Resilient Environmental Solutions cc
P. O. Box 90709, Windhoek
76 Dr Frans Indongo St, Windhoek West

Environmental Impact Assessment (EIA) for the Proposed ELSH Crematorium, Windhoek

Final Scoping Report

June 2022

Proponent:
ELSH Cremation Services cc
P O Box 60177, Katutura, Windhoek

Executive Summary

Introduction

The Proponent, ELSH Cremation Services, proposes to establish and operate a crematorium in Nubu Industrial Park, Nubuamis. This report describes the Environmental Impact Assessment to obtain an Environmental Clearance Certificate for the project.

Public Consultation

The first round of public consultation took place in March – April 2022. The main issues that were raised were:

- Concern over emissions and possible odours from the crematorium; and
- Concern that ongoing operation of the crematorium would not be adequately monitored by the authorities. Consequently, potential excessive emissions or other problems would not be detected or prevented.

The second round of public consultation in June 2022, with circulation of the Draft Scoping Report and the Draft Environmental Management Plan, raised no further issues.

Impact assessment

Emissions, with the potential to cause health problems, such as sulphurous and nitrous oxides (SOx and NOx), fine dust (PM10 and PM2.5), persistent organic pollutants (POPs eg dioxin and furans), and heavy metals (eg mercury), are known from crematoria. The USA manufacturer of the apparatus guarantees that no thresholds for indicator pollutants are exceeded if the apparatus is used and maintained as prescribed. Furthermore, international studies have shown there are no causal links between crematoria emissions and adverse health effects. Best practice recommends a precautionary approach, including:

- Follow the manufacturer's recommendations for the design, operation, and maintenance of the crematorium, and
- Independently monitor air quality in the vicinity of the crematorium.

These best practice recommendations are included in the suggested mitigations and the Environmental Management Plan (EMP) for the ELSH Crematorium.

Conclusions and recommendation

Mitigation measures and recommendations have been prescribed in this report and the EMP to reduce the significance of the negative impacts to acceptable levels. Based on the project information provided by the Proponent and the findings of the impact assessment, it is recommended that the proposed ELSH Crematorium may be granted an Environmental Clearance Certificate.

Table of Contents

List of Figures

List of Tables

Abbreviations and Acronyms

CV	Curriculum Vitae
DEA	Department of Environmental Affairs
EAP	Environmental Assessment Practitioner
ECC	Environmental Clearance Certificate
EIA	Environmental Impact Assessment
EMA	Environmental Management Act
EMP	Environmental Management Plan
GG	Government Gazette
GN	Government notice
IAP	Interested and Affected Party
NSA	Namibia Statistics Agency
RA	Roads Authority
ToR	Terms of Reference

Appendices

Appendix A: Application for Environmental Clearance Certificate

Appendix B: Environmental Management Plan

Appendix C: CVs of EAPs responsible for the Environmental Assessment

Appendix D: Public Consultation

Appendix D1: List of Interested and Affected Parties (IAPs)

1st Round of Public Consultation

Appendix D2: Notification email sent to I&APs (including authorities)

Appendix D3: Background Information Document (BID)

Appendix D4: Letters to competent authorities

Appendix D5: Proof of hand delivered letters to authorities

Appendix D6 Copies of newspaper notices placed in the printed media

Appendix D7: Proof of site notices

Appendix D8: Public meeting minutes and notes

2nd Round of Public Consultation

Appendix D9: Notice to IAPs - Crematorium EIA Draft Scoping Report

Appendix E: Guarantee note from American Crematory Company

Glossary

Cumulative Impacts - in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

Environment - As defined in Environmental Management Act - the complex of natural and anthropogenic factors and elements that are mutually interrelated and affect the ecological equilibrium and the quality of life, including – (a) the natural environment that is land, water and air; all organic and inorganic matter and living organisms and (b) the human environment that is the landscape and natural, cultural, historical, aesthetic, economic and social heritage and values.

Environmental Management Plan – as defined in the EIA Regulations (Section 8(j)), a plan that describes how activities that may have significant environmental effects are to be mitigated, controlled and monitored.

Interested and Affected Party (IAP) - in relation to the assessment of a listed activity includes - (a) any person, group of persons or organisation interested in or affected by an activity; and (b) any organ of state that may have jurisdiction over any aspect of the activity.

Mitigate - practical measures to reduce adverse impacts.

Proponent – as defined in the Environmental Management Act, a person who proposes to undertake a listed activity.

Significant impact - means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

1 Introduction

1.1 Project Background

ELSH Cremation Services cc intends to establish a crematorium in Nubuamis, on the northern outskirts of Windhoek. Resilient Environmental Solutions cc (RES) was contracted to apply for an Environmental Clearance Certificate for this project.

1.2 Project Need and Desirability

A crematorium provides an essential service to society, offering an accepted and safe way for disposing of the body of a deceased person as an alternative to traditional burial. The Windhoek Crematorium offers this service but the proponent has identified the need for additional cremation capacity to serve Windhoek and Namibia as a whole.

1.3 Terms of Reference

Resilient Environmental Solutions cc, hereafter referred to as RES or the Environmental Assessment Practitioner (EAP), was appointed by the Proponent to undertake an Environmental Impact Assessment (EIA) for the purpose of applying for an Environmental Clearance Certificate (ECC) for the project. No Terms of Reference was provided. This EIA is guided by the Regulations (2012) of the Environmental Management Act (2007), and complies with the requirements of this Act.

This EA has been conducted with the aim to apply for an ECC only. Any additional permits or licenses and/or approvals that are required (see Chapter 4) for the operation of the project should be applied for by the Proponent.

1.4 Environmental Assessment Process

The steps followed as part of this EA process are:

- registration of application for an ECC, and
- carrying out the scoping phase of the EIA process.

1.4.1 Registration of Application for Environmental Clearance Certificate

The first step was to identify the listed activities which the proposed project entails, as stipulated in the 'List of Activities that may not be undertaken without an Environmental Clearance Certificate' (GN. No. 29 of 2012). Two listed activities were identified.

WASTE MANAGEMENT, TREAMENT, HANDLING AND DISPOSAL ACTIVITIES

- The construction of facilities for waste sites, treatment of waste and disposal of waste.
- Any activity entailing a scheduled process referred to in the Atmospheric Pollution Prevention Ordinance, 1976.
- The import, processing, use and recycling, temporary storage, transit or export of waste.

HAZARDOUS SUBSTANCE TREATMENT, HANDLING AND STORAGE

- Any process or activity which requires a permit, licence or other form of authorisation, or the modification of or changes to existing facilities for any process or activity which requires an amendment of an existing permit, licence or authorisation or which requires a new permit, licence or authorisation in terms of a law governing the generation or release of emissions, pollution, effluent or waste.

Section 32 of the EMA requires that applications for an ECC be submitted to the relevant Competent Authority. The Competent Authority is defined as that authority having the jurisdiction to approve or permit a particular listed activity in accordance with the relevant national legislation. The Ministry of Health and Social Services (MoHSS) was identified as the Competent Authority. Therefore, the application for an ECC was submitted on 9 March 2022 to the Executive Director of the MoHSS (Appendix D4). The ECC application was uploaded to the Ministry of Environment and Tourism's EIA/ECC application website on 17 November 2021.

1.4.2 The Scoping Phase

After the ECC application was submitted, the scoping phase commenced, culminating in the production of this Scoping Report which includes all the findings of the scoping-level impact assessment. This report includes the following:

- A description of the proposed project (Chapter 3);
- Legislative provisions that have relevance to the proposed project (Chapter 4);
- A description of the existing biophysical and social conditions of the receiving environment (Chapter 5);
- A description of the public consultation process (Chapter 6);
- A description and significance assessment of all identified potential impacts (positive and negative) associated with the proposed project (Chapter 7); and
- Management and mitigation measures required to avoid or minimise the potential negative impacts as outlined in the Environmental Management Plan (EMP) (Appendix B).

