November 2021

Memorandum

Subject: **EIA APPLICATION APP-002404**

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) FOR THE PROPOSED SNAIL PRODUCTION PROJECT NEAR SWAKOPMUND, ERONGO REGION

Environmental Management Plan (EMP)

The EIA process for the above mentioned Snail Production Project has been completed. The Final EIA report (including the EMP) was submitted to the MAWLR (i.e. Competent Authority for the proposed activity) on the 29th of November 2021, for their review and consideration.

PLEASE NOTE THAT THE EMP IS PART OF THE EIA (SCOPING AND IMPACT ASSESSMENT) REPORT. REFER TO SECTION 10 OF THE REPORT.

Namisun Environmental Projects and Development
PO Box 8127, Swakopmund
Contact number: 081 7394591
Email: wpetrick@namisun.com

SNAIL PRODUCTION PROJECT

EIA SCOPING & IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PLAN FOR

THE PROPOSED SNAIL PRODUCTION PROJECT NEAR SWAKOPMUND, ERONGO REGION

Prepared for: Rainy Day Investments 47 (Pty) Ltd

November 2021

DOCUMENT CONTROL

Report Title	**EIA SCOPING & IMPACT ASSESSMENT REPORT FOR THE PROPOSED SNAIL PRODUCTION PROJECT NEAR SWAKOPMUND, ERONGO REGION**
Report Author	Werner Petrick
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EXECUTIVE SUMMARY

1. GENERAL INTRODUCTION

Rainy Day Investments 47 (Pty) Ltd (Rainy Day Investments) intends to develop a land-based snail production facility near Swakopmund in the Erongo Region of Namibia (see Figure A). The 5-ha facility is planned with a capacity to export 650 ton of snail meat to the European market. Cutting edge know-how technology will be applied to breed the common brown garden snail, *Cornu aspersum*, for the export market.

This Environmental Impact Assessment (EIA) Scoping and Impact Assessment Report summarises the EIA process being followed for Rainy Day Investments' proposed snail production project near Swakopmund. It includes an assessment of the environmental impacts that the proposed project is likely to have. The proposed management and mitigation measures relating to the proposed project are documented in an Environmental Management Plan (EMP).

2. ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

EIAs are regulated by the Ministry of Environment, Forestry and Tourism (MEFT) in terms of the Environmental Management Act, 7 of 2007. This Act was gazetted on 27 December 2007 (Government Gazette No. 3966) and its associated regulations were promulgated in January 2012 (Government Gazette No. 4878).

Prior to the commencement of the proposed activities of the snail production project, an application for an environmental clearance was submitted in terms of this Act and the associated EIA Regulations to the Ministry of Agriculture, Water and Land Reform (MAWLR), as the competent authority. MAWLR reviews the application and relevant reports and submits comments to the Ministry of Environment, Forestry and Tourism (MEFT) for their final review and decision.

The EIA process steps for the prosed project are explained diagrammatically in Figure B.

Registered Interested and Affected Parties (I&APs) were provided with the opportunity to comment on the EIA Scoping (including Impact Assessment) Report. The comment period ended on 25 October 2021, where after the report and EMP was updated to a final report with due consideration of the comments received, for submission to the MAWLR as the competent authority and the MEFT for decision-making.

