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HERITAGE IMPACT ASSESSMENT REPORT FOR
PROPOSED CONSTRUCTION OF AN AMMONIA TERMINAL AT WALVIS BAY
ERONGO REGION, NAMIBIA

DRAFT REPORT

29 July 2024

PREPARED FOR:

Environmental Compliance Consultancy (ECC)

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For attention: Kelly Ochs, Environmental Assessment Practitioner

QUALIFICATIONS AND EXPERTISE OF THE CONSULTANT

NAME	Dr Alma Nankela, PhDs
RESPONSIBILITY ON THE PROJECT	Archaeological Field Survey and impact assessment for the proposed construction of the ammonia terminal at the Walvis Bay port area as part of EIA by the Environmental Compliance Consultancy (ECC) on behalf of Cleanenergy Solutions Namibia (Pty) Ltd (the Proponent).
QUALIFICATIONS	PhDs & Masters Degrees in Quaternary and Prehistory (MNHN and UNIFE) & Bachelor Degree in History and Geography (UNAM).
PROFESSIONAL REGISTRATION	Association of Southern African Professional Archaeologists (ASAPA); Namibia Scientific Society (NSS); the Society of Africanist Archaeologists (SafA).
EXPERIENCE IN YEARS	17 (Field research and laboratory)
EXPERIENCE	Dr Nankela worked as an Archaeologist at the NHC for more than a decade where she has conducted extensive archaeological, anthropological and historical research, carried out extensive assessments across Namibia developed and developed heritage policies and systems.
HERITAGE PERMIT NO.	06/2024
REPORTING REQUIREMENT	National Heritage Act, (No. 27 of 2004) and the National Guidelines for Heritage Impact Assessment in Namibia (2021) by the National Heritage Council.

DECLARATION

I, a duly authorised representative of Research Culture Heritage Services (RCHS), hereby confirm my independence as a specialist and declare that:

1. Neither I nor the RCHS CC have any financial or any other personal interests in the construction of proposed ammonia terminal at the Walvis Bay port area other than consultation fees for work performed on the project.
2. The RCHS specialist was appointed on a strictly professional basis to conduct an archaeological field survey and impact assessment in line with the National Heritage Act (No. 27 of 2004) and its Regulations (Government Notice 106 of 2005), guided by the “Guidelines for Heritage Impact Assessment (HIA) of 2021” from the Heritage Council as well as the Environmental Management Act (No. 7 of 2007) and its Regulations (Government Notice 30 of February 6, 2012).



Dr. Alma Nankela,
Archaeologist & Heritage Management Specialist

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EXECUTIVE SUMMARY

Following the preliminary archaeological desk study, field surveys, and impact assessments carried out between May 28, 2024, and June 6, 2024, at the intended ammonia terminal infrastructure development and operation at the Walvis Bay port area in the Erongo Region, Namibia, this present report provides an archaeological baseline description located within and around the proposed ammonia terminal. The desk study located a total of *eight* (n = 8) sensitive archaeopaleontological features (shell middens) along the extinct mid-Holocene tidal lagoon as per a survey by Kinahan (2014). This is in addition to at least *two* (n = 2) heritage features recorded in our field surveys within the project footprint. In terms of the National Heritage Act (27 of 2004), pre-identified sites have a medium of very low significance due to the high degree of surface disturbances mainly driven by anthropogenic impacts. Therefore, some of the sites are neither sensitive nor vulnerable to the proposed ammonia terminal, as they are located over 100 metres away. Two sites located during the field survey are vulnerable to the proposed construction of the ammonia terminal but have a very low significance in terms of the Heritage Act (27 of 2004) as their natural setting is disturbed by anthropogenic and natural impacts. As a result, the sites will likely be directly and indirectly damaged by the proposed construction of the ammonia terminal at Walvis Bay. Identified sites requiring further protection and mitigation measures developed should be implemented while adopting the chance-find procedure appended to this report to guide future handling and discovery of heritage features within and around the footprint of the project.

1. PROJECT BACKGROUND

Cleanergy Solutions Namibia (Pty) Ltd., a joint venture between Ohlthaver & List (O&L) Group and CMB.TECH (“**Proponent**”), intends to construct an ammonia terminal at Walvis Bay port in the Erongo Region of Namibia (**Figure 1**). The proposed site lies along the B2 road between Swakopmund and Walvis Bay. The location of the ammonia terminal storage is strategically chosen for various reasons, including its proximity to the Namport jetty as its pipelines need to be limited (<5 km) to avoid evaporation in line (ammonia is transferred at -33 °C and is heating up during transfer); it is close to the loading and unloading zones for vessels for import and export purposes and bunkering activities. The green ammonia will be supplied to various marine and industrial applications and promote sustainable energy practices in Namibia, while the liquid ammonia will be transported from the ammonia production plant via the ammonia pipeline to the terminal for storage and exporting purposes (ECC, 2024).

The construction of the proposed ammonia terminal at Walvis Bay port and its associated infrastructure **will occupy a surface area of about...hectares**, therefore requiring an Environmental Clearance Certificate (ECC) as per the Environmental Management Act (No. 7 of 2007) and its Regulations (Government Notice 30 of February 6, 2012) as it has the potential to cause a significant negative impact on the receiving physical, biological, socioeconomic, and cultural environment. To obtain an ECC, the proponent appointed Environmental Compliance Consultancy (Pty) Ltd., as the independent Environmental Assessment Practitioner (EAP) to conduct an Environmental Impact Assessment (EIA) in terms of the environmental legislation for the proposed ammonia terminal near the Walvis Bay port terminal area. The ammonia terminal will connect the ammonia and hydrogen pipelines from Farm 58 to the port area (**Figure 2**).

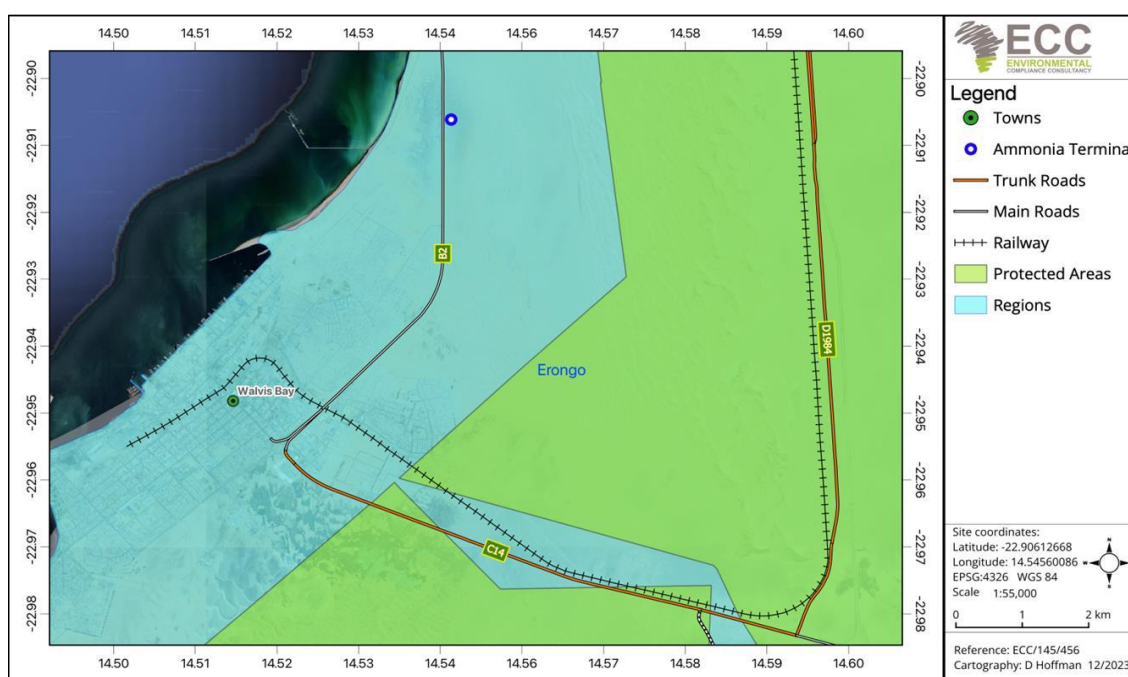


Figure 1: The location of the project site (Ammonia Terminal) along the B2 road near Walvis Bay port. Source: (ECC, 2024:13).

