Updated Environmental Management Plan – Application for the Renewal of the Environmental Clearance Certificate (ECC)

STERILWAVE Apparatus for Treatment of Health Care Waste at Lady Pohamba Private Hospital in Windhoek, Khomas Region

June 2023

ECC Renewal Application No.: APP-01548

Lady Pohamba Private Hospital

P. O. Box 35458 Kleine Kuppe Windhoek



Original ECC No.: ECC00703

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Abbreviations and Acronyms

| CoW | City of Windhoek (Windhoek Municipal Council) |
|---------|---|
| DEA & F | Department of Environmental Affairs and Forestry |
| ECC | Environmental Clearance Certificate |
| EIA | Environmental Impact Assessment |
| EMA | Environmental Management Act |
| EMP | Environmental Management Plan |
| GG | Government Gazette |
| GN | Government notice |
| I&AP | Interested and Affected Party |
| LPPH | Lady Pohamba Private Hospital |
| MEFT | Ministry of Environment, Forestry and Tourism |
| MoHSS | Ministry of Health and Social Services |
| STAAT | State and Territorial Association on Alternate Treatment Technologies |
| SW250 | STERILWAVE 250 |

Appendices

Appendix A: Environmental Clearance Certificate (ECC) No. 00703

Appendix B: Proof of recently submitted Environmental Monitoring Reports for the periods of June 2020-June 2021, June 2021-June 2022 and June 2022-June 2023

Glossary

Environment - As defined in the EMA- 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, a plan that describes how activities that may have significant environments effects are to be mitigated, controlled and monitored.

Interested and Affected Party (I&AP) - 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.

1 Introduction

1.1 General

This Environmental Management Plan (EMP) contains practical measures that must be taken to ensure that potentially negative impacts upon the environment (biophysical and social) are minimised or completely avoided as a result of the operates and maintains a STERILWAVE '250' (SW250) apparatus at the Lady Pohamba Private Hospital (LPPH) premises in the Kleine Kuppe Suburb, Windhoek of the Khomas Region. The STERILWAVE apparatus serves as a waste management system for integrated grinding and sterilization of medical waste by microwave treatment.

Namibia's Environmental Management Act (EMA) (7 of 2007) requires that an EMP be put in place before a project is implemented. This is usually prepared as part of an Environmental Assessment (EA) – either at a preliminary or scoping-level, or at the level of a more thorough, full detailed assessment. The STERILWAVE operations has not posed any significant negative environmental impacts to date, therefore a scoping-level Environmental Assessment (EA) was conducted in 2020.

This EMP as initially developed in 2020 has been valid for the establishment, installation and operational phases of the STERILWAVE apparatus at LPPH. The discontinuance of the apparatus is not specifically addressed in this EMP.

Upon submission of the EMP, an Environmental Clearance Certificate for the STERILWAVE apparatus (ECC 00703 – Appendix A) was issued on the 11th of June 2020 and expires on the 11th of June 2023. The approved EMP has been and continues to be implemented onsite. Environmental monitoring reports for the 3-years period have been compiled and submitted to the Ministry of Environment, Forestry, and Tourism (MEFT) on the 2nd of June 2023 – Appendix B.

2 Project Overview

Lady Pohamba Private Hospital generates about 100kg of health care waste on average per day. This waste comprises of items such as personal protective equipment, contained dressings, etc. Hazardous waste such as body tissues and cytotoxic pharmaceuticals are separated and incinerated, and are not intended for treatment by the STERILWAVE apparatus.

The health care waste is loaded and treated at the onsite STERILWAVE apparatus. The output dry waste, reduced to about 15 to 20% of its original volume is pathologically safe and stable.

The waste is then taken directly to the landfill for disposal (currently by. Frontier Multi Industries).