The purpose of this Scoping Report is to provide all affected authorities and registered IAPs with a description of the EIA process conducted to date, including a summary of the findings of the impact identification and assessment process.

1.5 Assumptions

The following assumptions apply to this EIA:

- It is assumed that the information provided by the Proponent is correct and that all necessary information has been disclosed.
- It is assumed that there will be no significant changes to the proposed project or the affected environment between the compilation of this report and implementation of the proposed project that could substantially influence findings and recommendations with respect to mitigation and management.

2 Project Team

The project team for this EIA consists of John Pallett and Sheldon Husselmann. Both have significant experience in conducting EIAs within the Namibian environmental context.

2.1 John Pallett

John Pallett is a certified Environmental Assessment Practitioner (EAP), with qualifications in geology (BSc) and zoology (BSc Honours). He specialises in providing environmental advice and evaluating environmental issues, particularly through Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs), for the benefit of managers, decision-makers and the lay public. He has been affiliated to the Southern African Association for Impact Assessment (SAIEA) since 2008, and the Desert Research Foundation of Namibia – Environmental Evaluation Associates of Namibia (DRFN-EEAN) for 14 years up to 2008. See CV (Appendix C1).

2.2 Sheldon Husselmann

Sheldon Husselmann is the holder of BSc, BSc Honours and MSc in Environmental and Geographical Science (2010, 2011 and 2016 respectively).

During his 6 years as an EAP with Enviro Dynamics cc, GCS Water Environmental Engineering (Pty) Ltd and Urban Green cc, he has gained valuable experience in conducting EIAs (including public consultation), both in team set-up as well as individual team leader. Sheldon has also been affiliated with the SAIEA since June 2018. Find attached his CV (see Appendix C2).

3 Project Description

3.1 Location

The proposed ELSH Crematorium will be situated on Plot 11, Nubu Industrial Park, in Nubuamis, the area loosely known as 'Brakwater' immediately north of the Windhoek built-up area (Figure 3-1, Figure 3-2). Nubu Industrial Park is situated on Portion 108, a Portion of the Remaining Extent of Portion 15, of the Farm Nubuamis No. 37.

The site is fairly open with hills to the west, and flat, open ground to the north, east and south. Carin Park area lies immediately north of Nubu Industrial Park. The B1 highway running north-south lies about 120 m to the east of the site. On the opposite side of Plot 11 over Habis Street, on the northern side, is a newly established WESCO plant for recycling waste oil.

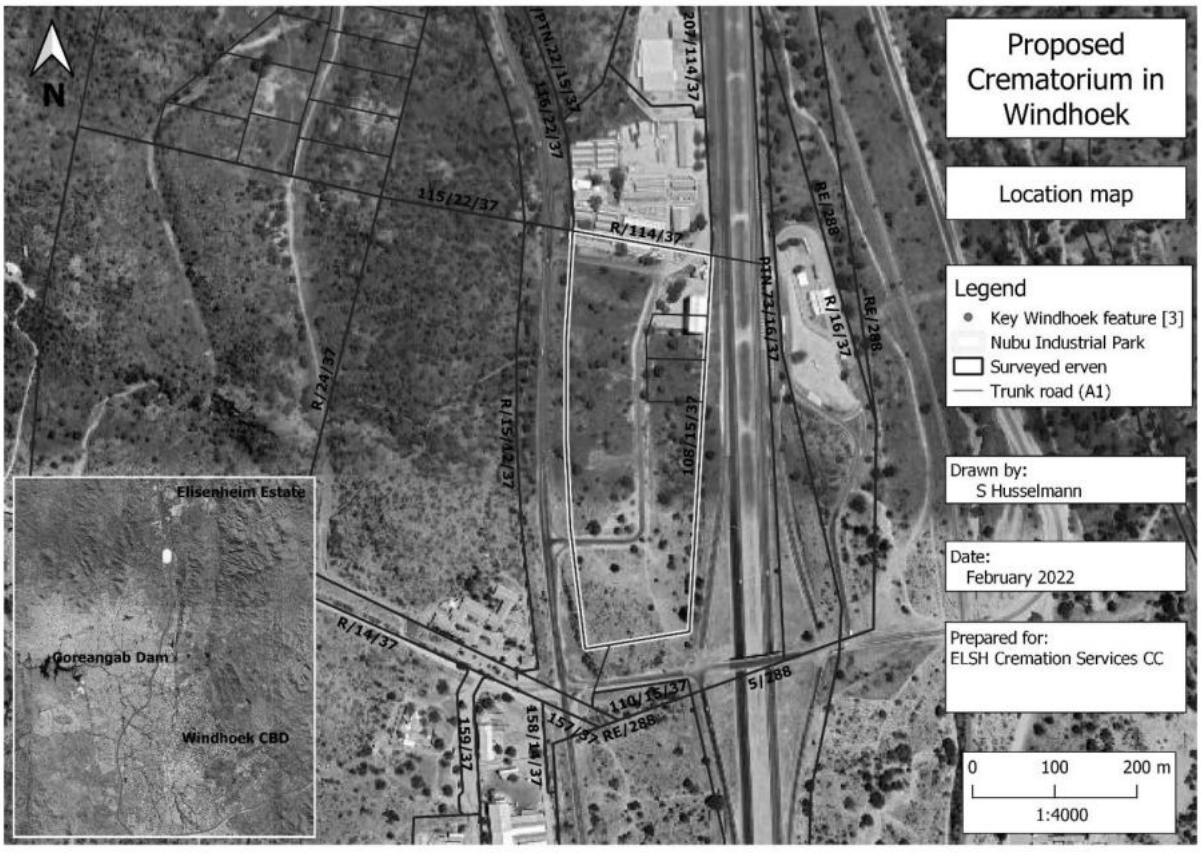

Figure 3-1: Location of Nubu Industrial Park, Nubuamis, Windhoek.