FIGURE A: PROPOSED LOCATION OF THE SNAIL PRODUCTION PROJECT

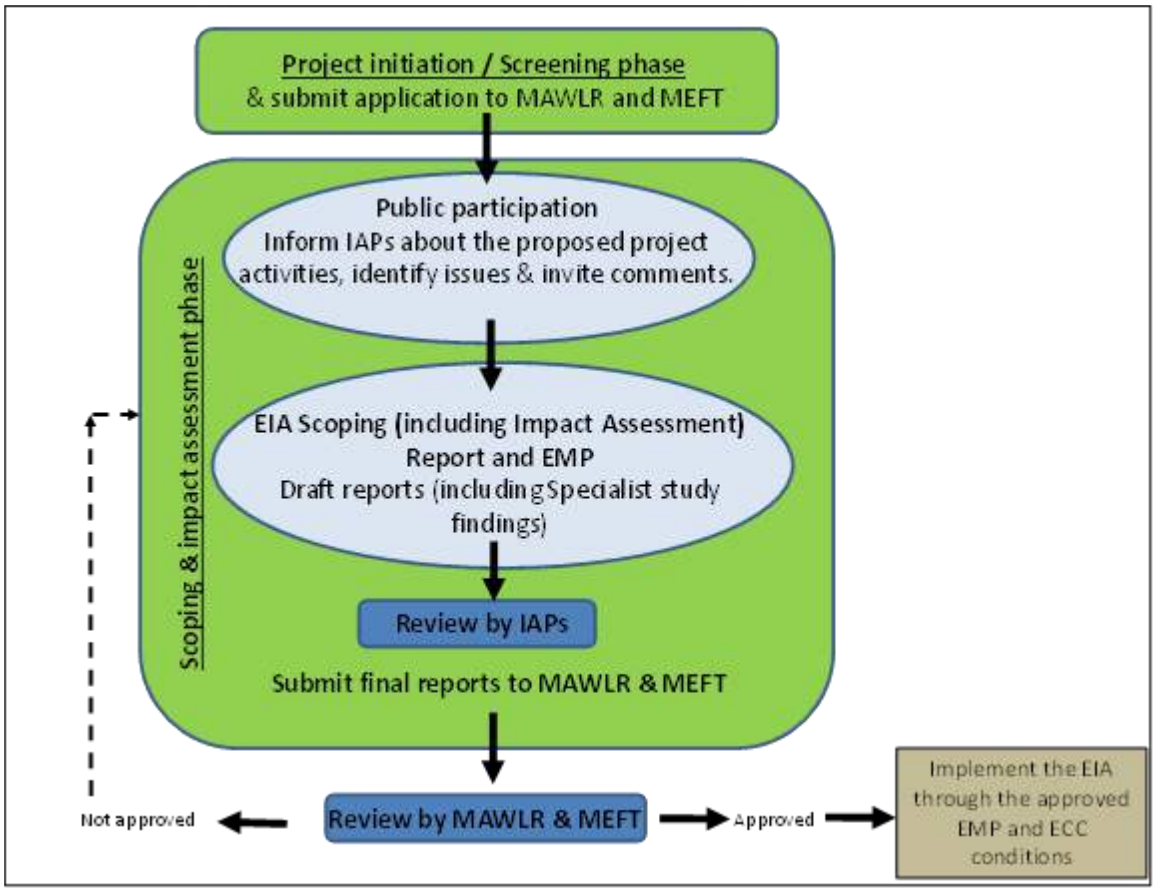


FIGURE B: THE EIA PROCESS

2.1 EIA Team

Namisun Environmental Projects and Development (Namisun) is an independent environmental consultancy firm appointed by Rainy Day Investments to undertake the EIA. Werner Petrick, the EIA project manager, has over twenty two years of relevant experience in conducting / managing EIAs, compiling EMPs and implementing EMPs and Environmental Management Systems. Werner is certified as lead environmental assessment practitioner (EAP) and reviewer under the Environmental Assessment Professionals Association of Namibia (EAPAN). He holds a B.Eng. (Civil) Degree and a Master's degree in Environmental Management.

Dr Pierré Smit, the project coordinator holds a PhD in Landscape Ecology and has over twenty years of experience in environmental management, managing environmental assessment and the implementation of EMPs and Environmental Management Systems in Namibia.

A biological impact specialist study was prepared by Peter Thorpe of Mykiss Fisheries Consultancy (Pty) Ltd (Mykiss) and is included as Appendix F.

2.2 Steps in the public participation process

All comments, questions and issues that have been raised throughout the process by authorities and I&APs are provided in Appendix C of this report. A summary IRR is attached in Appendix E. Various I&APs provided positive comments relating to the proposed project.