2.1 Description and Overview of the SW250 Apparatus

The STERILWAVE system is based on shredding the waste by rotating blades and a microwave module in one single chamber (250 litres) to sterilize appropriate solid medical waste into unrecognizable municipal waste. The system produces no liquid waste whatsoever. The resultant waste is a stable and dry final waste which can be taken directly to landfill for safe disposal, or used as a refuse-derived fuel combustible.

According to the Environmental Screening Report by Resilient Environmental Solutions in 2020, the 'STERILWAVE 250' apparatus is relatively small ($1.2 \times 1.2 \times 1.0$ m, weight 700kg) and comes as a stand-alone model, therefore there is no need for specific construction works for installation.

No water supply is required, and no liquid effluent is generated.

The vapours leaving the vessel are evacuated through a high efficiency particulate air (HEPA)

filter which then leads via exhaust ducting to the outside.

The products of the STERILWAVE as well as all air contamination results have been tested under the supervision of the French Ministry of Health and Social Affairs as well as the Ministry of Ecology, of Sustainable development and of Energy according to the French NF X 30-503 Standard, known as one of the strictest worldwide. STERILWAVE equipment reaches all UK and French regulatory standards according to sterilization efficiency requirements, as well as the USA



recommendation STAAT (State and Territorial Association on Alternate Treatment Technologies) (as provided in the 2020 Environmental Screening Report). The device is made in France and carries the European Community Certificate. Bertin Technologies is certified ISO 9001 – 2008 (as provided in the Screening Report from 2020).

The STERILWAVE 100 has furthermore been approved for use in the United Kingdom by their Industrial Safety Solutions agency who found that they meet with the conditions of Environment Agency Permit: EPR/DB3706HZ. The finding was "The results of Efficacy testing, using the nominated Biological Indicator Species of 6 Log10 Bacillus atrophaeus with a D-

Value of 1.9 show that a >4 Log10 inactivation has been achieved for all samples, therefore STAAT level III criteria has been achieved (as reported in the 2020 documents, i.e. Environmental Screening Report).

Importantly, the STERILWAVE process destroys the coronavirus as it treats the waste at temperatures above 80°C.

2.2 Apparatus Installation Phase

The installation of the STERILWAVE 250 (SW250) apparatus was done by African Gas Solutions (AGS). Bertin Medical Waste Company (the manufacturer and supplier of the apparatus) trained the AGS technical staff to optimize the installation, operation and maintenance of the apparatus. The STERILWAVE apparatus was installed at the Lady Pohamba Private Hospital buildings.

3 Operations and Maintenance

The operation of the apparatus is done by the Lady Pohamba Hospital operators who received training from Bertin Medical Waste in January 2021 on the utilization/operation of the STERILWAVE equipment.

Maintenance of the SW250 apparatus is done by African Gas Solutions, who also received training from Bertin in January 2021.

The SW250 apparatus operates as shown graphically in Figure 3-1.

- Waste loading: Waste bags are loaded into the apparatus.
- Internal shredding: The waste is broken down in the hopper by a rotating feed arm and ground into smaller pieces by an internal shredder.
- Microwave treatment: The shredded particles are heated to 100° 110°C by microwave generators.
- Holding time: A holding section ensures that the waste is treated for a minimum of 30 minutes.
- Discharge: The treated waste is discharged directly into a bin. The bin is sent to a
 compactor and taken directly to landfill. The removal of medical solid waste from the
 Hospital is done by Frontier Multi Industries as of March 2023. The type of waste
 moved is incineration ash that is treated prior to disposal. The other type of waste
 removed from site is the condemned/off-spec. Foods.



Figure 3-1: Graphic representation of the treatment process of the STERILWAVE apparatus

4 Environmental Impacts

The potential environmental impacts as outlined in the 2020 Screening Assessment Report and for which the management and mitigation measures has been recommended in the EMP are listed below.

4.1 Potential Negative Impacts

- The presence of pathogens
- Emission of gases
- Emission of odours
- Waste segregation onsite.