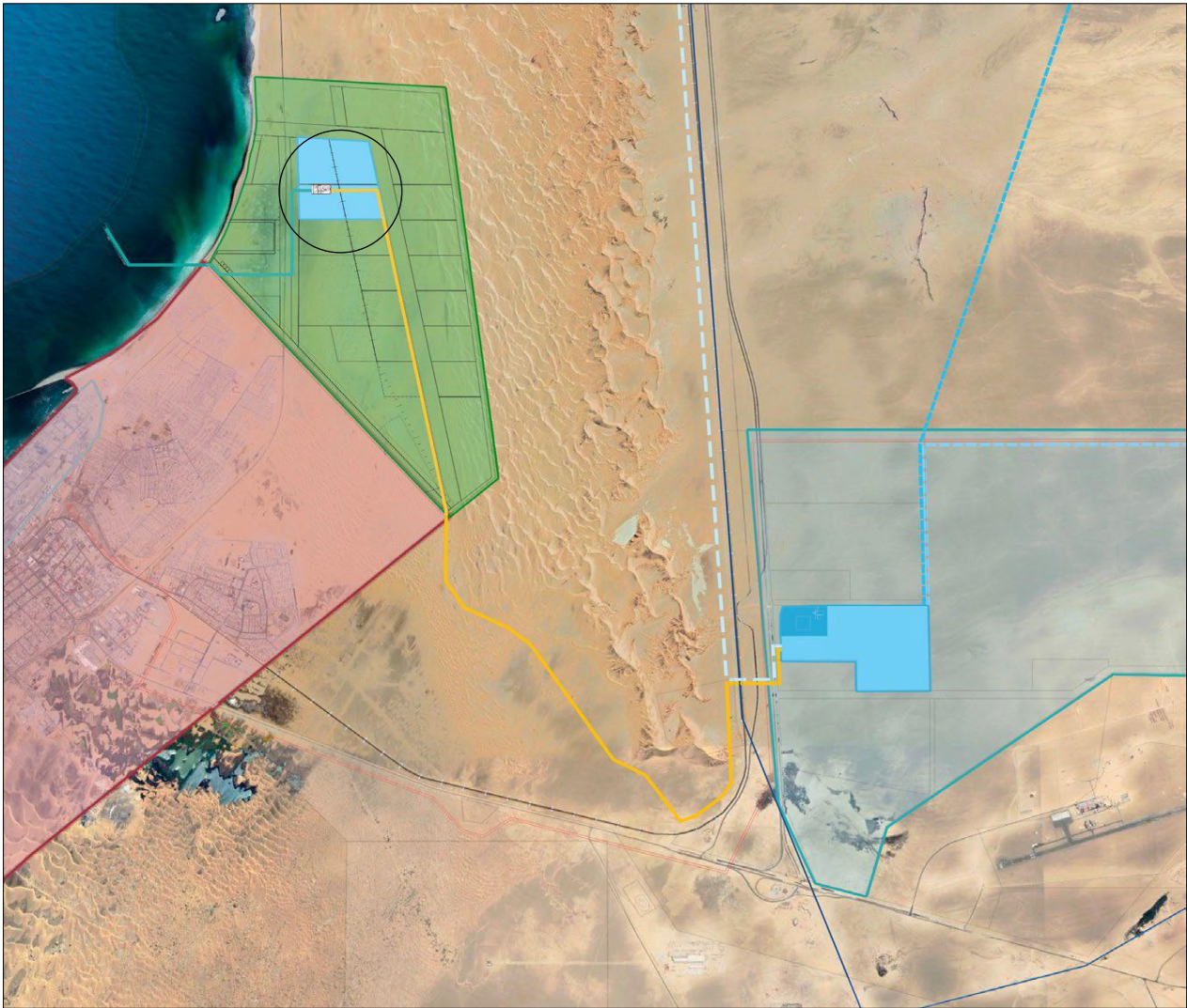


Figure 2: The locality of proposed ammonia terminal (black circle) in relations to ammonia pipelines (orange line) from Farm 58 and other associated infrastructure development. Source: (Cleanergy Solutions Namibia, 2024:12).

In Namibia, the heritage and culture component forms part of the required specialist studies to be considered in the overall EIA in an effort to examine whether possible heritage features within the footprint of the project are correctly identified, accurately recorded, reported, interpreted and their significances appropriately estimated in order to fulfil the requirements of the following legislations –the National Heritage Act No. 27 (2004) and the National Heritage Regulation of 106 of 2005 as well as the Environmental Management Act (2007) and Environmental Impact Assessment (EIA) Regulations (2012), in which the process of review, verification and consent will be required to clear the project. The significance of heritage resources (sites, structures, and artefacts) is determined by means of assessing their archaeological, palaeontological, historical, aesthetic, technological, and scientific value in relation to their uniqueness, condition of preservation, and research potential. These aspects are not mutually exclusive, and the evaluation of each resource is done following the significance criterion ratio outlined in the “National Guidelines for Heritage Impact Assessment in Namibia (2021)” from the Heritage Council. Consequently, Environmental Compliance Consultancy (Pty) Ltd., subcontracted the services of the Research Culture Heritage Services (RCHS) to carry out the heritage surveys and impact assessments.

2. TERMS OF REFERENCE (TOR)

This heritage survey and impacts assessment study aimed for the specialist to:

- a) Identify sensitive and the nature of heritage resources that could be affected by the proposed ammonia terminal project.
- b) Assess the degree of significance, vulnerability, and sensitivity of heritage resources within and immediately surrounding the footprint of the proposed ammonia terminal project.
- c) Establish the impact on heritage resources within the area emanating from the proposed development activities, and
- d) Devise management measures to satisfy the requirements of the Environmental Management Act (2007) and those of the National Heritage Act (2004) to facilitate the issuance of a heritage consent and, thereafter, the issuance of an environmental clearance certificate.

3. PROJECT DESCRIPTION

The proponent's main goal for the construction of the ammonia terminal at the Walvis Bay port area is to supply ammonia and green hydrogen to various marine and industrial applications and promote sustainable energy practices in Namibia, which will contribute to the global shift towards clean energy (ECC, 2024). It is proposed that the liquid ammonia will be transported from the proposed ammonia plant via the ammonia pipeline to the terminal for storage and export purposes. The ammonia terminal is therefore an important component in the development of the green ammonia industry within Namibia. The proposed project involves the construction of an ammonia terminal at the Walvis Bay port area shown in (**Figure 3, Figure 4 and Figure 5**) which will comprise of the following main sections: (i) an ammonia storage tank of 40 000 metric tonnes capacity and the export facilities associated; (ii) a nitrogen generation unit to produce the nitrogen required for the utilities; (iii) an instrument air unit to produce the air required for the nitrogen generation unit; (iv) fire/service water tanks and pumps; (v) an emergency diesel generator; (vi) a wastewater unit; BOG (boiled off gas) compression unit; flare unit and scrubber & aqueous ammonia (AA) storage.

The construction phase will include low-impact and non-intrusive activities, and the following sections will be incorporated in the ammonia terminal: (a) the installation of a double-walled, full-containment ammonia storage tank of 40 000 metric tonnes capacity (height: +/- 30 m; diameter: +/- 55 m) and the associated export facilities; (b) a nitrogen generation unit to produce the nitrogen required for the utilities; (c) an instrument air unit to produce the air required for the nitrogen generation unit; (d) fire and service water tanks and pumps; (e) an emergency diesel generator; (f) a wastewater unit; (g) BOG (boiled off gas) compression unit; (h) flare unit and (i) scrubber & aqueous ammonia (AA) storage. In the operational

phase, the liquid ammonia will be transported from the ammonia plant to the ammonia terminal for storage. Ammonia will be loaded on a vessel for export. It is anticipated that the import and export of ammonia via a mid-size ammonia/LPG carrier will be 25,000 metric tonnes, and the vessel needs to be loaded within 16 hours. This infrastructure will require at least ~20 m³/day of water consumption and 750 kW (holding) or 4000 kW (peak) of power consumption.

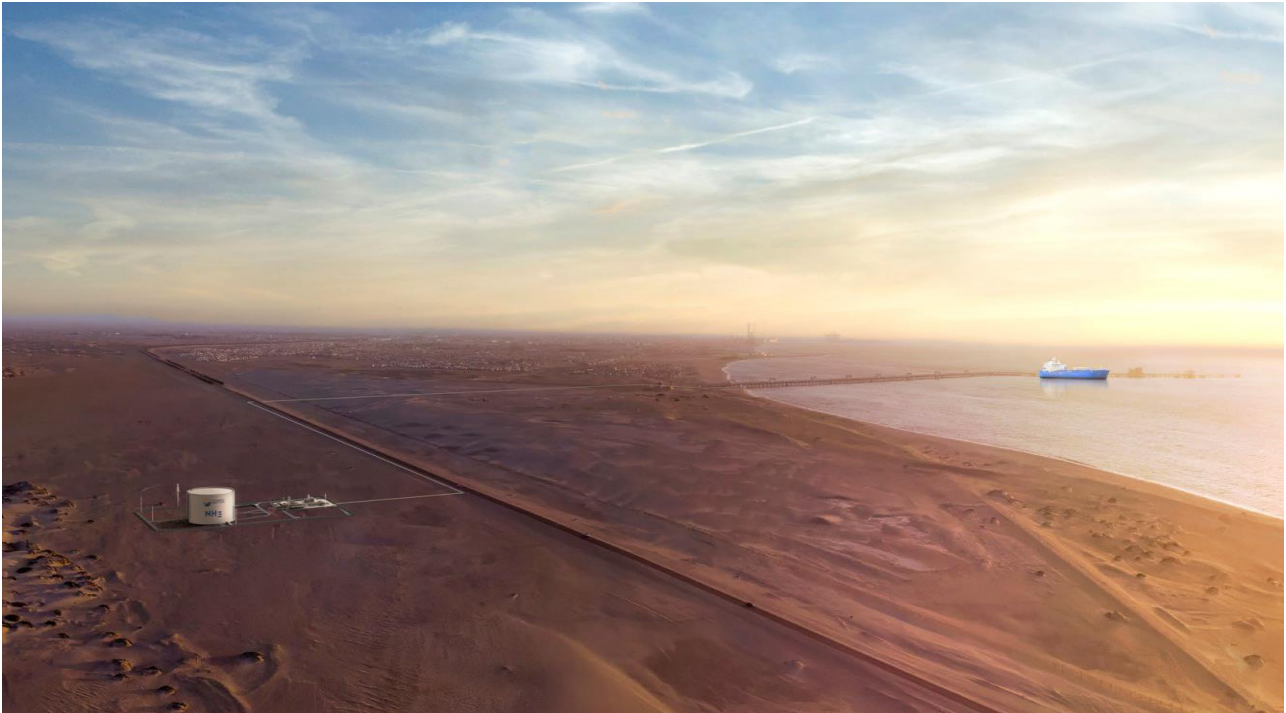


Figure 3: Shows the aerial image of the proposed ammonia terminal infrastructure development at Walvis Bay along B2 road. Source: (Cleanergy Solutions Namibia, 2024:11).



