draft Environmental Impact Report was Report compiled by Anthony Mader -

Qualifications:
Anthony Mader: BSc, BSc (Hons), PhD (currently completing) at the University of the Witwatersrand, Johannesburg, South Africa.

Expertise:
Anthony has over three years of experience within environmental consulting and has worked on private and government projects throughout the country, including Western Cape, Northern Cape, KwaZulu-Natal, and the Eastern Cape. Anthony has facilitated Environmental (EA) and Water Use (WUA) applications whereas other duties included auditing of various types of construction types to ensure environmental compliance with the EA. The variety of projects Anthony has worked on include, but are not limited to;

- Housing developments;
- Civil engineering infrastructure projects such as water supply schemes, roads, culverts, bridges, warehouses, and a substation; and
- Auditing of water supply schemes, housing developments, warehouses, roads, bridges, and reservoirs

Anthony Mader joined EnviroAfrica CC in March 2020 and is employed as an Environmental Assessment Practitioner (EAP), working on various private and government projects throughout the Western Cape and Northern Cape.

Employment:

Previous employment as an Environmental Consultant	**:**	**EnviroPro Environmental Consultants (2017 – 2020)**
Current employment as Environmental Assessment Practitioner	**:**	**EnviroAfrica cc (2020 – present).**

Report reviewed and supervised by Bernard de Witt – The whole process and report was supervised by Bernard de Witt who has more than 30 years' experience in environmental management and environmental impact assessments. Bernard de Witt: B.Sc. Forestry (Stellenbosch); B.A. (Hons) Public Administration (Stellenbosch); National Diploma in Parks and Recreation Management; EIA Short course (UCT); ISO 14001 Auditors course (SABS)

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