4.2 Potential Positive Impacts

- Final waste is completely free of pathogens.
- Final waste is dry, inert, stable, unrecognizable and recyclable
- No need for special transport of final waste
- Greatly reduces the storage of medical waste onsite, and thereafter also reduces the risk of exposure to staff during storage.
- Low energy consumption, no water, no steam
- Reduces the volume of waste by up to 80%

• No need for dedicated construction works and installation modifications.

5 Roles and Responsibilities: Implementation of the EMP

The EMP identified the Hospital General Manager and Safety & Health Officer as important roles to guide the environmental management of the operational activities. These roles might however in practice, owing to various circumstances, be undertaken by one person. A list of specific responsibilities and duties to be undertaken by each are provided below.

It should be noted that the aforementioned roles are delegated roles and the owners of Lady Pohamba Private Hospital are ultimately responsible for the implementation of the EMP.

5.1 Hospital General Manager

The Hospital (General) Manager will be responsible for the following:

- With the designated apparatus Operators, operate the apparatus and overseeing all activities during operations.
- Managing/overseeing the implementation of this EMP and updating and maintaining it when necessary.
- Issuing fines to individuals who contravene EMP provisions and if necessary, removing such individuals from site.
- Setting up and managing the schedule for the day-to-day activities.
- Liaise with all relevant interested and affected parties/stakeholders.
- The Manager should compile an environmental report on a 6-monthly basis. These reports will aid in the compilation of the monitoring reports, which will be required when renewal of the ECC is needed after 3 years, i.e., every 3 years of the apparatus operations.

6 Environmental Management Plan Actions

The aim of the management actions laid out below is to avoid potential impacts where possible. Where impacts cannot be avoided, measures are provided to reduce the significance of these impacts.

The following tables provide the mitigation measures recommended to manage the potential impacts identified in the apparatus Screening Report. These mitigation measures have been arranged in the EMP as follows:

• Applicable legislation in terms of permitting/licensing (Table 6-1), and

• Operation and maintenance phase management actions (Section 6.1) and the monitoring - Table 6-2.

The Proponent and their Site Manager, who are in charge of the whole operation, have the final responsibility for implementation of the EMP.

The EMA implies that the EMP should be monitored. Renewal of the Environmental Clearance Certificate (after 3 years) depends on the results of monitoring exercises.

The Proponent should assess these commitments in detail and should acknowledge their obligation to the specific management actions detailed in the tables of the following Sections.

Table 6-1: Legislation applicable to the project in terms of permitting and licensing

| Legislation | Provisions | Contact Details |
|------------------------|--|----------------------------|
| Environmental | Activities listed in Government Notice | Mr Timoteus Mufeti: |
| Management Act 2007 | (GN) No. 29 of GG No. 4878 require an | Environmental |
| Environmental Impact | Environmental Clearance Certificate | Commissioner – Department |
| Assessment (EIA) | (ECC). | of Environmental Affairs & |
| Regulations (EIAR) (GG | The amendment, transfer or renewal of | Forestry at the MEFT |
| No. 4878) | the ECC (EMA S39-42; EIAR Regs19 & 20). | Tel.: +264 (0) 61 284 2701 |
| | Amendments to this EMP will require an amendment of the ECC. | |
| | The ECC needs to be renewed every 3 | |
| | years. | |

The management and mitigation measures for the operational phase as implemented are provided below.

6.1 Operation Phase – Impacts Description and Mitigation Measures (Actions)

6.1.1 Monitoring for adequate disinfection of pathogens

The specifications of the STERILWAVE apparatus state that it achieves microbial inactivation over 8log10, and provides proof from research in its country of origin, France. Additionally, recent proof from authorities in China and France, in response to the Covid 19 pandemic, has shown complete disinfection of viral pathogens. Therefore there is no risk of contagious spread from the STERILWAVE waste. Nevertheless, precaution advises that the output material should still be subjected to microbiological tests to verify the level of disinfection

achieved under the specific circumstances at the hospital. A biological indicator kit can be acquired to check the sterilisation efficiency of the apparatus.