Figure 4: Is the ammonia layout at the proposed ammonia terminal. Source: (Cleanergy Solutions Namibia, 2024:10).

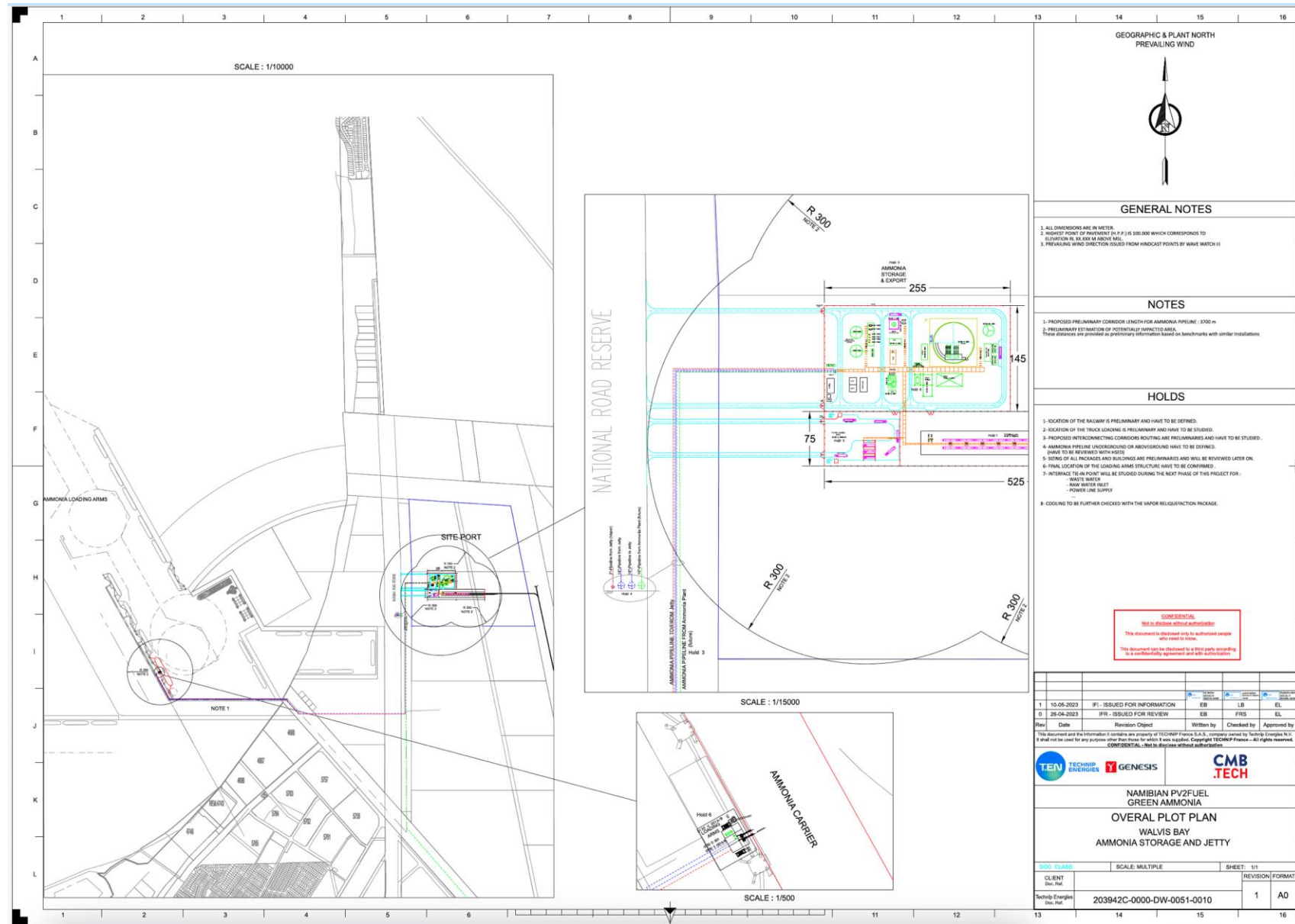


Figure 5: Shows the ammonia terminal plot plan it will occupy. Source: (Cleanergy Solutions Namibia, 2024)

4. ASSUMPTIONS AND LIMITATIONS

This archaeological heritage study assumes that the project description and layout plans provided by the proponent are accurate and up-to-date. The assessment, therefore, focused primarily on the proposed ammonia terminal and its immediate vicinity. It does not apply to and may not be used for any other future developments and expansions of the project outside the assessed areas. The available heritage records from previous assessments of similar projects undertaken in the same general area were used in this study. These records were complemented by a recent comprehensive field survey and assessment carried out in two days in May 28, 2024, and June 6, 2024. No heritage features were identified through interviews with affected local communities in the vicinity of the project as part of the community consultations. Nonetheless, since archaeological and/or palaeontological heritage surveys largely depend on the indicative value of surface finds, it is always possible that hidden or subsurface remains could be overlooked; therefore, the appended Chance Find Procedure Guidelines should be implemented. Since the proposed ammonia terminal and associated infrastructure fall within Dorob Park, authorization from the Ministry of Environment, Forestry, and Tourism was granted to the RCHS researcher to access the area. Another limitation experienced was the fact that the entire area is disturbed by off-road vehicle tracks, which pressed the soil surface, ultimately trampling any sub-surface sediment in shallow deposits while debris from waste (especially in the dune area) trapped in the soils sediment and plants equally reduced the visibility of surface other possible buried remains.

5. LEGISLATIVE CONTEXT

The National Heritage Act (No. 27 of 2004) is the regulatory authority for the identification, protection, preservation, management, and promotion of Namibia's heritage resources. Part 1 of the Heritage Act defines 'heritage resources' as both *places* and *objects* of archaeological, palaeontological, and rare geological objects, including meteorites, cultural, historical, ethnographical, scientific, technological, and social significance. The significant places also include "the natural or existing condition or topography of land", as well as "trees, vegetation, topsoil, or bodies of water" that maintain the ecological functioning and integrity of the specific area. In these aspects, the Act provides legal protection for both tangible and intangible heritage resources. The newly developed "Guidelines for Heritage Impact Assessment in Namibia of 2021" have been formulated for the implementation of the National Heritage Act, especially Section 51 (3), which outlines requirements for heritage impact assessment in Namibia. The aspect of intangible heritage may include sacred sites: "places to which oral traditions are attached to or which are associated with living heritage, graves and burials, historic settlements, and military sites by means of a building, garden, or tree" which are considered to have heritage significance in Namibia. The significance of the heritage resources (sites, structures, and artefacts) is determined by means of their typological classifications defined in Part 1 of the Act in relation to their uniqueness, condition of preservation, and

research potential. Therefore, these aspects are not mutually exclusive, and the evaluation of each resource is achieved following the significance criterion ratio entrenched in the ‘Guidelines for Heritage Impact Assessment (HIA) in Namibia of 2021’.

NHC maintains a heritage register in accordance with Part IV of the Heritage Act. The register lists ‘significant heritage’ places and objects of national importance. The register allows new approved entries to be added based on an assessment of their heritage significance and, thereafter, publication of the sites in the Government Gazette. Consequently, Part V applies immediate legal protection to heritage sites added to the register to prevent unnecessary disturbances or damages to heritage resources as an inevitable result of infrastructure development, unless permitted in terms of Section 48 of the Act. Moreover, aspects concerning the conservation, management, and impact assessment studies of cultural heritage resources for projects such as the proposed ammonia terminal are also addressed in the Environmental Management Act, 2007 (No. 7 of 2007). The need for environmental impact assessment forms part of the Act, and this requires that Namibia’s cultural heritage must be protected and respected for the benefit of present and future generations. Other applicable laws and policies relevant to the protection of heritage resources globally are the international standards and protocols expected to be followed to ensure best practice during development activities. For instance, Performance Standard 8 of the International Finance Corporation’s (IFC) Performance Standards on Environmental and Social Sustainability (2012) addresses both national and world cultural and natural heritage. The standards apply whether or not the heritage material is protected, irrespective of whether it may have been previously disturbed. Furthermore, Namibia being a state party to the World Heritage Convention, the country strictly follows and adopts the operational guidelines for the implementation of the convention that aim at facilitating the implementation of the convention concerning the protection of the inscribed world cultural and natural heritage properties on the World Heritage List against any deterioration or disappearance of these most prized assets because of their exceptional qualities, which have been considered to be of “outstanding universal values”.

6. METHODOLOGY AND IMPACT ASSESSMENT

This archaeological survey followed a basic two-phase process of evaluation: the desk study, followed by an assessment based on the field survey. Field investigations included extensive examination of the site surfaces through field transect approaches such as walking across the landscape **Figure 6** while recording surface artefacts using conventional criteria of physical setting and archaeological affinity through photography, general description, and GPS locations to aid the field survey. When required, some sub-surfaces with partly buried shell midden sediment in shallow deposits were examined to determine their significance and research potential. Secondary data from available records on archaeo-palaeontological assessments within footprints and its immediate surroundings of the project enriched this assessment.