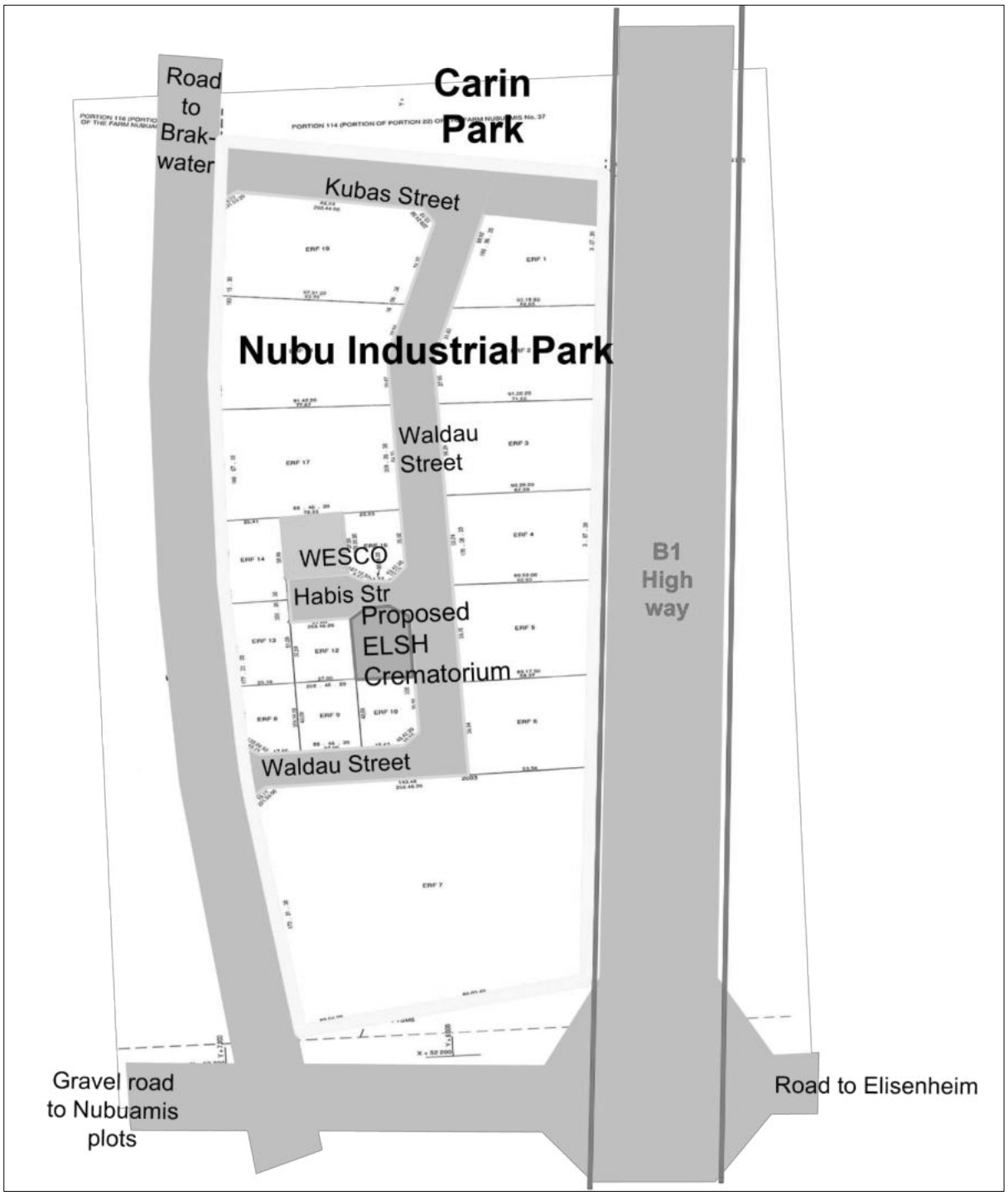

Figure 3-2: Location of proposed ELSH Crematorium in relation to Nubu Industrial Park and surroundings, Nubuamis, Windhoek.

3.2 Zoning and industrial equipment

Nubu Industrial Park is zoned for light industrial and business activities.

The apparatus to be installed is one crematorium unit of the American Crematory Model DFE-A-250 (Figure 3-3). This will be fuelled by Liquid Petroleum (LP) Gas.

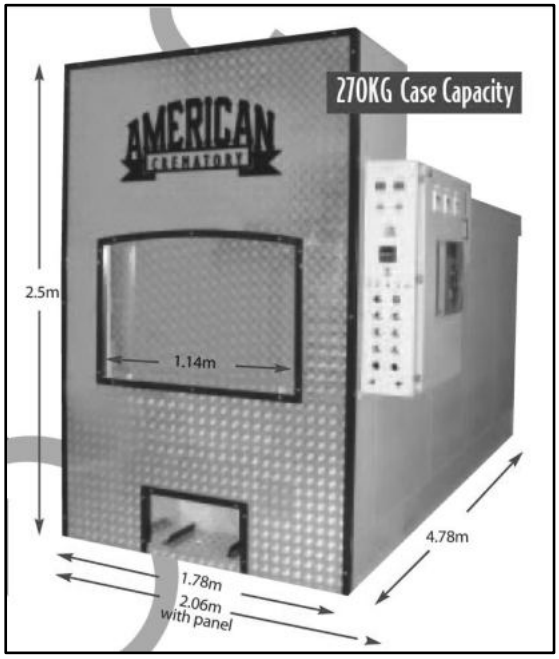

Figure 3-3: Catalogue diagram of the crematory apparatus.

3.3 Proposed activities

The ELSH Crematorium will provide cremation services for Windhoek and all areas of Namibia.

Human bodies (cadavers) will be brought to ELSH Crematorium from a mortuary or a funeral home. There will be a mortuary room in the building with capacity for 18 (maximum 21) cadavers. The cadavers will not be kept on site for longer than 48 hours, and if necessary, will be prepared and placed in a coffin for cremation. The crematorium will cremate 6 – 8 bodies per work day.

Visitors to the Crematorium, who will mostly come as mourners at the end of a funeral service, will park their vehicles along the Waldau Street access and parking area that will be created as shown in the architect's drawing (Figure 3-4).

Figure 3-4: Artist's impression of the proposed ELSH Crematorium buildings.

3.4 Construction Phase

The Proponent will appoint a contractor to construct the crematorium and facilities. The construction crew will be accommodated off-site in Windhoek for the duration of the construction works. A relatively small workforce (i.e. approximately 15 people) will be employed during the course of the construction phase. This is expected to last approximately three months. This is an estimate subject to change based on conditions at the time when construction starts.

3.5 Operational features

The operation phase infrastructure and requirements are outlined below.

3.5.1 Water

It is estimated that the water consumption will be 1,000 litres per day. This water supply will come from a connection to the NamWater pipeline running north-south parallel to and on the west side of the B1 Highway from Okahandja to Windhoek. A supplementary water tank, with capacity of 10 m^3, will be established on the site, and will be kept filled by the inflow from the Namwater pipeline. The water storage tank will supply the site with water in case of the need to extinguish a fire, and domestic water as per the relative SANS requirements.

Sewage water and grey water from the buildings will be carried via standard sewer pipes to a small septic tank system for disposal and treatment of the wastewater from the plant.

3.5.2 Energy

Four LP Gas storage banks consisting of ten 48 kg cylinders each will be installed. The LP Gas cylinders will be replaced on a daily or weekly basis depending on the operational load of the crematorium unit. The crematorium unit will be supplied via two of the LP Gas storage banks. Building safety requirements for gas storage, such as fire safeguards, will be included in the design and operations of the Crematorium.

Electricity will be provided by a dedicated offtake from the existing distribution kiosk situated in close vicinity to the property. No additional power lines will be necessary.

3.5.3 Road Access

Road access to site is obtained from Waldau Street which runs along the east side of the property.

3.5.4 Noise

All the cremation apparatus will be enclosed in the building to absorb noise, so that the visitors are not disturbed by this aspect. The operating furnace makes a low-frequency, soft burning noise that is designed to be unobtrusive.

The Windhoek Crematorium at the Pioneers Park cemetery, managed and operated by the City of Windhoek, does not produce any loud or disturbing noises. This was ascertained during the site visit, and is understood to be the typical situation. Noise is therefore deemed to be an insignificant issue.

3.5.5 Solid Waste Management

The solid waste will consist of waste from the coffins and the cadavers themselves, and standard domestic waste from the office and small kitchen.

The fine ash and crushed bone fragments derived from the cremation process are completely sterile from the high temperatures of the crematory, and can be safely disposed of. These are packaged in an urn and given to the relatives of the deceased. Metal parts such as surgical pins and plates in the cadavers will be collected in a grate in the crematory apparatus. Such parts are also completely sterilised, and will be added to the standard domestic waste coming from the site. A municipal waste collection service will pick up such rubbish for standard disposal at the Windhoek waste disposal site at Kupferberg.

3.5.6 Air emissions

Cremation is a combustion process in which a coffin and human remains are burned at a high temperature in a closed chamber[1]. The process is fuelled by LP Gas and produces emissions associated with fossil fuel combustion as well as emissions from the material being burned. The potential emissions are listed below.

The emissions will be expelled via a chimney stack that will rise 2.5 m above the roof level. This is designed to expel the emissions at sufficient height so that they are well diluted and mixed within a 100 m radius under still conditions.

The USA manufacturer provides a guarantee that all potentially hazardous emissions do not exceed any safety thresholds prescribed by the World Health Organisation (Appendix E). Namibia does not have air quality regulations, so the WHO standards (consistent with the South African National Ambient Air Quality Standards, NAAQS) are applied.

3.5.6.1 Potential emissions

Particulates such as dust, soot, ash and other unburned particles originate from the coffin and human remains. Carbon-based organic particulates are removed in the secondary combustion chamber and through proper adjustment and operation of the cremation equipment.

Carbon monoxide results from incomplete combustion of the coffin, human remains, gas fuel and other contents. Carbon monoxide may be minimised through proper adjustment and operation of the cremation equipment.

Sulphur dioxide is produced from the combustion of gas, the coffin, and contents. The sulphur content of natural gas and human remains is low.