- <u>Action:</u> Undertake regular microbiological tests of the output material. This should be done through an independent monitoring agency or the official authorities.
- Verification: Annual certificate of safety issued by MoHSS.

6.1.2 Emission of gases

The STERILWAVE apparatus will give off gaseous exhaust. The specifications provided by the manufacturer stipulate that these are below the threshold of allowable emissions. This impact is therefore insignificant.

- <u>Action:</u> Periodic (monthly) monitoring of emissions should be undertaken, at least for the first year. If emissions are below Namibia's thresholds, then monitoring can be relaxed to once per year thereafter. This should be done through an independent monitoring agency or the official authorities.
- Verification: Annual certificate of safety issued by MoHSS.

6.1.3 Emission of odours

While odours from the operation of waste might be expected, the manufacturer stipulations state that odours are completely masked with the addition of a recommended gel. This impact is therefore insignificant as long as the mitigation measure is implemented.

- Action: Ensure that the masking agent is employed to avoid offensive odours being emitted. This should be done by hospital staff.
- Verification: MoHSS.

6.1.4 Monitoring of waste segregation practices in the hospital

The effectiveness of the STERILWAVE treatment depends heavily on correct segregation of types of waste that are generated in the hospital. The CoW instructions are clear in this respect. The implementation of these instructions, and more that have come out with respect to preventing contagion of Covid-19, is critical. Therefore waste management procedures in the hospital should be regularly monitored so that the health care waste is segregated into the appropriate waste treatment streams.

The plan for mitigating the waste segregation aspect is as follows:

 Action: Regularly (at least once per month) carry out spot checks of waste management procedures in the hospital, with respect to correct segregation of waste types and the different kinds of treatment given to each type. Any identified shortcomings in the procedures should be rectified immediately. This should be done by hospital senior staff, and verified through an independent monitoring agency or the official authorities.

• Verification: Annual certificate of safety issued by MoHSS.

6.1.5 Training, usage, and maintenance procedures of the STERILWAVE apparatus

The Namibian Integrated Health Care Waste Management Plan suggests worker training for this technology. This should include:

- A basic understanding of microwaves and steam-based treatment systems,
- Standard operating procedures,
- Occupational safety (proper waste handling techniques),
- Record keeping,
- Identifying waste that should not be treated in the unit,
- recognizing shredder problems and what to do when soft waste gets stuck in the shredder section,
- Periodic inspections and preventive maintenance, and
- Contingency plans (e.g., what to do in case of a spill or power outage).

The action plans for this aspect are as follows:

- Training for use of the STERILWAVE apparatus should be implemented.
- The STERILWAVE apparatus should be periodically inspected and well maintained as described in the operating manual, to minimise operational problems and to detect them before they get serious.
- While microwave radiation is not hazardous (compared to e.g. X-rays), there should be periodic testing for microwave energy leakage.
- These actions should be done by hospital staff.

<u>Verification:</u> Annual certificate of safety issued by MoHSS.

6.2 Monitoring

The role of the Health & Safety Officer – i.e. the person responsible for monitoring the implementation of the mitigation measures detailed above, might be carried out by a dedicated member of staff, or might form part of the Hospital General Manager's responsibilities. Either way, the Safety Officer's monitoring responsibility should be carried out on a regular basis (possibly monthly or twice a month) during the operation phase, but also following the monitoring requirements in the Table 6-2 below.

The monitoring findings should be incorporated into the bi-annual monitoring reports. The bi-annual reports will be required when renewal of the ECC is needed after 3 years.