This is vital to find best practice measures to enhance positive impacts and avoid, minimise, or mitigate the negative impacts, either by recording or preservation. If possible, any form of impact is to be avoided by finding alternatives to damage or destruction. Actions that cannot be avoided or minimised ought to be mitigated in an effort to reduce the impact as much as possible. This procedure is dependent on the size of the site, its state of preservation, and its values and significance. The principle behind the mitigation is that no final decision on the site's future can be made until it has been demonstrated that all measures to avoid, minimise, and mitigate have been fully explored.



Figure 6: Archaeological field surveys on the extensive area of the proposed ammonia terminal area in Walvis Bay Source: (RCHS, 2024f).

In Namibia, the significance and vulnerability rating of heritage impact assessment follow standard methodology devised by the National Heritage Council with its “Guidelines for Heritage Impact Assessment of the National Heritage Council (2021)” shown in **Table 1** and **Table 2** and those adopted by the Council on the basis of an evaluation developed by the Quaternary Research Services (Kinahan 2012).

Table 1: Heritage Significance rating table with key attributes adopted by the National Heritage Council, 2021.

LEVEL OF SIGNIFICANCE	GRADING	DESCRIPTION
Exceptional/upper higher	5	- Major national heritage resources. - Rare & outstanding example. - Containing unique evidence of high regional & national significance.
Considerable high	4	- Very important to the heritage of the region. - High degree of integrity/ authenticity. - Multi-component site and objects - High research potential
Moderate	3	- Contributes to the heritage of the locality and region - Has some altered or modified elements, not necessarily detracting from the overall significance of the place. - Forming part of an identifiable local distribution or group. - Research potential.

Low	2	- Isolated minor find in undisturbed primary context, with diagnostic materials - Makes some contribution to the heritage of the locality, usually in the combination with similar places or objects.
Little	1	- Makes little contribution to the heritage resources of the locality. - Heritage resources in a disturbed or secondary context, without diagnostic or associated heritage.
Zero/ no significance	0	- Absence of heritage resources - Highly disturbed or secondary context, without diagnostic or associated heritage

Table 2: The vulnerability rating table with key attributes adopted by the National Heritage Council, 2021.

VULNERABILITY RATING	
0.	Not Vulnerable
1.	No threat posed by current or proposed development activities
2.	Low or indirect threat from possible consequences of development (e.g. soil erosion)
3.	Probable threat from inadvertent disturbance due to proximity of development
4.	High likelihood of partial disturbance or destruction due to close proximity of development
5.	Direct and certain threat of major disturbance or total destruction

In an effort to measure the sensitivity of archaeological sites considering their significance and vulnerability rating in Tables 1 and 2, the assessment also estimated the extent of the possible impact, the magnitude of the impact, and the duration of these impacts on sensitive heritage resources. The scales of estimation developed by Quaternary Research Services (Kinahan 2012) are replicated below in **Table 3**.

Table 3: Assessment criteria for the evaluation of cumulative impacts on archaeological heritage sites adopted by the National Heritage Council, 2021

CRITERIA	CATEGORY	DESCRIPTION
Extent or spatial influence of impact	National Regional Local	Within Namibia Within the Region On site or within 200m of the site impact
Magnitude of impact (at the indicated spatial scale)	High Medium Low Very Low Zero	Social and/or natural functions and/ or processes are severely altered Social and/or natural functions and/ or processes are notably altered Social and/or natural functions and/ or processes are slightly altered Social and/or natural functions and/ or processes are negligibly altered Social and/or natural functions and/ or processes remain unaltered
Duration of impact	Short Term Medium Term Long Term	Up to 3 years 4 to 10 years after construction More than 10 years after construction

7. COMMUNITY CONSULTATION

The public participation process is a critical and integral part of the HIA process, and it was deemed necessary that affected local communities, authorities, and interest groups in Walvis Bay are engaged on heritage matters with respect to the proposed ammonia terminal to provide their input into the planned development as the impacts may directly or indirectly affect them. These consultations provide stakeholders with the opportunity to provide input on issues related to the project on matters of heritage in an effort to supplement secondary data and bridge gaps in heritage knowledge of the area by identifying key heritage features, elements, or aspects that the present-day communities living near the proposed development value, such as tangible and intangible heritage resources, in an effort to safeguard them.

The EIA public consultation on the proposed ammonia terminal and its associated infrastructure development was commissioned by ECC and commenced in March 2024 with the community directly affected and/or interested and key stakeholders. Public meetings and focus group meetings were held in Walvis Bay, Swakopmund, and Arandis. Additional notices advertising the public meetings were also published in national newspapers and in the media. Posters (**Figure 7**) have also been erected along the B2 road between Walvis Bay and Swakopmund for public awareness. The Ministry of Environment, Forestry, and Tourism office, which manages Dorob National Park, was engaged on May 27, 2024, while the National Petroleum Corporation of Namibia (NAMCOR) was engaged on May 28, 2024, and on June 6, 2024, but no known heritage features were identified.



Figure 7: Public engagement poster at the proposed ammonia terminal along the B2 road. Source: 9RCHS, 2024f).

8. BASELINE ENVIRONMENTAL SETTING

The proposed ammonia terminal project site lies in very close proximity to the extinct mid-Holocene tidal lagoon **Figure 8** a barren salt-encrusted area partly obscured by a surficial sand sheet while bordering a landward dune belt system covered by endemic shrubs like Hummock dune species such as *Sasofa nollothensis* shrub, *Zygophyllum clavatum*, *Psilocaulon salicomioides*, *Salsola nollothensis*, and *Salsola aphylla* (Giess, 1971; **Figure 9**). The extinct mid-Holocene tidal lagoon (Kinahan 2014) is of geoarchaeological and historical importance because it allowed us to better define and extend the reconstruction of the Holocene paleoenvironmental evolution of the paleo-lagoons along the Namibian coast and in particular the macrotidal estuarine systems, which highlights the Holocene evolution of such systems and their proximity to important river mouths. This is in addition to harvesting other valuable records of Holocene paleoenvironmental information, for example, sea-level changes, fluctuations in upwelling strength, and other climate signals. However, no animals, their footprints, or their skeletal faunal remains could be observed around the proposed construction of the ammonia terminal area for obvious reasons, including but not limited to: lack of fresh water, edible plants, extreme noise pollution from vehicles due to proximity to a major highway, off-road vehicles, urban expansion, and a rapidly expanding population.



Figure 8: A soft barren salt encrusted extinct mid-Holocene tidal lagoon where the proposed ammonia terminal is will be constructed. Source: (RCHS, 2024f).



Figure 9: Images shows the endemic shrubs along the margin of the dune belt system behind the proposed ammonia terminal site. Source: (RCHS, 2024e).

9. GEOLOGICAL SETTING

According to Botha et al. (2014), after the breakup of West-Gondwana during the early Cretaceous (130–135 Ma ago), the continental uplift occurred, which heightened the erosional cutback and formed Namibia's Great Escarpment. Lithologically, the local geological setting of Walvis Bay became then underlain by the Swakop Group of the Damara rocks, such as biotite schists, quartzites, metagreywackes, marbles, and calc silicates of the Tinkas member of the Karibib Formation, Steven (1993). As the South Atlantic marine conditions became established around 80 Ma ago, towards the end of the Cretaceous (70–65 Ma ago), a relative level surface was created, on which later deposition of sediments took place (Botha et al., 2014). Marine deposition became covered by the newly formed South Atlantic Ocean, while terrestrial deposits took place on land. Further continental uplift moved the shoreline to its present position (Botha et al., 2014). Today, the superficial sequence that covers the surface area of the footprint

of the project area is the aeolian sand dune (Error! Reference source not found. and