Nitrogen oxides are formed by high temperature combustion processes through the reaction of the nitrogen in air with oxygen. Nitrogen oxide emissions from crematories are low and are not of major concern. Control of nitrogen oxides can be achieved through temperature control and burner design.

Mercury emissions originate from dental fillings of the deceased. Mercury may be removed through the use of selenium salt in the cremation chamber or scrubbers. It should be noted that in some countries the use of plastic or other types of fillings are gaining popularity, thereby reducing potential mercury emissions.

[1] O'Keeffe J. 2020. Crematoria emissions and air quality impacts. National Collaborating Centre for Environmental Health, Canada.

Non-methane volatile organic compounds (NMVOCs) are produced from incomplete or inefficient combustion of hydrocarbons contained in the fuel, body, and coffin. NMVOCs are reduced through the proper use and adjustment of the crematory.

Dioxins and furans (PCDD/Fs) result from the combustion of wood cellulose and chlorinated plastics. Dioxins and furans may be reduced through reducing the amount of chlorinated plastics in the wood of the coffin, and with sufficiently high temperature and residence time in the secondary combustion chamber. Reformation of dioxins and furans can be avoided by good design of the flue-gas ducts, by reducing particulate deposition and avoiding the dioxin and furan reformation temperature window.

Most contaminants except for the heavy metals can be minimised through proper operation of the cremation apparatus in conjunction with adequate temperature and residence time in the secondary combustion chamber. Mercury, a heavy metal, can be removed by adding activated carbon to the particulate control devices e.g. bag filters.

The WHO and South African air emission guideline thresholds[2] are shown in Table 4-4 below.

3.6 Need and Alternatives

3.6.1 Need and desirability for a crematorium

A crematorium provides an essential service to society, offering an accepted and safe way for disposing of the body of a deceased person. The Windhoek Crematorium offers this service but the proponent has identified the need for additional cremation capacity to serve Windhoek and Namibia as a whole.

The Windhoek Crematorium, situated in the Gammams Cemetery in Pionierspark, is currently Namibia's main crematorium. A new crematorium has recently (early 2022) been established in Walvis Bay. Stakeholders to the public consultation meeting for this EIA mentioned a crematorium in Mariental. This was checked and found to be not true; the only facility for cadavers in Mariental is a funeral home and mortuary.

The need for additional cremation capacity, with the advantage of being in the private sector, is therefore justified.

[2] From (i) WHO (2005). WHO Air Quality Guidelines Global Update, World Health Organisation, October 2005, Germany. (ii) DEA (RSA) 2009. National Ambient Air Quality Standards. Schedule to National Environmental Management: Air Quality Act 2004.

3.6.2 No-Action Alternative

If the proposed project was denied an Environmental Clearance Certificate (ECC), this would have the following consequences:

- **Negative:**
  - The Namibian public would remain dependent on one cremation facility.
  - The few jobs to be created by the business would not materialise. This represents a small opportunity cost given the unemployment situation in Namibia.
  - The company's contribution to the economy in terms of taxes and VAT would not be made.
- **Positive:**
  - There would be no additional traffic and activity at the Nubu Industrial Park. This is preferred by some of the Nubuamis residents who choose to live there for the peace and natural ambience. This is debateable, as the vacant site would probably be filled by some other industry. This is seen in the existing establishment of the Wesco oil recycling plant, and a proposed medical warehouse facility, that are now growing in the Industrial Park.

3.6.3 Alternative sites

No site alternatives have been proposed by the proponent.

This assessment of the proposed business has not identified any significant impacts or fatal flaws that would create the need to find alternatives (see Sec 7 below). The argument put forward by residents in the vicinity that they would like to maintain the out-of-town, natural ambience of this area, is noted. But it raises the question: where would the proposed activity not have this impact? According to the City of Windhoek, this type of business is not permitted in a residential area; it must be located in an industrial area. The situation of the proposed Crematorium is therefore justified, as the Nubu Industrial Park is allocated for industrial use.

This EIA concludes that alternative sites do not need to be considered. The focus is therefore on mitigating any negative impacts as far as possible, to prevent or minimise the impacts for any affected parties.

4 Legislation Relevant to the Project

4.1 National Legislative Requirements

The legal framework for EIA in Namibia is shown in the tables below.

Table 4-1: Environmental management legislation applicable to the project

Statute	Provisions	Project Implications
Environmental Assessment Legal Framework		
The Namibian Constitution (1990)	Article 95 (1) states that "*the State shall actively promote and maintain the welfare of the people by adopting, inter alia, policies aimed at… maintenance of ecosystems, essential ecological processes and biological diversity of Namibia and utilization of natural resources on a sustainable basis"* Article 100 stipulates that all natural resources are vested in the state, unless otherwise legally owned. The use of such resources is only allowed within reasonable limits. Beyond such limits, permission should be obtained from a competent authority responsible for the use and governance of the concerned natural resources.	The project should support the provisions of the Namibian Constitution
Environmental Management Act (No 7 of 2007)	Section 3(2) of the EMA provides a set of principles that give effect to the provisions of the Namibian Constitution for integrated environmental management. Section 27(3) stipulates that no party, whether private or governmental, can conduct a listed activity without an ECC obtained from the Environmental Commissioner.	The project should adhere to the principles provided in the EMA. An ECC should be obtained for the proposed project. The Proponent should renew the ECC every three years.

Statute	Provisions	Project Implications
	Section 40(1) stipulates that an ECC remains valid for a period not exceeding three years, subject to cancellation or suspension.	
Environmental Impact Assessment (EIA) Regulations GN 28-30 (GG 4878)	Details requirements for public consultation within a given environmental assessment process (Rs21-24). Details the requirements for what should be included in a Scoping Report (R8) and an Assessment Report (R15).	The EIA Regulations should inform and guide this EIA.

4.2 Sectoral Legislative Requirements

Table 4-2: Sectoral legislation applicable to the project.

Statute	Provisions	Project Implications
Water Act (No. 54 of 1956)	Makes provision for a number of functions pertaining to the management, control and use of water resources, water supply and the protection of water resources.	The Proponent should prevent any potential pollution of groundwater. Water should be used in a sustainable way. Water abstraction and use should be done in a responsible and sustainable manner and compliant with any permit/license requirements of the Ministry of Agriculture, Water and Land Reform.
Water Resources Management Act No. 11 of 2013	Provides for the management, development, protection, conservation, and use of water resources. Part XIII of the Act requires that efficient water management practises be applied by each and every person or organisation and organ of state. This Act has not yet been brought into force.	
Pollution Control and Waste Management Bill	This Bill is not yet promulgated so is not in force. The Act will regulate the discharge of pollutants to the air, water and land; it will regulate noise, dust and odour pollution; and it will establish a	Pollution to the air and water should be avoided, and dust pollution should be prevented. Waste

Statute	Provisions	Project Implications
	framework for integrated pollution prevention and control.	management should be applied.
Atmospheric Pollution Prevention Ordinance No. 11 of 1976 (as amended)	This Ordinance provides for the prevention of pollution of the atmosphere. Part II deals with control of noxious or offensive gases, which applies to the emissions from a crematorium.	A registration certificate is required for emission of noxious or offensive gases, obtainable from 'the Director of Health Services' (presumably MoHSS).
Public and Environmental Health Act (No. 1 of 2015)	This Act provides a framework for a structured uniform public and environmental health system in Namibia. The act identifies health nuisances, such as chimneys emitting smoke in quantities that can be offensive, injurious or dangerous to health, which are liable to be dealt with. Under this Act, all Local Authorities must take measures to prevent unhygienic or offensive conditions in their jurisdiction, and must prevent occurrence of health risks.	Sec 52: Any party that generates industrial / hazardous waste must register with the Local Authority. The LA must in turn register with the Chief Health Officer.
Labour Act (No. 11 of 2007)	The Labour Act of 1992 (Act 6), the New Labour Act of 2007 (Act 11) and Government Notice 156 of 1997: Labour Act, 1992: Regulations Relating to the Health and Safety of Employees at Work, governs working conditions of employees. These regulations are prescribed for among others safety relating to hazardous substances, exposure limits and physical hazards.	The Proponent should comply with health and safety regulations pertaining to the health and safety of their employees.
Regulations relating to the health and safety of employees at work	Details conditions pertaining to occupational health and safety applicable to manual labour.	Work conditions during both construction and operations should comply with these regulations.