Table 6-2: Key Aspects for monitoring and actions thereto: Operation Phase

| No. | Objective | Requirement | Frequency | Evidence |
|-----|---|--|--|--|
| 1 | Waste disinfection and management | -Waste should be adequately disinfected and properly disposed of as per the hospital operational requirements from relevant regulatory authorities such as PathCare and Ministry of Health & Social Services (MoHSS) | Monthly | -Records of the waste disinfection and medical waste removal and disposal. |
| 2. | Monitoring of gas emissions | -Gas emissions should be monitored as per the MoHSS and City of Windhoek (CoW) standards. | -Periodically but done as and when required. | -The gas emission records. |
| 3. | Emission of Odours | -The masking agent should be employed to avoid offensive odours being emitted. | -Periodically inspected but done as and when required. | -Purchase records of the masking gel. |
| 4. | Training of staff | -The installer, operator (user) and maintenance team of the STERILWAVE apparatus should be trained. | -Once off, but may be required when needed. | -Refresher training records |
| 5. | Servicing and maintenance of the STERILWAVE apparatus | -The STERILWAVE apparatus should be periodically inspected and well maintained as described in the operating manual, to minimise operational problems and to detect | -Periodically inspected but done as and when requiredBased on the monitoring information provided, service | - Maintenance and service records of the authorised STERILWAVE service provider. |

| No. | Objective | Requirement | Frequency | Evidence |
|-----|----------------|---|---------------------|---------------------------|
| | | them before they get | and inspection is | |
| | | serious | done bi-annually. | |
| | | -Periodic testing for microwave energy leakage should be conducted. | | |
| 6. | Local / | -The Hospital should ensure | -Annually: The | -Annual renewal of the |
| | institutional | that it has all the local and | certificates of | certificates from the two |
| | and national | national | fitness and | institutions (MoHSS) and |
| | permitting | permitting/authorisations | operations from | (CoW). |
| | requirements | governing the project | CoW and MoHSS | |
| | of the project | activities. These include the | are issued for a | |
| | specific | Certificate of Fitness by the | period of one (1) | |
| | activities | City of Windhoek and | year and subject to | |
| | | MoHSS certification of the | renewal thereafter. | |
| | | Hospital operations. | | |

7 Recommendations and Conclusions

7.1 Recommendations

The aim of this document was to review the existing EMP and based on new project information, compile/update the EMP to enable the renewal of the ECC.

The STERILWAVE apparatus was environmentally cleared in June 2020. Three Environmental Monitoring Reports had been compiled for the period of June 2020 to June 2023 covering three years' periods as per the Monitoring Report submitted on 02 June 2023.

The project is still in operation, thus, the potential impacts remain the same, and their occurrence on site have been monitored. The Proponent has been compliant with the requirements of the EMP and conditions set in the ECC. Therefore, the implementation of the recommended management measures (action plans) contained herein will be continued throughout the project cycle.

The RES Environmental Consultants are therefore confident that the Proponent will continue to manage and mitigate the potential negative impacts by effectively implementing the appropriate measures and with continued commitment on implementation monitoring. It is therefore, recommended that the ECC is renewed, subject to the following recommendations:

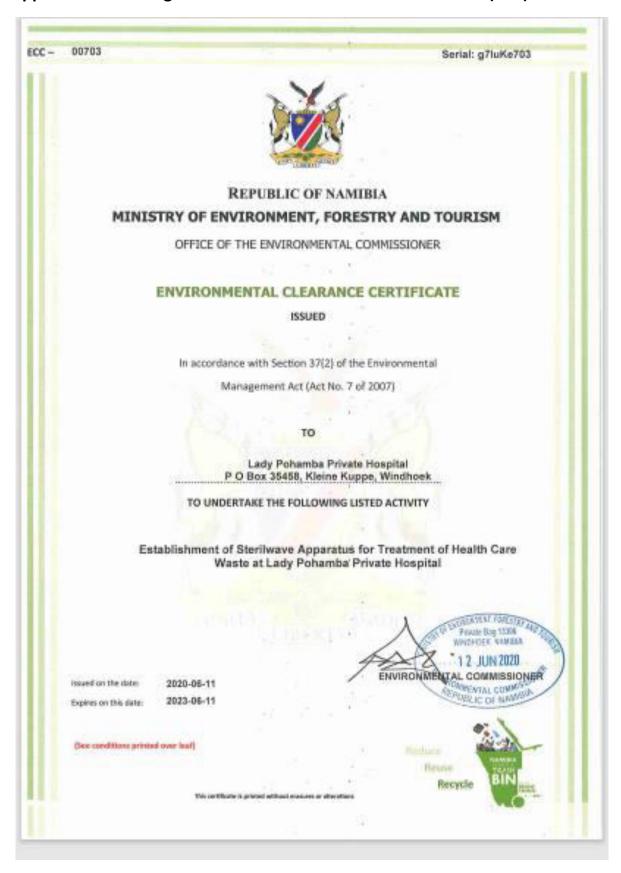
- All required permits, licenses and approvals for the activities are obtained (and renewed) as required (Table 6-1).
- All mitigations and monitoring measures listed under section 6.1 and respective monitoring are implemented as stipulated Table 6-2.