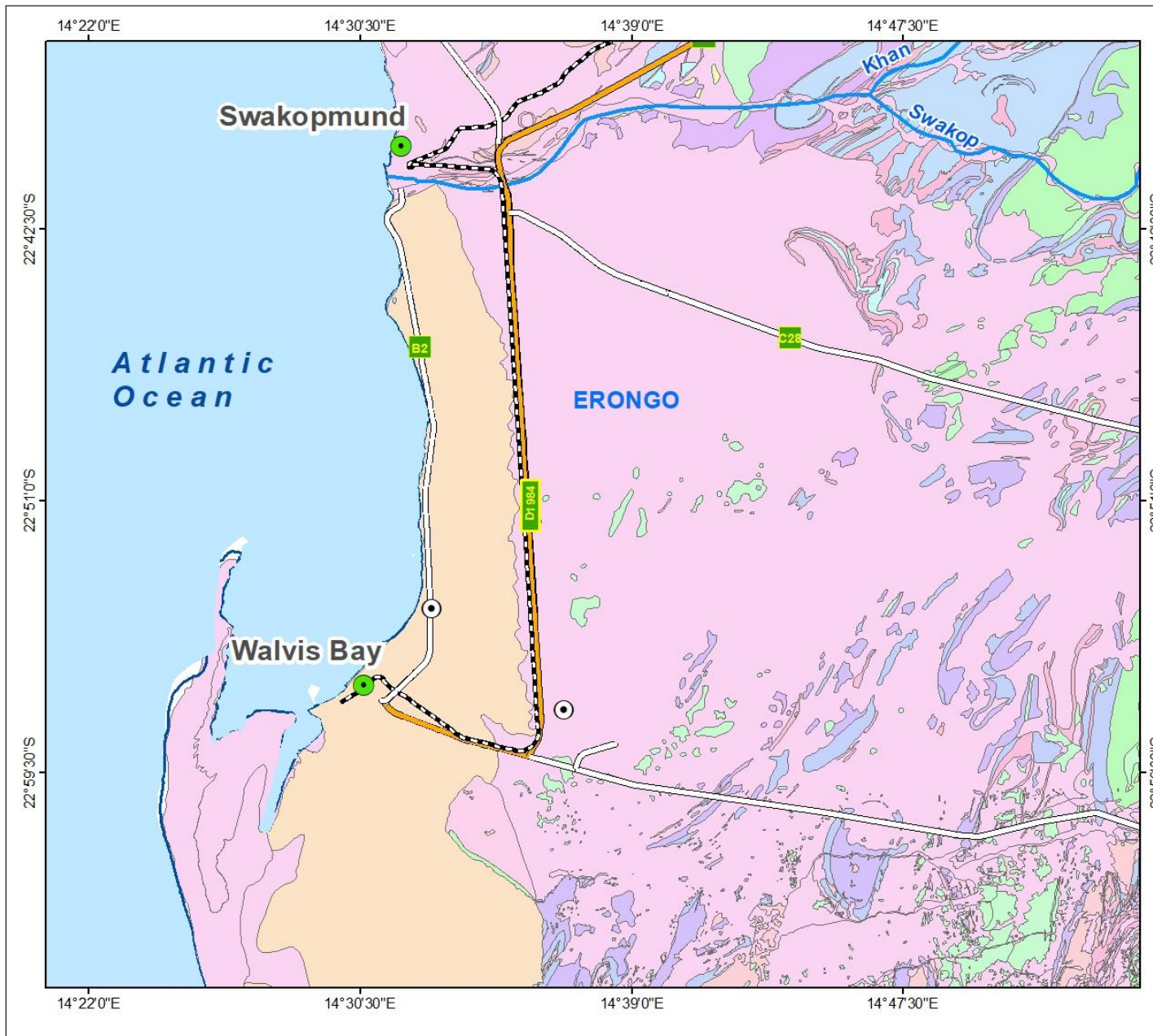


Figure 11) belonging to the Swakopmund/Walvis Bay Dune Field Belt.

These types of sand dunes are typically formed from the accumulation of windblown sand largely influenced by the dunefield belt, the sand sea, and the south-south-westerly wind regime. These grains of sand are very small in diameter, hence not cohesive, and therefore are easily carried by the wind. The Dune Field Belt complex hence comprised of four dune types: complex linear dunes on the eastern side, large transverse barchanoid dunes on the western side, and at the northern leading edge both barchans and small transverse dunes according to (Soboil, 2016).



Figure 10: A localised geological foreground of the ammonia terminal site and its surrounding environment. Source: (RCHS, 2024f).

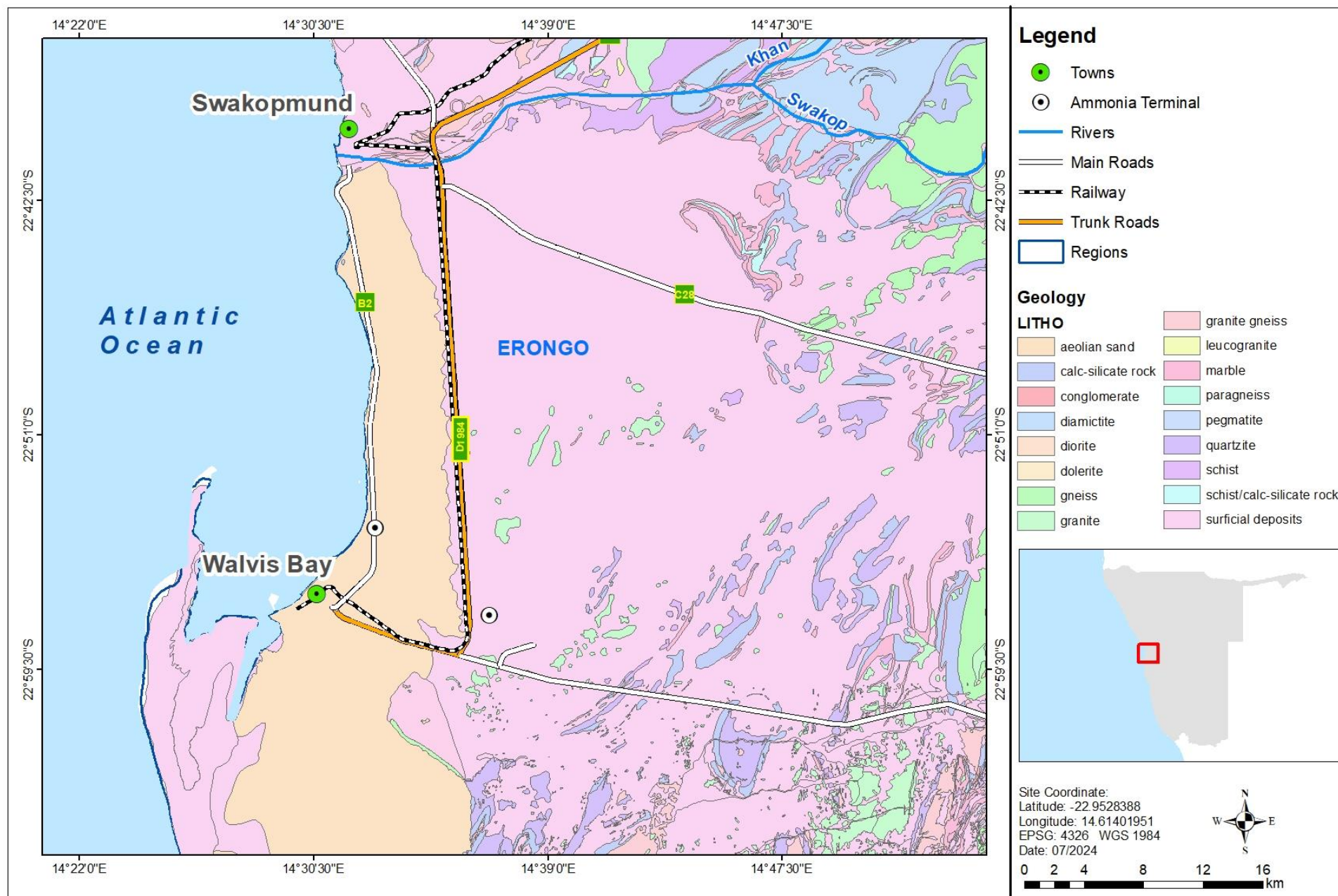


Figure 11: The geological setting of Ammonia Terminal along B2 road in Walvis Bay. Cartographer: (Maria Sigopi, RCHS).

10. HERITAGE SETTING

A series of detailed archaeological, palaeo-environmental research and heritage survey assessments carried out along the coastal region and in the vicinity of the project footprint (see Mitchell 2002; Kinahan and Kinahan 2009; Kinahan 2014; Compton 2007; Morse et al., 2013;) has revealed a wealth of archaeological data considered to be of great significance due to their state of preservation. Accordingly, these archaeological features manifest themselves in the form of a group of shell-middens, accumulations of skeletal remains of marine and terrestrial (wild and domestic) vertebrates, pottery, beads, human footprints, and various artefacts, including human remains buried under silt deposits, with some largely exposed by natural erosion corresponding to the flood deposits.

More recently, palaeo-archaeological and archaeological assessment in the vicinity of the project area by Kinahan (2014), in relation to the Port of Walvis Bay SADC Gateway project **Figure 12** along the extinct mid-Holocene tidal lagoon, the inland dune barrier, and the extinct Tumas River mouth, has yielded significant evidence of superficial shell-midden accumulations mainly of *Bullia digitalis*, *Dosina lupines*, and other molluscan fauna diagnostic of tidal lagoon conditions dated to be $40\,830 \pm 480$ BP (Beta-396312), which represent the tidal flood extent of a terminal Pleistocene lagoon (Kinahan 2014). Further, the hummock dunes had also produced some evidence of the 6 m beach associated with the last interglacial period (Eemian, or Riss-Würm), which began about 130,000 years ago before the present period (Holocene). These extensive shell-midden accumulations along the extinct Tumas River mouth provided valuable archaeological evidence related to the coastal conditions of Namibia associated with human occupations over the last 0.8 million years, appearing extensively during the mid-Holocene Optimum—over the last 6,500 years ago at the northern extremity of the Khuseb Delta. The pottery vessel recovered from the shell-midden sites at the extinct Tumas River mouth and dated to the 7th century AD.