The steps that were followed as part of the consultation process are summarised below:

- Namisun notified MEFT and MAWLR of the proposed project through a background information document (BID).
- The application was registered onto MEFT's online registration system.
- MAWLR was informed about the Application and the EIA process and the Application for Authorization form (i.e. Form 1) will be submitted to the Ministry (as the competent authority) with the final report submission.
- Namisun developed an EIA-specific I&AP stakeholder database for the project. This database is updated as and when required, throughput the EIA process.
- BIDs were distributed via email to relevant authorities and I&APs on the stakeholder database and copies were made available on request.
- The purpose of the BID is to inform I&APs about the proposed project activities, the EIA process being conducted, possible environmental impacts and ways in which I&APs could provide input to Namisun. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.
- Namisun contacted (telephonically) various key stakeholders to confirm their e-mail addresses, to obtain further input and to share the relevant information. Focus group meetings were also arranged this way and new I&APs were added to the database.
- E-mails were sent to all I&APs on the database; a site notice was placed at the entrance gate to Plot 88 (i.e. the proposed project location); and flyers were delivered to neighbouring plots - to notify I&APs of the proposed project, the EIA process being following and who to contact for further information requirements.
- Block advertisements were placed on the 22nd and again the 29th of July 2021 in the Market Watch as part of the following newspapers: Die Republikein; Allgemeine Zeitung; and The Namibian Sun.

- The following meetings were held with I&APs / Stakeholders:
    - Focus Group meetings with the MAWLR (Agriculture Directorate and Directorate of Veterinary Services (DVS)) on the 16th of July 2021.
    - Focus group meeting with Swakop River Plot Owners on the 28th of July 2021.
    - Focus group meeting with Swakopmund Municipality on the 29th of July 2021. Further discussions and e-mail correspondence with the Swakopmund Municipality Environmental Officer / Engineering & Planning Services are attached in Appendix c (including a letter received).
- Various (informal) telephone calls were held with other plot owners, interested parties as well as a Ministry of Fisheries and Marine Resources representative in Swakopmund.
- A hard copy and electronic (soft) copy of the Draft Scoping and Impact Assessment Report and EMP (including all appendices) were made available for review at the Swakopmund Public Library.
- Electronic copies of the Scoping (including Impact Assessment) Report and EMP (excluding the appendices) were distributed to all register I&APs and relevant regulatory authorities via e-mail.
- Electronic copies of the full report (including Appendices) were available on request to Namisun.
- Authorities and I&APs had the opportunity to review the draft report and submit comments in writing to Namisun. The closing date for comments was 25 October 2021.
- A follow up ('EIA feedback') meeting was held with the MAWLR (Directorate of Veterinary Services) on the 21st of October 2021
- Namisun (and the appointed Environmental Specialist) considered the comments from I&APs and regulatory authorities after the closing date for comments. Where relevant, the report was updated. A copy of the final report, including authority and I&AP review comments, will be delivered to MAWLR, who will forward it, with their recommendations, to MEFT for their review and final decision regarding the Application for environmental clearance.

2.3 Opportunity to comment

Interested and Affected Parties (I&APs) were invited to comment on this EIA Scoping Report, which was available for a review & comment period from **27 September to 25 October 2021**. Comments had to be sent to Namisun at the address, telephone number, or e-mail address shown below by no later than **25 October 2021**.

Namisun
Attention: Werner Petrick
E-mail address: wpetrick@namisun.com
Cell number: +264 (0)81 739 4591

3. DESCRIPTION OF THE PROPOSED SNAIL PRODUCTION PROJECT

Rainy Day Investments found the future of the snail market to be very strong. The growth in the popularity of healthy eating and the benefits of incorporating snail's meat in humans' diets, the marketing of products made from snail slime, the emergence of new products like snail caviar, and the growing demands for organic products in the pharmaceutical and cosmetic industries contribute to the upward trend in the snail's market performance.