Statute	Provisions	Project Implications
(GN 156/1997 (GG 1617))		
Road Ordinance 1972 (Ordinance 17 of 1972)	Infringements and obstructions on and interference with proclaimed roads. (S37.1)	The conditions applicable to road accesses should be adhered to.

4.3 International Treaties and Conventions

Table 4-3: International Treaties and Conventions applicable to the Project

STATUTE	PROVISIONS	PROJECT IMPLICATIONS
International Air Quality standards	Namibia has no local air quality standards, so international criteria are used. The most widely referenced international air quality standards are those published by the World Health Organisation (WHO). The South African National Ambient Air Quality Standards (SA NAAQS) are also applicable due to the similar environmental, social and economic characteristics between the two countries. The threshold values of the potential pollutants emitted from the crematorium are provided in Table 4-4 below.	

Table 4-4: International assessment criteria for potential pollutants from a crematorium.

Pollutant	Averaging Period	WHO Guideline Value (µg/m³)	South Africa NAAQS (µg/m³)
Sulphur Dioxide (SO_2)	1-year	-	50
	24-hour	125 (IT-1)	125
		50 (IT-2)	
		20 (guideline)	
	1-hour	-	350
	10-minute	500 (guideline)	500
Nitrogen Dioxide (NO_2)	1-year	40 (guideline)	40
	1-hour	200 (guideline)	200
Particulate Matter (PM_{10})	1-year	70 (IT-1)	40
		50 (IT-2)	
		30 (IT-3)	
		20 (guideline)	
	24-hour	150 (IT-1)	75
		100 (IT-2)	
		75 (IT-3)	
		50 (guideline)	
Particulate Matter ($PM_{2.5}$)	1-year	35 (IT-1)	25
		25 (IT-2)	20
		15 (IT-3)	15
		10 (guideline)	
	24-hour	75 (IT-1)	65
		50 (IT-2)	40
		37.5 (IT-3)	25
		25 (guideline)	
Carbon Monoxide (CO)	1-hour		30 000
	8-hour		10 000

IT-1, IT-2 and IT-3 refer to Interim Targets provided by WHO to enable countries to set targets over time that would gradually approach the guideline value.

5 Description of the Receiving Environment

5.1 Biophysical Environment

5.1.1 Climate

Windhoek, located in the central highlands in the interior of Namibia, experiences a moderate climate with average maximum temperature of 17 - 30°C, and average minimums of 5 - 16°C. Windhoek receives between 10 to 20 days of frost per annum. The monthly course of average temperatures is shown below in Table 5-1.

Table 5-1: Monthly average, minimum and maximum temperatures at Windhoek

Month Temp ˚C	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	22.3	21.2	20.1	18.1	15.6	12.5	12.0	15.0	18.7	21.4	22.0	22.7
Avg Minimum	16.4	15.8	14.8	12.4	9.3	5.9	5.0	7.2	10.3	13.6	14.6	15.7
Avg Maximum	18.3	26.9	25.8	24.1	22.3	19.8	19.7	23.0	17.0	29.2	29.4	29.5

The average annual rainfall for Windhoek is 300 - 400mm, with the wettest months being January to March. Relative humidity is generally low, from 10 – 20% during the driest time of the year from June to November, and increasing to over 50% during rainy months February and March.

The important factors for dispersion of emissions are wind and temperature. Figure 5-1 below presents the average wind speeds and directions for Windhoek.

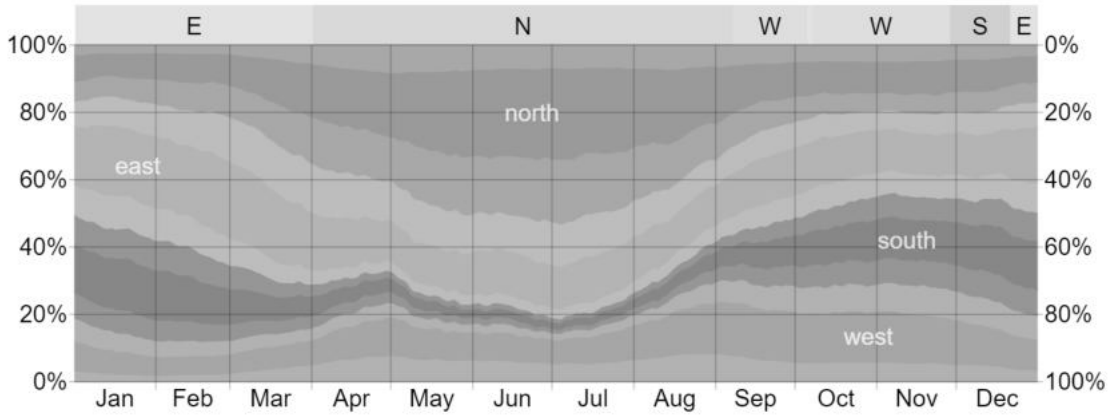

Figure 5-1 Average wind direction during the year measured at Windhoek Met Station. Source: https://weather.namsearch.com/wdhwindsummary.php

Winds predominate from the north for five months during the winter (April to August), when speeds average 4.2 km/h. They also blow predominantly from the east at higher average speeds (5.0 km/h, January to March, the three wet summer months) and the west at the highest average speeds (5.7 km/h, September to November, the three dry summer months), as well as predominating from the south for a short period in the summer, also at fairly high average speeds (5.0 km/h).

It is therefore impossible to identify a predominant year-round wind direction, but as a general rule, winds blow from the west, east and south at higher speeds during the warmer months (September to March), and at lower speeds from the north during the cooler months (April to August).

5.1.2 Topography and geology

The project site falls in the Khomas Hochland, an area of hilly terrain underlain by schist and quartzite rocks of the Damara Formation, at about 1500 m altitude. The site itself is flat, and is bounded on the west side by low hills.

5.1.3 Biodiversity

5.1.3.1 Vegetation

The habitat is classified as highland Acacia savannah, comprising medium-sized trees and scattered shrubs, with a grass layer, growing on thin stony soils. On and near the site there are a few camelthorn trees (*Acacia erioloba*) which will not be cleared as they contribute to the pleasant visual aspect of the proposed buildings.

5.1.3.2 Fauna

The fact that the crematorium is on a brownfield site, and it is situated in a built-up area, means that there will be very little impact on the natural indigenous fauna. Birds occurring in the area are typical of Windhoek and the Khomas Hochland. That is, there are various urban-associated birds with occasional recordings of raptors such as rock kestrel and gabar goshawk. There are no wetland-associated birds in the vicinity. Any conservation priority species which might occur there, such as Verreaux's eagle, would be only very rare vagrants. None of the reptiles and small mammals that occur in the immediate surroundings are known to be conservation priority species.

5.2 Socio-Economic Environment

5.2.1 Land Use

The surrounding land at the site is used for typical peri-urban developments such as small industries (e.g. Clover dairy warehouse, Neo Paints and Wesco waste oils plant), businesses which require space (such as truck yards and a storage depot), and small residential plots in the Nubuamis hills area to the west and north. The B1 double-lane highway between Windhoek and Okahandja is adjacent to the Industrial Park on the eastern side. Therefore, the general land use of the area is light industry, with low density residential and rural land beyond a radius of about 2 km from the site.

5.2.2 Archaeology and Heritage Resources

The proposed crematorium is a brownfield site. There is very low likelihood of encountering any heritage resources in the project, since it is not on or near a watercourse, nor in an area known to have historical or cultural interest.

6 Public Consultation

Public consultation is an important aspect of an Environmental Assessment process. During public consultation, potential impacts that the proposed project may have on the receiving environment were identified. Consultation with Interested and Affected Parties (IAPs) enables transparent decision-making.