In total, at least eleven ($n = 11$) palaeo-archaeological sites were located by Kinan (2014) within and along the margin of the extinct mid-Holocene tidal lagoon, in the inland dune barrier, and at the extinct Tumas River mouth. They comprise of shell midden site (QRS 206/189), gravel mining site (QRS 206/190), shuttered concrete structure (QRS 206/191), corrugated asbestos structure (QRS 206/192), isolated shell heap with scattered *Dosina lupines* fragments (QRS 206/193), gypsum encrustation on pan surface (QRS 206/194), surface scatter of *Donax serra* fragments (QRS 206/195), surface scatter of *Donax serra* fragments (QRS 206/196), *Dosina lupines* fragments- (QRS 206/197), shell-middens, *Donax serra* (QRS 206/198), shell-middens and *Donax serra* (QRS 206/199), as shown in **Figure 12** in relation to the ammonia terminal site layout. **Its not cleared from the proponent if these will be affected by the ammonia terminal project as the surface area of the site is not known yet, however, they are located at least 43.31m radius from the site location.**

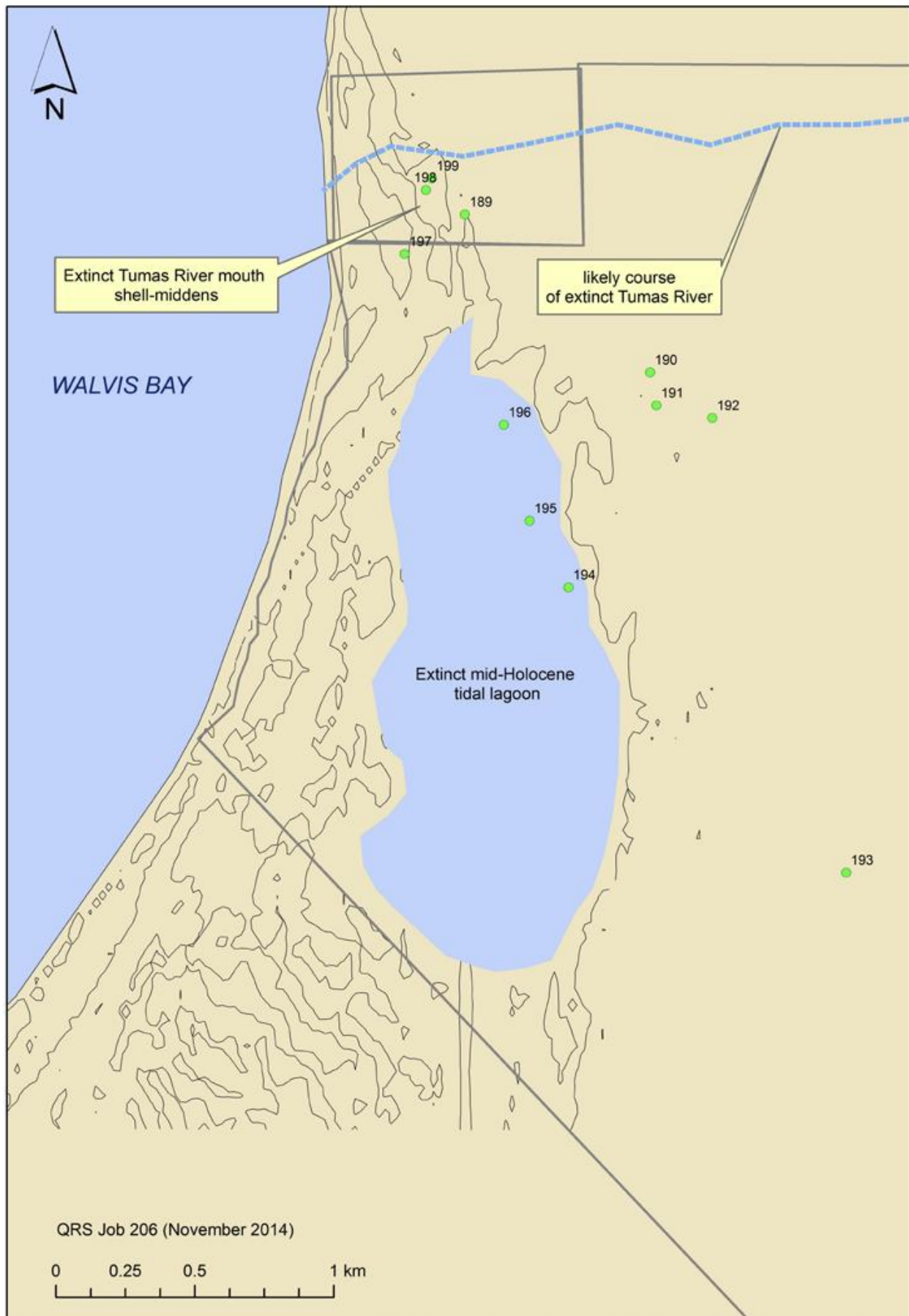


Figure 12: A localised map of Walvis Bay area indicating a number of recorded palaeoarchaeological features associated with the port of Walvis Bay SADC Gateway Development project site (grey polygon) in vicinity of the Dunes Belt Area. Source: (Kinahan 2014:14).

11. ASSESSMENT FINDINGS

The field survey and assessment have located at least two heritage features ($n = 2$) in proximity of the proposed ammonia terminal area presented in **Table 4** and in **Figures 14, 15, 16, and 17**, respectively. **Although the surface area of the proposed ammonia terminal is unknown**, one cannot safely argue that these sites will be directly and indirectly impacted by the proposed development; however, they have a low significance ratio in terms of the National Heritage Act (No. 27 of 2004), as shown in **Table 4**. These comprised of one ($n = 1$) shell midden and fragmented *Donax serra* (white mussel) located at least 43.31 m from the proposed footprint of the site. The second site ($n = 1$) is rather a potential historic site with an isolated heap of discarded debris from rusted and corrugated metal materials (**Figure 15**). It is unknown whether such debris were discarded in recent times or from the historical period associated with the temporary settlement post, but no other similar or associated materials were observed in the immediate surrounding area of the site. However, the site is not sensitive but vulnerable to the proposed ammonia terminal, as it is located over 278 metres away. Furthermore, its relevance in terms of the National Heritage Act (27 of 2004) is very low, as it is rated 0-1 as it has no research potential.

Of the eleven palaeo-archaeological sites located by Kinahan (2014) (see **Figure 12**) within and along the margin of the extinct mid-Holocene tidal lagoon, only three of these sites were verified due to their relative proximity from the footprint of the proposed ammonia terminal. These are (1) the gypsum encrustation on the pan surface (*QRS 206/194*) located 412.62 m from the proposed ammonia terminal; (2) the surface scatter of *Donax serra* fragments (*QRS 206/195*) located about 574.69 m from the proposed ammonia terminal; and (3) the surface scatter of *Donax serra* fragments (*QRS 206/196*) located about 923.96 m from the proposed ammonia terminal. The description, typology, vulnerability, and significance ratings, as well as mitigation measures of both RCHS and QRS heritage features, are presented in the following table:

Table 4: Present the list of potential archaeological sites and historic heritage resources within and around the proposed project.

Site Coordinates	Description	Typology	Distance from the proposed Ammonia Terminal	Vulnerability Rating	Significance Rating	Recommendation
22° 54' 22.362" S 14° 32' 42.402" E (Site 01)	Superficial shell-middens and <i>Donax serra</i> fragments	Palaeo-environmental remains	43.31 m	3	0-1	No further mitigations required
22°54'30.69"S 14°32'46.89"E (Site 02)	Isolated heap of discarded debris materials	Potential historic Site	278.17 m	3	0	No further mitigations required

S22.8910 1 E14 E14.544 .544 46 46 QRS 206/189	Shell Midden	Palaeo- environme ntal remains	1706.02m	0	3	No further mitigations required
S22.89614 E14.55045 QRS 206/190	Gravel mining site	Historic Site	1208.02m	0	0-1	No further mitigations required
S22.89721 E14.55065 QRS 206/191	Shuttered concrete structure	Historic Site	1132.81m	0	0-1	No further mitigations required
S22.89762 E14.55246 QRS 206/192	Corrugated asbestos structure	Historic Site	1179.43m	0	1	No further mitigations required
S22.912 38 E14.556 79 QRS E14 206/19 .556 3 79	Isolated shell heap with scattered <i>Dosina lupines</i> fragments	Palaeo- environme ntal remains	1344.75m	0	3	No further mitigations required
S22.90312 E14.54781 QRS 206/194	Gypsum encrustation on pan surface	Palaeo- environme ntal remains	412.62m	1	0-1	No-Go Zones
S22.90096 E14.54655 QRS 206/195	Surface scatter of <i>Donax serra</i> fragments	Palaeo- environme ntal remains	574.69m	1	0-1	No-Go Zones
S22.89784 E14.54572 QRS 206/196	Surface scatter of <i>Donax serra</i> fragments	Palaeo- environme ntal remains	923.96m	1	0-1	No-Go Zones
S22.89229 E14.54251 QRS 206/197	<i>Dosina lupines</i> fragments	Palaeo- environme ntal remains	1587.16m	0	2	No further mitigations required
S22.89022 E14.54320 QRS 206/198	Shell-middens, <i>Donax serra</i>	Palaeo- environme ntal remains	1820.22	0	3	No further mitigations required
S22.88984 E14.54339 QRS 206/199	Shell-middens, <i>Donax serra</i>	Palaeo- environme ntal remains	1821.47m	0	3	No further mitigations required