3.1 Project location

The proposed snail production project is situated on Plot No. 88 (Swakop River plots), approximately 15 km to the east of Swakopmund within the Swakopmund Townlands (see Figure A).

3.2 Project design and proposed activities

The proposed snail production project will involve the construction and the management of a snail breeding facility, of which the following specifications apply:

- Total land area required for 25 breeding units: 5 ha for production, storage and other related infrastructure.
- All 25 units will be developed at Year One and will be fully operational from that year.
- At the start of the production cycle, the 25 units will each receive 1,200 kg of brood stock snails (total 30,000 kg) imported from Cyprus where they have been cultivated in a closed system.

- One production cycle of about 9 months is planned. At the end of the cycle the farm will yield 650 tons of snails ready for harvest.
- Each breeding unit will consist of a closed nethouse. The nethouses will be surrounded by a metal sheet installed (50 cm into the ground) around the perimeter of the nethouse to prevent animals entering the units and snails to escape.
- Each breeding unit bottom would include cultivated local grass species to be used as a natural habitat setup for the snails.

The proposed production activities include the following:

- The once-off import of live snails.
- Egging and hatching.
- Juvenal and fattening stage.
- Collection and packing.
- Export.

IMPORT OF LIVE SNAILS

Live snails will be imported from Cyprus. Delivery will be from the Walvis Bay port to the farm following strict biosecurity protocols. Once the containers arrive at the farm, the snails will be released inside the breeding units.

EGGING AND HATCHING

During this stage baby snails are hatched and grow to a juvenal size. The hatched snails would be contained in special cells designed for this purpose.

JUVENILE AND FATTENING STAGE

During this stage the juvenal snails are fed daily with a formulated feed to gain weight. At a weight of 8 – 10 g each, the snails are ready for harvesting.

HARVESTING AND PACKING

Matured snails are harvested once a year over a two-month period. The harvested snails are packed in net bags and placed in a plastic box, loaded on a pallet and put into cooling containers.

EXPORT

The snails are exported to the European market as per offtake agreement. A truck will transport the loads of export snails from the site to the point of export.

3.3 Water requirements

The maximum water consumption for the proposed snail production activities is estimated at 45,000 m^3 per annum, which will be obtained from the municipal supply network. A new HDPE pipeline will be connected to the main supply pipeline.

3.4 Power supply

Electricity requirements are calculated at a maximum of 21,000 KW per year. Power supply will be obtained by means of a grid connection to Erongo Red.

3.5 Effluent / waste management

The breeding units are designed in such a way that the waste of the snails stays on wood surfaces when they are out and active. The wood (with waste) gets cleaned daily and any waste would be reused as organic fertilizer for cultivating the needed grass. Wood will only be replaced during routine maintenance activities.

Furthermore, any dead snails are also removed daily and similarly disposed. Waste on the soil will be reused as an additional fertilizer for the grass.

Therefore, the waste that will be generated (i.e. mix of deposit, feces, and dead remains of snails) will be recycled within the farm. This implies that the waste would only be managed/handled/treated inside the actual farm net houses parameters. This practice would be applicable throughout the entire 9 months production cycle and the 3 month of maintenance thereafter.

Between the production cycles (i.e. during the 3 remaining months) and when required, the entire farm (i.e. the project area) would be disinfected from any organic matters (including eggs and the like) using special designated chemical materials, whereby the stock for the next cycle would be kept in a strict biosecurity area within the actual farm boundaries. The entire farm (i.e. 25 production units) will be covered and closed by the net houses structure. Disinfection would be done by local spraying method, and only inside the net houses (under no-wind condition) to ensure no external spraying effects.

Any possible odd disposed materials during operations (e.g. due to maintenance) would be disinfected firstly before removed from the farm and transported out to the nearest approved municipal disposal area.

3.6 Disinfectant chemicals

With reference to section 5.8, the likely list of key required disinfectant chemicals to be applied during the disinfection process is provided in Table A.