7.2 Conclusion

RES Consultants recommend that the STERILWAVE ECC be renewed. It is crucial for the Proponent to continue with the effective implementation of recommended management measures to ensure environment management and protection. Monitoring of EMP implementation should be continued to ensure that all potential impacts identified in the Screening Report, and other impacts that might arise during implementation, are properly identified in time and addressed.

During the period of June 2020 to May/June 2023, the STERILWAVE apparatus activities have been done in accordance with the EMP measures. RES Consultants trust that the Proponent will continue to maintain the same commitment towards environmental protection and sustainability, once the ECC is renewed.

Appendix A: The original Environmental Clearance Certificate (ECC) No. 00703



Appendix B: Proof of recently submitted Environmental Monitoring Reports for the periods of June 2020-June 2021, June 2021-June 2022 and June 2022-June 2023

02 June 2023

The Environmental Commissioner
Ministry of Environment, Forestry and Tourism
Private Bag 13306
Windhoek, Namibia

MINISTEY OF ERVIRONMENT, FORESTEY AND TORINSM
DIRECTORAGE OF EMPROMEMALAFFAIRS

9 2 JUN 2023

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RECEIVE U 2

Dear Mr. T. Mufeti

Re: Environmental Monitoring Report for the Operations of STERILWAVE Apparatus for Treatment of Health Care Waste at Lady Pohamba Private Hospital in Windhoek, Khomas Region (Bi-Annual Monitoring Report for the period of June 2020 to June 2021) — ECC No. 00703

Lady Pohamba Private Hospital (the Proponent) was granted Environmental Clearance Certificate (ECC) for the installation and operation of the STERILWAVE '250' (SW250) apparatus at the Lady Pohamba Private Hospital (LPPH) located in the Kleine Kuppe Suburb on the 11th of June 2020.

Bi-Annual Environmental Monitoring and EMP implementation

The STERILWAVE '250' (SW250) apparatus was installed onsite in 2020 and has since been in operation and maintained as per the recommendations provided in the EMP developed for the apparatus. Resilient Environmental Solutions cc (RES) hereby submit this Environmental Monitoring Report for the period of June 2020 to June 2021. The Monitoring Report was prepared based on the implementation of the management measures contained in the 2020 EMP.

Should your office require any further information on the project activities, please do not hesitate to contact us.

Sincerely,

Wit all Mr.

John Pallett

Environmental Assessment Practitioner

02 June 2023

The Environmental Commissioner
Ministry of Environment, Forestry and Tourism
Private Bag 13306
Windhoek, Namibia

MINISTRE OF ENVIRONMENT,
FORESTEE STANDARD TO ASSIM
DRESTORATE STANDARD TO ASSIM

8 2 JUN 2023

BELLEN WELLS

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Should your office require any further information on the project activities, please do not hesitate to contact us.

Sincerely,

4-7

John Pallett

Environmental Assessment Practitioner

02 June 2023

The Environmental Commissioner
Ministry of Environment, Forestry and Tourism
Private Bag 13306
Windhoek, Namibia



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Sincerely,

John Pallett

Environmental Assessment Practitioner