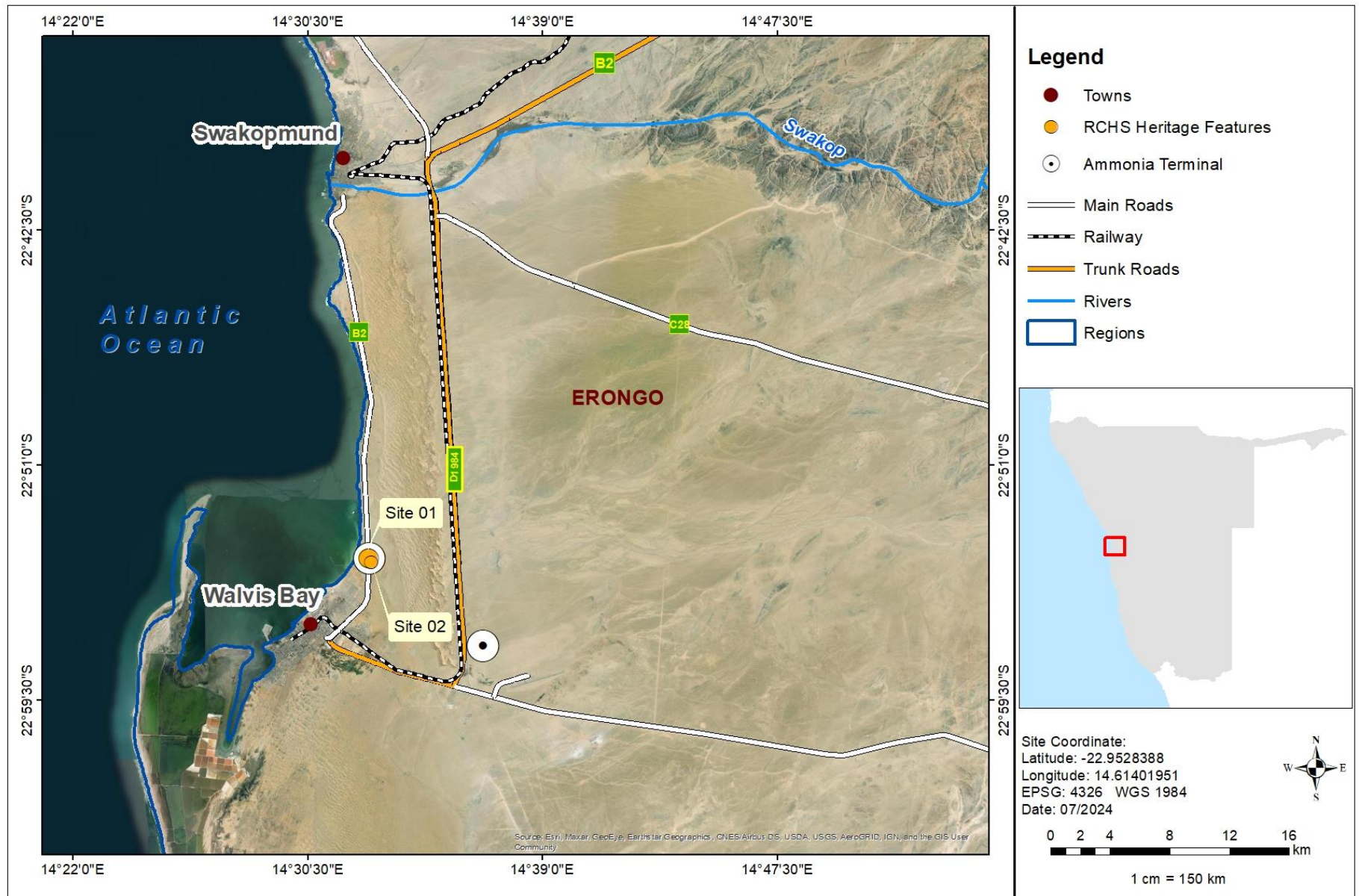


Figure 13: The distribution of heritage located within the footprint of the proposed ammonia terminal project along B2 road in Walvis Bay. Cartographer: (Maria Sigopi at RCHS, 2024f).

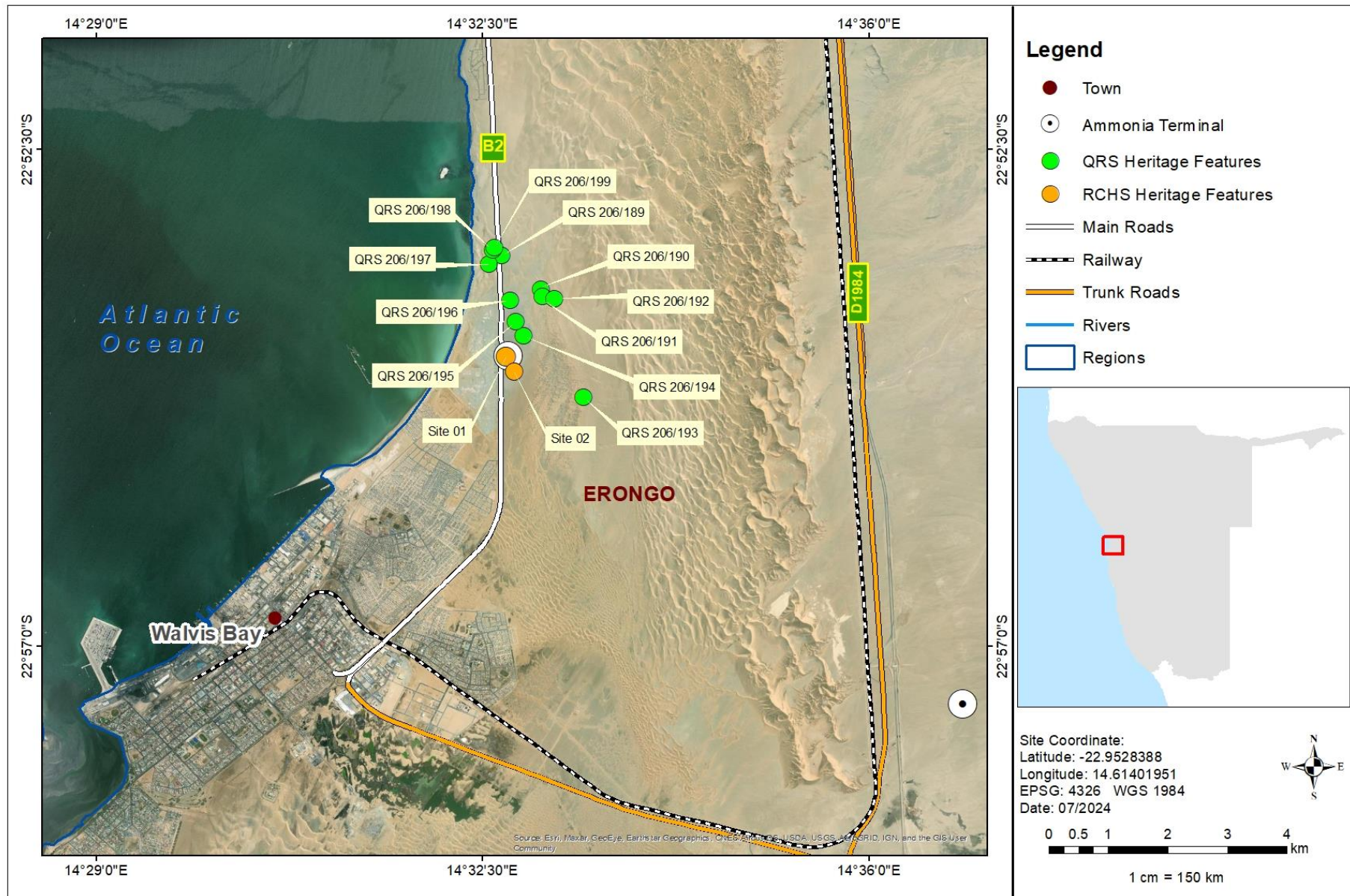


Figure 14: Consolidated map of all heritage features within and around the footprint of the proposed ammonia terminal at Walvis Bay project recorded in in 2014 by QRS and RCHS in 2024. Cartographer: (Maria Sigopi at RCHS, 2024f).

The first site is a concentration of an extensive but superficial scatter of shell-midden accumulations and fragmented *Donax serra* with no evident depth spread over a large area of approximately 15 metres in a disturbed tidal flat of the extinct mid-Holocene tidal lagoon **Figure 15**. The site falls outside the footprint of the proposed construction of the ammonia terminal (43.31 m away) but is close to the development and is indirectly under threat from the proposed development. However, due to previous tidal erosions and fluvial actions within the extinct mid-Holocene tidal lagoon, the shell-midden and *Donax serra* fragments do not appear to be in situ but are likely transported from their original context, hence secondary depositions.



Figure 15 Images shows the significant but superficial shell midden accumulations near the extinct mid-Holocene tidal lagoon. Source: (RCHS, 2024e).

Further, the area along the extinct mid-Holocene tidal lagoon has been severely disturbed by the construction of the B2 tar road and its associated infrastructure, as well as off-road tracks, which has

ultimately reduced its scientific value. No other faunal/ material remains were observed at the site, but the calibrated AMS date from the nearest site, QRS 206/193, from the sample of *Dosina lupines* from the lagoon strandline on the eastern margin of the Port of Walvis Bay SADC Gateway Development project site was dated to $40\,830 \pm 480$ BP (Kinahan 2014). The potential historic site with an isolated heap of discarded debris from rusted and unidentified corrugated metal materials **Figure 16**. At this stage, it is unknown whether such debris was discarded in recent times or from the historical period associated with the temporary settlement post, but no other associated materials were observed in the surrounding area of the site. However, the site is neither sensitive nor vulnerable to the proposed ammonia terminal, as it is located over 278 metres away. Furthermore, its relevance in terms of the National Heritage Act (27 of 2004) is very low, as it is rated 0-1 as it has no research potential. These heritage features are presented in the following table:



Figure 16: A potential historic waste dump site with discarded heap of debris materials of rusted materials. Source: (RCHS, 2024f).