This chapter describes the details of the public consultation process that was followed and the IAPs that were notified of the study being undertaken. It also includes the main issues and concerns raised during the public consultation process and comments received on the Background Information Document (BID) distributed during the first round of public consultation.

The public consultation process was carried out as prescribed by Regulations 21 to 24 of the Environmental Impact Assessment Regulations (GN. 30 of 2012).

6.1 First Round of Public Consultation

Engagement with IAPs as part of the first round of public consultation commenced on 8 March 2022, when IAPs and authorities were given an opportunity to register and submit comments on the proposed project.

6.1.1 Public Consultation Activities

Activities undertaken to ensure effective and adequate IAP involvement, were as follows:

- A register of IAPs was compiled and maintained (Appendix D1). A total of 47 IAPs were included in the database.
- A notification email (Appendix D2) with the BID (Appendix D3) was distributed to all registered IAPs on 11 March 2022 or on later dates as they became registered.
- Notification letters were hand-delivered to the Windhoek Municipality, Ministry of Mines and Energy and the Ministry of Health and Social Services, on 8 March 2022 (Appendix D4).
- Public notices announcing the commencement of the EA and an invitation to register as an IAP were placed in “Die Republikein” and “The Namibian” newspapers on 10 and 17 March 2022 (Appendix D6).
- A notice board with the dimensions 60cm x 42cm was placed in front of the site (Figure 2). A second notice was placed on the junction of Brakwater Road and Kubas Street (Appendix D7).
- A public meeting was held at Role Equestrian Park, about 1.5 km from the project site, on 22 March 2022. Eleven people attended (Appendix D8a). The minutes of the

meeting are shown in Appendix D8b, and the presentation that was given is in Appendix D8c.

6.1.2 Comments Received and Responses Provided

All comments and feedback received from IAPs are summarised in Table 6-1 below. No email comments were received.

Table 6-1: Comments received and responses provided during public consultations

No.	Comment	Response
1.	a. Who is the watchdog? b. What happens when issues emerge after operation commences? c. What are the checks and balances in place? d. Who monitors the EMP? DEA? If so, we can expect virtually no monitoring to take place.	a. RES: CoW and MOHSS b. RES: The EMP dictates what mitigation and monitoring measures must be carried out to prevent and minimise issues. c. Architect: Regular maintenance of the apparatus will be undertaken to ensure operational efficiency. The consequence is that pollution issues will be unlikely as the machine will run as it should, with noise and emissions at the right levels. d. RES: Noted. We cannot give any guarantees that compliance will be monitored and enforced. Nevertheless, we can design the EMP to reduce the risk that negative issues might arise in future.
2.	WHO standards are not on par with other standards?	RES: Disagree. Namibia does not have regulatory air quality standards so we fall back on WHO standards, which are internationally recognised and accepted.
3.	a. Are there any other privately owned crematoria in Namibia? b. How are they run?	A. Architect: One in Walvis Bay and one in Mariental. (Subsequently corrected: there is no crematorium in Mariental. The one in Walvis Bay is still under construction, and not yet operational.) b. RES: No investigations feasible since none are yet operational. Architect: It is in everybody's interest to keep the machinery in good working condition, and some kind of

No.	Comment	Response
		"fitness certificate" will be required annually from the CoW (regulator).
4.	Will there be any smell?	RES: As far as we are aware, no odours will be emitted. The Windhoek Incinerator, operated and managed by City of Windhoek, has not ever experienced complaints from the public in this regard.
5.	Is the 2.5m stack height sufficient?	Architect: Yes, it is sufficient and complies with the manufacturers' requirement.
6.	The Waldau Str – Brakwater road intersection is potentially dangerous.	RES: Noted.
7.	Scrubbers are expensive.	Architect: The scrubbers are part of the purchase price.
8.	Is this the best place to locate a crematorium?	RES: It is not an unreasonable location, and there are no fatal flaws that would suggest a different location is needed.
9.	There are concerns around the smoke emissions, and the health risks posed by them.	RES: Noted. If the crematorium is run according to manufacturer's specifications, the levels of mercury and other noxious gases will be within international standards and within allowable thresholds..
10.	Residents of Brakwater live here to be 'in nature' and for the sense of place.	RES: Noted.

6.2 Outcome of First Round of Public Consultation

The main issues raised during the first round of public consultation are as follows:

- Concern over the health impacts of the emissions and the potential for offensive odours.
- Concern over potential traffic impacts on the Brakwater road.
- Concern by residents in the Nubuamis Hills area about the potential loss of the natural sense of place of the area.

No critical issues, with the potential to stop the proposed development, were raised.

RES undertook a site visit to the Windhoek Crematorium on 25 March 2022, under the guidance of the CoW caretaker and Central Technical Supplies, the company that maintains and services the Windhoek Crematorium machinery. This helped to understand the concerns that IAPs had raised.

6.3 Second Round of Public Consultation

Engagement with IAPs as part of the second round of public consultation commenced on 13 June and concluded on 1 July 2022. During the second round of consultation, IAPs and affected authorities were given an opportunity to review the draft scoping report and submit comments.

6.3.1 Public Consultation Activities

A notification email (Appendix D9) with the draft scoping report and was distributed to all IAPs on 13 June 2022. Feedback was invited, with a deadline of 27 June 2022.

6.3.2 Comments Received

No comments on the draft scoping report were received from IAPs, including authorities, during the second round of public consultation.

7 Impact Assessment

The proposed project is expected to have varied impacts on the immediate and surrounding receiving environment. An understanding of these impacts together with effective mitigation measures can however minimise and possibly avoid such impacts.

The purpose of this chapter is to identify potential impacts that the proposed project is expected to have on the receiving environment and determine their significance. The chapter provides a description and assessment of the identified impacts. Mitigation measures relevant to the construction and operational phases of the project are recommended. These measures are aimed at avoiding, minimising or mitigating negative impacts while maximising potential benefits. The significance of potential impacts without and with mitigation is provided.

7.1 Screening process

Each of the potential impacts identified by Interested and Affected Parties during public consultation and by the EAP based on professional experience was screened according to a set of questions (Figure 7-1), which resulted in highlighting the key impacts requiring further detailed assessment.

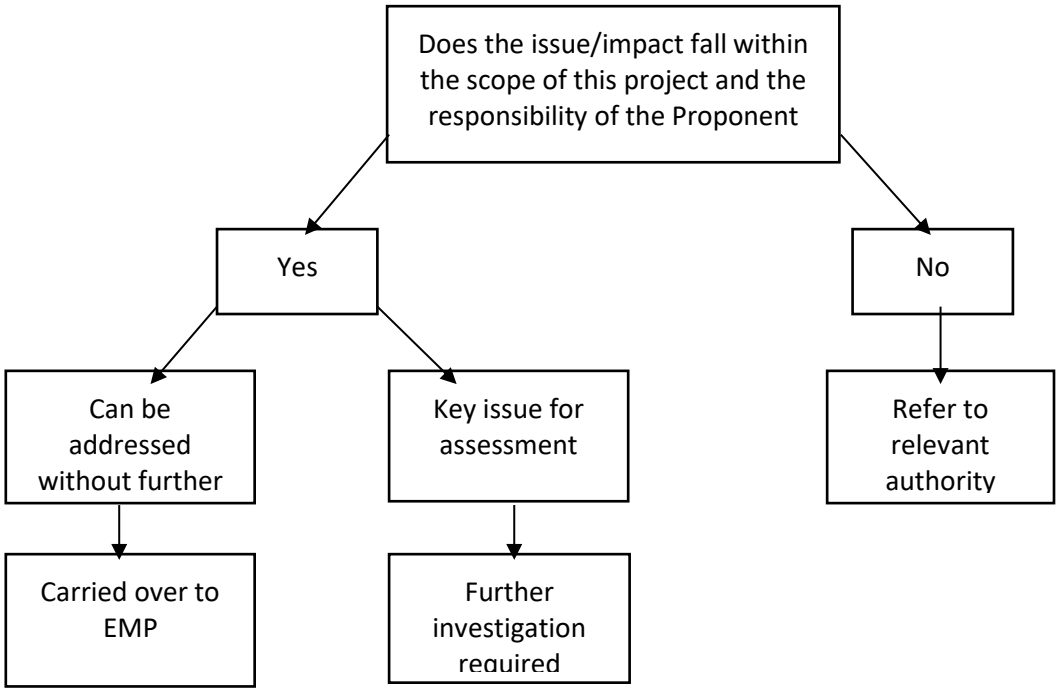

Figure 7-1: Screening process for determining key impacts

This list of impacts that were subjected to a detailed assessment is presented in Table 7-2, as per the evaluation criteria presented in Table 7-1.