TABLE A: CHEMICALS TO BE APPLIED DURING THE DISINFECTION PROCESS

Chimical name	Application	Function
Vertimec	spray	pesticide
Copper	spray	Fungicide
Chlorine	spray/Soaking	tools disinfection
Cypermethrin	spray	Insecticid/fungicid

Notes:

- The required chemicals are standard agriculture materials used in the industry.
- The use/application of the above chemicals is subject to best practice guidelines which are prescribed by the manufacturers and when needed by a qualified agronomist (as been applied in any agriculture operation).
- The storage of the chemical would be within a dry dedicated container. The actual storage would be very limited only to a bio-monthly period use as and when needed.
- The chemicals to be used will be as per the list above (Table A) or equivalent active ingredients as per the available approved brand in Namibia.

3.7 Biosecurity and access control

Daily cleaning of the units, as well as various strict biosecurity protocols (see the EMP in section 10 of this report), will be implemented to prevent the spreading of diseases and viruses. To prevent insects, birds and other predators of snails from entering the breeding units, the units are covered and closed. This also prevents any snails from escaping the breeding units.

The internal growing pens will be surrounded by an electric fence in order to prevent the snails to escape and specifically to secure the biosecurity protocols.

People entering the farm will be required to follow relevant health protocols to avoid the transfer of bacteria to the snails. Control of staff and visitors would be done through the farm manager and recorded continuously.

3.8 Production management

A specifically designed online system will be implemented to monitor all activities of the project daily, including aspects such as temperature and humidity, feed quality and management protocols to ensure growth and harvesting. Cold chain management is also monitored to ensure secured offtake and to assure product quality.

Being scalable and modular, the project will be developed with options to expand and produce more than 650 tons per annum as per offtake agreement

3.9 Transport requirements

Workers will be transported to and from the site by vehicles daily. During the initial construction phase, and during the annual production phase, the additional staff would be travelling daily to and from the site. Vehicles of workers will not be allowed onsite. Workers will be dropped off and pick up at the site's perimeter.

Feed deliveries would be done twice a week by a truck.

A maximum of five truckloads (20 – 40 feet size) per day will transport the harvested snails to the warehouse during the two-month harvesting period.

3.10 Employment

The project would include two phases of employment:

- Construction phase – approximately 30 workers for a period of four months.
- Operational phase – 16 full-time employees (including a manager, supervisors and general workers) and approximately 60 additional temporary employees for a period of two months per year (during the harvest time).

No provision is made for staff to reside onsite – only key staff (up to ~5 people) (i.e. the manager, security and relevant visitors) would likely reside on site.

4. IDENTIFICATION AND DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS AND ASSESSMENT FINDINGS

The following aspects and their potential impacts were identified in the process and have been considered by the Environmental Team:

- Construction / set up:
    - Spilling or leaking of hydrocarbons causing pollution on land.
    - Increased road traffic.

- Noise and pollution.
- General disturbance of biodiversity during construction.
- Damage to heritage resources.
- Nuisance impacts such as noise, smoke, odours and dust can cause disturbance to third parties.
- Contamination of soil or water as a result of waste generation and effluent discharges.

- Operations phase:
  - Biosecurity risks of the accidental introduction of a non-native snail species into the ecosystem.
  - Biosecurity risks of introducing and spreading of associated diseases, parasites, and pests.
  - Attracting of insects, birds and other predators of snails.
  - Contamination of soil or water because of:
    - Waste generation.
    - Effluent discharges.
  - Negative impacts on neighbouring land use activities.
  - Use of disinfection chemicals:
    - Soil and water contamination
    - Negative impacts on neighbouring land use activities and other third parties
  - Odours.
- Harvesting, packing and export:
  - Noise and pollution effects from vehicles and equipment during harvesting, packing and export.
  - Traffic related impacts.
- Unplanned events:
  - Rainstorm damage to structures.
  - Pollution and accidental spills.