12. INTERPRETATION OF ASSESSMENT

The heritage resources recorded in the course of the proposed construction of ammonia terminals and associated infrastructures were assessed as to their significance (0–5) and vulnerability (0–5) (see **Table 4**, and recommended measures deemed necessary for mitigation were devised. In the case of superficial shell-middens and *Donax serra* fragments, the significance ratio stands at 0-1, which is very low in terms of the National Heritage Act (27 of 2004) because the remains are in secondary deposition and their natural setting is disturbed, which reduces their scientific values. If they were in primary contexts, these paleoenvironmental faunal remains could make a significant contribution to the understanding of the extinct mid-Holocene coastal environmental changes in this area through scientific analyses. Although the site's vulnerability reading is rated 3, no further mitigations are required as the remains are surface finds in a poorly preserved, eroded setting that will be indirectly impacted by the proposed project due to its proximity. With regards to the potential historic site characterised by an isolated surface heap of discarded metal materials located at least 278.17 m from the proposed construction of ammonia terminals and associated infrastructure, one can safely argue that the site is not significant in terms of the National Heritage Act (27 of 2004) due to the absence of heritage resources and the fact that there are no diagnostic or associated heritage features in the surrounding area and has not been confirmed whether it's indeed a historic site or recent addition from a nearby community.

The three sites identified through the QRS assessment, namely: the gypsum encrustation on the pan surface (QRS 206/194) located at 412.62 m from the proposed ammonia terminal; the surface scatter of *Donax serra* fragments (QRS 206/195) located at about 574.69 m from the proposed ammonia terminal; and the surface scatter of *Donax serra* fragments (QRS 206/196) located at about 23.96 m, although they have a low significance ratio of 0-1, should still be treated as no-go zones because the probable threat is too low and they still lack more detailed information from their previous project.

13. IMPACT ASSESSMENT

There is a likely impact of the proposed construction of ammonia terminal at Walvis Bay at the two identified heritage features, namely: the superficial shell-middens and *Donax serra* fragments Lat: 22° 54' 22.362" S and Long: 14° 32' 42.402" E, as well as the potential historic site Lat: 22° 54' 30.69 S and Long: 14° 32' 46.89 E, as the sites are located between 43.31 m and 278.17 m from the footprint of the proposed project and its vulnerability ratio stands at a median 3. The likely impact is further propounded by the fact that the surface area (scale) of the proposed ammonia terminal is unknown upon writing this preliminary report. However, the site has a very low significance ratio (0-1 and 0) in terms of the National

Heritage Act (27 of 2004) due to its poor state of conservation and the fact that it has not been established whether the discarded debris from rusted and corrugated metal materials is from a recent or historical period. The only best conservation measure was to mitigate the impacts by recording these features, as the likelihood of encroachment, direct or indirect damage, or destruction by the proposed development cannot be avoided. However, particular attention should be taken to the heritage features recorded by the QRS that fall within 100 m from the proposed ammonia terminal: **QRS 206/194**, **QRS 206/195**, and **QRS 206/196**. Any likelihood of encroachment or indirect damage should be completely avoided in case of no-go zones. The extent of the two impacted sites (**site 01** and **site 02**) would be low as its direct effect would be confined within the area itself. As with all impacts on archaeological and/or paleoarchaeological features, the duration is considered to be permanent. Given the distance the sites are from the proposed surface works associated with the construction of an ammonia terminal, the probability of the impact is considered to be high. The extent or spatial influence of impact, magnitude of impact, and duration of impact on the heritage resources will mainly have a negligible cumulative impact on Namibia's palaeoenvironment resources.

14. SPECIFIC RECOMMENDATION

- a) The proponent is implored to submit information concerning the surface area (scale) of the proposed ammonia terminal to establish whether the sites fall directly or indirectly within the footprint of the project.
- b) The proponent is to submit this HIA report to the competent authority, the National Heritage Council of Namibia, in an effort to secure heritage consent.
- c) The proponent is implored to incorporate the GIS data of the heritage resources in their sensitivity mapping of the project layout so that flagged sites (no-go) can be avoided as a management measure to avoid any possible encroachment and disturbance.
- d) The proponent is implored to sensitise heritage data to the operator and fieldwork personnel and to exercise due caution when working in close proximity to where the heritage features are found.

15. CONCLUSION AND MANAGEMENT PROCEDURES

This baseline study has identified some potential heritage features that are vulnerable but not significant, as well as slightly significant but not vulnerable heritage likely outside the footprints of the proposed project that are worth preserving in terms of the National Heritage Act (No. 27 of 2004). Therefore, where mitigations are required, these should be implemented. Where no further mitigation measures are required prior to the construction of the proposed ammonia terminal and associated infrastructure, such features should not be disturbed. However, since this field survey relied only on surface finds, it is

possible that buried sub-surface archaeological, paleontological, or historic resources could fall within the footprints of the project during site preparation and construction phases. The following chance-finding procedure, devised by Kinahan (2012) and replicated hereto, is applicable to address these uncertainties in the project phases.

16. APPENDIX 1: CHANCE FIND PROCEDURES

The ‘chance finds’ procedure covers actions to be taken from the discovery of a heritage site or item to its investigation and assessment by a trained archaeologist or other appropriately qualified person. The ‘chance find’ procedure intends to ensure compliance with the relevant provisions of the National Heritage Act (27 of 2004), especially Section 55 (“a person who discovers any archaeological object must as soon as practicable report the discovery to the Council”). The procedure for reporting set out below, developed by Kinahan (2021) and replicated hereto, is to be observed.

RESPONSIBILITIES

Operator:	To exercise due caution if archaeological remains are found
Foreman:	To secure site and advise management timeously
Superintendent:	To determine safe working boundary and request inspection
Archaeologist	To inspect, identify, advise management, and recover remains

PROCEDURE

Action by person identifying archaeological or heritage material:

- If operating machinery or equipment stop work
- Identify the site with flag tape
- Determine GPS position if possible
- Report findings to foreman

Action by **Foreman**:

- a) Report findings, site location and actions taken to superintendent.
- b) Cease any works in immediate vicinity Action by superintendent.
- c) Visit site and determine whether work can proceed without damage to findings
- d) Determine and mark exclusion boundary.
- e) Site location and details to be added to GIS for field confirmation by archaeologist

Action by **Superintendent**

1. Visit the site and determine whether work can proceed without damage to findings.
2. Determine and mark exclusion boundaries.
3. Site location and details to be added to Archaeological Heritage Geographical Information System (GIS) for field confirmation by archaeologist

Action by **Archaeologist:**

- a) Inspect site and confirm addition to GIS.
- b) Advise NHC and request written permission to remove findings from work area.
- c) Recovery, packaging, and labeling of findings for transfer to National Museum

In the event of discovering human remains

- d) Actions as above
- e) Field inspection by archaeologist to confirm that remains are human
- f) Advise and liaise with NHC and Police
- g) Recovery of remains and removal to National Museum or National Forensic Laboratory, as directed.

17. REFERENCES

1. Compton, J. 2006. The mid-Holocene sea-level highstand at Bogenfels Pan on the southwest coast of Namibia. *Quaternary Research* 66: 303-310; Compton, J. 2007. Holocene evolution of the Anichab Pan on the south-west coast of Namibia. *Sedimentology* 54: 55-70.
2. Cleanergy Solutions (Namibia) (Pty) Ltd, (2024). Public presentation of the project description.
3. Environmental Compliance Consultancy, (2023). BID for the proposed construction of an Ammonia pipeline from Farm 58 to Walvis Bay port, Erongo region, Namibia. December 2023.
4. Environmental Compliance Consultancy, (2024). Preliminary ESMP for the proposed construction of a green ammonia pipeline from Farm 58 to the Walvis Bay port area, Erongo region, Namibia, July 2024
5. Giess, W. (1971). A Preliminary Vegetation Map of South West Africa. *Dinteria*, 4, 5 -114.
6. Kinahan, Jill & Kinahan, John. 2009. "A thousand fine vessels are ploughing the main..." Archaeological traces of the nineteenth century 'Guano Rage' on the south-western coast of Africa. *Australasian Historical Archaeology* 27: 43-54.
7. Kinahan, J. (2014). Archaeological baseline survey of the proposed Port of Walvis Bay SADC Gateway Development, QRS Job 206. In Botha, P., Faul, A., Hooks. P., Brews. L., November 2016. Strategic Environmental Assessment for the New Port of Walvis Bay SADC Gateway by Geo Pollution Technologies (Pty) Ltd.
8. Kinahan, J. (2012) Archaeological Guidelines for Exploration & Mining in the Namib Desert, the Namibia Archaeological Trust.
9. Kinahan, J.H.A. (2000). Cattle for beads: the archaeology of historical contact and trade on the Namib coast. Uppsala, *Studies in African Archaeology* 17.
10. Morse, S. A., Bennett, M. R., Liutkus, Pierce, C., Thackeray, F., McClymont, J., Savage, R., & Crompton, R. H. (2013). Holocene footprints in Namibia: the influence of substrate on footprint variability. *American journal of physical anthropology*, 151(2), 265-279.
11. National Heritage Act No. 27. of 2004. Government Gazette of the republic of Namibia dated, 29 December 2004.
12. Sobol, J. H., (2016). Dunes and dune movement in the Walvis Bay area of Namibia, and implications for future land-use planning and development. Master Thesis, University of Cape Town: South Africa.