7.2 Assessment criteria

The identified impacts are assessed according to a synthesis of criteria required by the integrated environmental management procedure. This entails the establishment of the expected impact's duration (time scale), extent (spatial scale), magnitude (intensity), probability, and status, in combination providing the expected significance (see Table 7-1).

Table 7-1: Criteria applied to each potential impact

Criteria	Category
Impact	This is a description of the expected impact.
Nature **Describe the type of impact.**	*Positive:* The activity will have an environmental (social or biophysical) benefit. *Neutral:* The activity will have no effect. *Negative:* The activity will have an environmentally (social or biophysical) harmful effect.
Extent **The area affected by the impact.**	*Site Specific:* Expanding only as far as the activity itself *(on-site)* *Small / Local:* Restricted to the site's immediate environment, within 5 km of the site *Medium:* Impact experienced over a wider area, extending up to 20 km from the site *Large / Regional:* Beyond 20 km of the site *International:* Impact experienced over an extensive area and into other countries.
Duration **Predicts the lifetime of the impact.**	*Temporary:* < 1 year *Short-term:* 1 – 5 years *Medium term:* 5 – 15 years *Long-term:* >15 years (impact will stop after the operational or running life of the activity, either due to natural causes or by human interference) *Permanent:* Impact will be where mitigation or moderation by natural causes or by human interference will not occur in a particular means or in a particular time period that the impact can be considered temporary.

Criteria	Category
Magnitude **Describe the scale/size of the Impact.**	*Very low:* Affects the environment in such a way that natural and/or social functions/processes are not affected. *Low:* Natural and/or social functions/processes are slightly altered. *Medium:* Natural and/or social functions/processes are notably altered in a modified way. *High:* Natural and/or social functions/processes are severely altered and may temporarily or permanently cease.
Probability of Occurrence **Describe the probability of the Impact actually occurring.**	*Improbable:* Not at all likely. *Probable:* Distinct possibility. *Highly probable:* Most likely to happen. *Definite:* Impact will occur regardless of any prevention measures.
Degree of Confidence in Predictions **State the degree of confidence in predictions based on availability of information and specialist knowledge**	*Unsure/Low:* Little confidence regarding information available. *Medium:* Moderate confidence regarding information available. *High:* High confidence regarding information available.
Significance **The impact on each component is determined by a combination of the above criteria.**	*No change:* A potential concern which was found to have no impact when evaluated. *Very low:* Impacts will be site-specific and temporary with no mitigation necessary. *Low:* The impacts will have a minor influence on the project and/or environment. These impacts require some thought to adjustment of the project design where achievable, or alternative mitigation measures. *Moderate:* Impacts will be experienced in the local and surrounding areas for the life span of the development and may result in long term changes. The impact can be lessened or improved by an amendment in the project design or implementation of effective mitigation measures. *High:* Impacts have a high magnitude and will be experienced regionally for at least the life span of the development, or will be

Criteria	Category
	irreversible. The impacts could have the no-go proposition on portions of the development in spite of any mitigation measures that could be implemented.

Significance is determined through a synthesis of impact characteristics as described in Table 7-1 above. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required. Where the impact is positive, significance is noted as "positive". Significance will be rated on the following scale:

- No significance: The impact is not substantial and does not require any mitigation action;
- Low: The impact is of little importance, but may require limited mitigation;
- Medium: The impact is of importance and is therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels; and
- High: The impact is of major importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire project proposal unacceptable. Mitigation is therefore essential.

7.3 Potential impacts of the ELSH Crematorium

The potential impacts associated with the construction and operation of the ELSH Crematorium are presented in Table 7-2.

Table 7-2: Key impacts expected during the construction and operational phases

Aspect	Potential Impacts
Socio-economic environment	Positive: The creation of skilled, semi- and unskilled employment and associated income for a few individuals, and skills transfer – both phases.
	Positive: Diversification of the local economy, and provision of a useful social service by the private sector – operation phase.
	Negative: Potential inconvenience, and health and safety impacts from increased traffic to and from the site – both phases.
	Negative: Occupational health and safety impacts – both phases

Aspect	Potential Impacts
	Negative: Potential air quality impacts, creating health and safety risks to people in the vicinity of the crematorium, from the smoke and air emissions – operation phase.
	Noise: issue raised by IAPs, but described in the project description (section 3.5.5) as a non-issue.
Biophysical environment	Ongoing, long-term control over emissions and air quality.

Details with respect to the potential impacts expected during the construction and operation phases are discussed below. Recommended mitigation and monitoring measures are presented in the tables below and the Environmental Management Plan (Appendix B).

7.4 Construction phase impacts

7.4.1 Employment and skills transfer

The construction activities will provide some temporary employment opportunities for skilled, semi-skilled and unskilled workers in the Windhoek area. Some permanent employment opportunities will also be created during the operational phase. The income generated will benefit the individuals' households, and their further employability.

Table 7-3: Assessment of impact associated with employment creation for construction and operations

Criteria	Description
Potential impact	Employment creation and skills transfer (a few temporary and permanent skilled, semi-skilled and unskilled opportunities) – both phases.
Nature	**Positive impact**
Extent	Local to regional
Duration	Short-term and medium term
Magnitude	Low
Probability	Definite
Significance	Low
Recommended measures to improve impact	• Where possible, Namibian citizens and permanent residents from the local area should be employed.

Criteria	Description
	• Equal opportunities should be provided for both men and women.
Significance (with mitigation)	Low-medium
Confidence level	High

7.4.2 Increased traffic at and near the site

The construction activities will create increased traffic on the roads leading to the site. During operations, transport of cadavers and visitors to the crematorium will also add to traffic on the roads in the vicinity. This relatively small increase in traffic, relative to present conditions, will cause some inconvenience to local road users and will increase the likelihood of traffic accidents in the vicinity. Parking at the site, along Waldau Road, is considered to be adequate for the expected frequency of visitors, and it is off the main thoroughfare. This is not expected to cause any congestion to neighbouring businesses.

Table 7-4: Assessment of impact associated with increased traffic on nearby roads

Criteria	Description
Potential impact	Potential inconvenience, and health and safety impacts from increased traffic to and from the site.
Nature	**Negative impact**
Extent	Local
Duration	Long-term
Magnitude	Low
Probability	Probable
Significance	Low
Recommended mitigation measures to reduce impact	• The junction of Waldau Road with the Brakwater road is about 200 m north of the main Brakwater on/off-ramp on the B1 highway. It is recommended that an application be made to Roads Authority for traffic calming rumble-strips to be constructed on the Brakwater road on the approach to the B1 on/off-ramp. This is to slow down traffic and reduce the likelihood of accidents at the Waldau Road intersection.

Criteria	Description
Significance (with mitigation)	Very low – Low
Confidence level	Medium

7.4.3 Occupational health and safety impacts

Activities associated with the project's phases have the potential to cause accidental injury, owing to either minor (i.e. superficial physical injury) or major (i.e. involving heavy machinery or vehicles) accidents, to the Proponent's and sub-contracted personnel. On-site safety of all personnel is the responsibility of the Proponent and should be adhered to as per the requirements of the Labour Act (No 11 of 2007) and its regulations.

Table 7-5: Assessment of potential occupational health and safety impacts

CRITERIA	DESCRIPTION
Potential impact	Occupational health and safety impacts
Nature	**Negative impact** through potential injuries occurring during construction and operational activities. Explosion of fuel storage and associated injury to Proponent's personnel or locals.
Extent	Local
Duration	Short to long-term
Magnitude	Medium
Probability	Improbable
Significance (no mitigation)	Medium
Mitigation	• The Labour Act's Health and Safety Regulations should be complied with. • All personnel should be trained in/sensitised to the potential health and safety risks associated with their respective site jobs. • Prior to operating and using site machines and equipment, personnel involved in different project tasks should be trained on how to properly and correctly use them.

CRITERIA	DESCRIPTION
	• Appropriate personal protective equipment should be provided to personnel. • The equipment and fuel storage site should be properly secured and appropriate warning signage put in place. • An emergency preparedness plan should be compiled and all personnel appropriately trained.
Significance (with mitigation)	Low
Confidence level	High

7.5 Operation Phase

7.5.1 Diversification of local economic activities, and private sector provision of a social service

The crematorium will diversify and add resilience to the local economy. It will also provide a useful service to all sectors of society and reduce reliance on the country's only crematorium operated by the City of Windhoek. The fact that this crematorium will be operated and managed by the private sector, where service delivery needs to be efficient and friendly for the business to succeed, means that these qualities will likely be implemented and sustained.

Table 7-6: Assessment of impacts associated with economic diversification and service provision.

CRITERIA	DESCRIPTION
Potential impact	Local economic diversification, bringing increased economic resilience.
Nature	**Positive impact**
Extent	Local to regional
Duration	Long-term
Magnitude	Low
Probability	Probable
Significance (no mitigation)	Medium

CRITERIA	DESCRIPTION
Recommended measures to improve impact	None
Significance (with mitigation)	Medium
Confidence level	Medium

7.5.2 Air quality impacts

The major emissions of concern from crematories are nitrogen oxides, sulphur dioxide, carbon monoxide, particulate matter (PM10 and PM2.5), mercury and other heavy metals, non-methane volatile organic compounds, and some persistent organic pollutants (POPs, namely dioxins and furans).

The specifications of the proposed apparatus for the ELSH Crematorium list the predicted levels of these compounds. They are all within the air emissions thresholds set by WHO. The emission rates also depend on the design of the crematorium, combustion temperature, gas retention time, duct design, duct temperature and any control devices. It is therefore necessary to operate the apparatus strictly according to the manufacturer's instructions to prevent and minimise the potentially harmful emissions.

While the above potential pollutants have been associated with a range of adverse health effects, no studies have shown causal links between crematoria emissions and adverse health effects. Advice from Canadian authorities (2020[3]) and the European Environment Agency (2019[4]) recommends that a precautionary approach should be adopted, that includes following best practice recommendations for the design, operation, monitoring and maintenance of a crematorium.

Table 7-7: Assessment of air quality impacts

CRITERIA	DESCRIPTION
Potential impact	Emission of air pollutants
Nature	**Negative impact**

[3] O'Keeffe J. 2020. Crematoria emissions and air quality impacts. National Collaborating Centre for Environmental Health, Canada.
[4] European Environment Agency 2019. Air pollutant emission inventory guidebook.

CRITERIA	DESCRIPTION
Extent	Local
Duration	Long-term
Magnitude	Medium – High
Probability	Probable, a distinct possibility
Significance (no mitigation)	Moderate
Recommended mitigation measures	• Ensure that the appropriate scrubbers and filters are installed in the crematory apparatus. These must be installed during construction and replaced regularly as required during the operational phase. • Ensure that operation of the cremation apparatus strictly follows the manufacturer's instructions, especially regarding the temperature and duration of firing, to prevent and minimise potentially toxic emissions. • Ensure that the equipment is regularly serviced and maintained for optimal functioning, so that the manufacturer's claim that operations are safe with respect to emissions, is upheld. • Install air quality monitoring equipment and implement the necessary procedures for independent monitoring, in the vicinity of the crematorium. Notify IAPs that the monitoring system is installed and how they can obtain the results from a publicly accessible website.
Significance (with mitigation)	Low
Confidence level	Medium

7.5.3 Cumulative Impacts

Cumulative impacts are those that result from the effects of an action, project or activity (collectively called "developments") when added to other existing, planned, and/or reasonably anticipated future developments (International Finance Corporation, 2013).

Some of the cumulative impacts to which the proposed project potentially contributes is the increased risk of air pollution, originating from the neighbouring Wesco oil recycling plant and other possible industrial plants that will be established in the Nubu Industrial Park.

The implementation of an air pollution monitoring system, in reasonably close proximity to the ELSH Crematorium and the Wesco plant, will help to establish whether air emissions from these (and other) combined sources are within the safety levels prescribed by the WHO.

8 Conclusions and Recommendations

The Proponent, ELSH Cremation Services, proposes to establish and operate a crematorium in Nubu Industrial Park, Nubuamis.

There is a societal need for another crematorium in Namibia, that will service the whole country.

Based on the findings of this impact assessment, the following can be concluded with respect to the socio-economic environment:

- The creation of a few jobs and associated income for Namibians, with diversification of the local economy, is a **positive** impact of low-medium significance.
- Impacts associated with health and safety from the crematorium emissions, and possible traffic problems, are **negative** impacts of low or low-medium significance.

Mitigation measures and recommendations have been prescribed in this report to reduce the significance of these key impacts to acceptable levels.

Based on the project information provided by the Proponent and the findings of the impact assessment, including the concerns and comments received from interested and affected parties, it can be concluded that that the proposed project may be granted an Environmental Clearance Certificate. The ECC issuance will be on condition that the recommendations and impact mitigation measures in this report and all the provisions in the EMP are adhered to.

The findings of this scoping phase conclude that no further detailed assessments are required. Furthermore, the implementation of the aforementioned recommendations, impact mitigation measures and EMP provisions should be monitored by the Proponent and applicable Competent Authority to ensure that all potential impacts identified in this study, and other impacts that might arise during implementation, are properly identified and addressed.

8.1 Recommendations

It is recommended that an Environmental Clearance Certificate be issued for the proposed establishment of the ELSH Crematorium, subject to the following recommendations:

- All required permits, licenses and approvals for the proposed activity should be obtained as required.
- All mitigations listed in Chapter 6 and the Environmental Management Plan (Appendix B) should be implemented as stipulated.

9 References

DEA (RSA) 2009. National Ambient Air Quality Standards. Schedule to National Environmental Management: Air Quality Act 2004.

European Environment Agency 2019. Air pollutant emission inventory guidebook. Available at: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019#:~:text=The%20joint%20EMEP%2FEEA%20air,compile%20an%20atmospheric%20emissions%20inventory. [Accessed 09/04/2022].

International Finance Corporation, 2013. *Good Practice Handbook: Cumulative Impact Assessment and Management.* Washington: International Finance Corporation.

Mendelsohn, J., Jarvis, A., Roberts, C. & Robertson, T., 2003. *Atlas of Namibia.* 2nd ed. Cape Town: David Philip Publishers.

O'Keeffe, J. 2020. Field Inquiry: Crematoria emissions and air quality impacts. Vancouver, BC: National Collaborating Centre for Environmental Health. Available at: https://ncceh.ca/documents/field-inquiry/crematoria-emissions-and-air-quality-impacts [Accessed 10/04/2022].

UNEP 2007. Guidelines on best available techniques and provisional guidance on best environmental practices relevant to Article 5 and Annex C of the Stockholm Convention on Persistent Organic Pollutants. Crematoria. Available at: http://chm.pops.int/Portals/0/download.aspx?d=UNEP-POPS-BATBEP-GUID-GUIDELINES-All.En.pdf

WHO (2005). WHO Air Quality Guidelines Global Update, World Health Organisation, October 2005, Germany.

Word Weather Online, 2022. *Namibia: Weather.* Available at: https://www.worldweatheronline.com/windhoek-weather-averages/na.aspx [Accessed 09/04/2022].