- Socio-economic (positive):
    - Income.
    - Job creation and skills development.
    - Empowerment of people.
- Socio-economic (negative):
    - Impacts to community health, safety and security.

The issues that were identified as requiring further assessment; and the assessment findings are summarised in Table B.

TABLE B: SUMMARY OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED SNAIL PRODUCTION PROJECT

Potential Impact	Significance	
	Before mitigation	After mitigation
Introduction of a non-native snail species	**L-M**	**L**
Introduction of associated diseases, parasites and pests	**L-M**	**L**
Attraction of insects, birds and other predators of snails	**M-H**	**L**
Potential negative impacts on the neighbouring land use activities	**M**	**L**
Potential odours from the snail breeding facility	**L**	**L**
Impact relating to community health, safety and security as a result of temporary and permanent workers and job seekers.	**H**	**L**
Potential negative impacts associated with the application of disinfection chemicals	**M-H**	**L**

5. WAY FORWARD

The way forward is as follows:

- I&APs reviewed the report and sent their comments to Namisun.
- Namisun finalised the report, incorporating I&APs' comments.
- Submission of the final report (including I&APs' comments) to MAWLR and MEFT for their review and decision.

6. ENVIRONMENTAL IMPACT STATEMENT AND CONCLUSIONS

It is Namisun's opinion that the environmental aspects and potential impacts relating to the proposed snail breeding facility has been successfully identified and assessed as part of this EIA process. Relevant management and mitigation measures have been provided to ensure significant environmental and social impacts are avoided / minimised and positive social impacts enhanced, where relevant. These measures are included in the EMP (Section 10 of this report).

It is recommended that, if MEFT provides a positive decision on the Application for the proposed Project, they should include a condition to the clearances that Rainy Day Investments must implement all commitments in the EMP.

ACRONYMS AND ABBREVIATIONS

Below a list of acronyms and abbreviations used in this report.

Acronyms / Abbreviations	Definition
BID	Background Information Document
CV	Curriculum vitae
DEA	Directorate of Environmental Affairs
DVS	Directorate and Directorate of Veterinary Services
EAP	Environmental Assessment Practitioner
EAPAN	Environmental Assessment Professionals' Association of Namibia
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ha	hectare
I&AP	Interested and Affected Parties
MAWLR	Ministry of Agriculture, Water and Land Reform
MEFT	Ministry of Environment, Forestry and Tourism
NGO	Non-Government Organisation
(Pty) Ltd	Proprietary Limited
sp.	species (singular)
spp.	Species (plural)

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Environmental Impact Assessment (EIA) Scoping (including Impact Assessment) Report summarises the EIA process being followed for the proposed Snail Production Project. The report includes an assessment of the environmental impacts that the proposed project activities are likely to have. The proposed management and mitigation measures relating to the proposed project are documented in an Environmental Management Plan (EMP), see Section 10.

Registered Interested and Affected Parties (I&APs) were provided with the opportunity to comment on the EIA Scoping (including Impact Assessment) Report (see Section 3.5). The comment period ended on 25 October 2021, where after the report and EMP was updated to a final report with due consideration of the comments received, for submission to the Ministry of Agriculture, Water and Land Reform (MAWLR) as the competent authority and the Ministry of Environment, Forestry and Tourism (MEFT) for decision-making.

1.2 INTRODUCTION TO THE PROPOSED PROJECT

Rainy Day Investments 47 (Pty) Ltd (Rainy Day Investments) intends to develop a land-based snail production project near Swakopmund, in the Erongo Region of Namibia (see Figure 1 and Section 5 for a description of the project location).

The facility is planned with a capacity to export 650 tons of snail meat to the European market.

Cutting edge know-how technology will be applied to breed the common brown garden snail, *Cornu aspersum*, for the export market. The proposed location for this project seems to be feasible due to its suitable climate conditions and favourable location in terms of access to infrastructure.

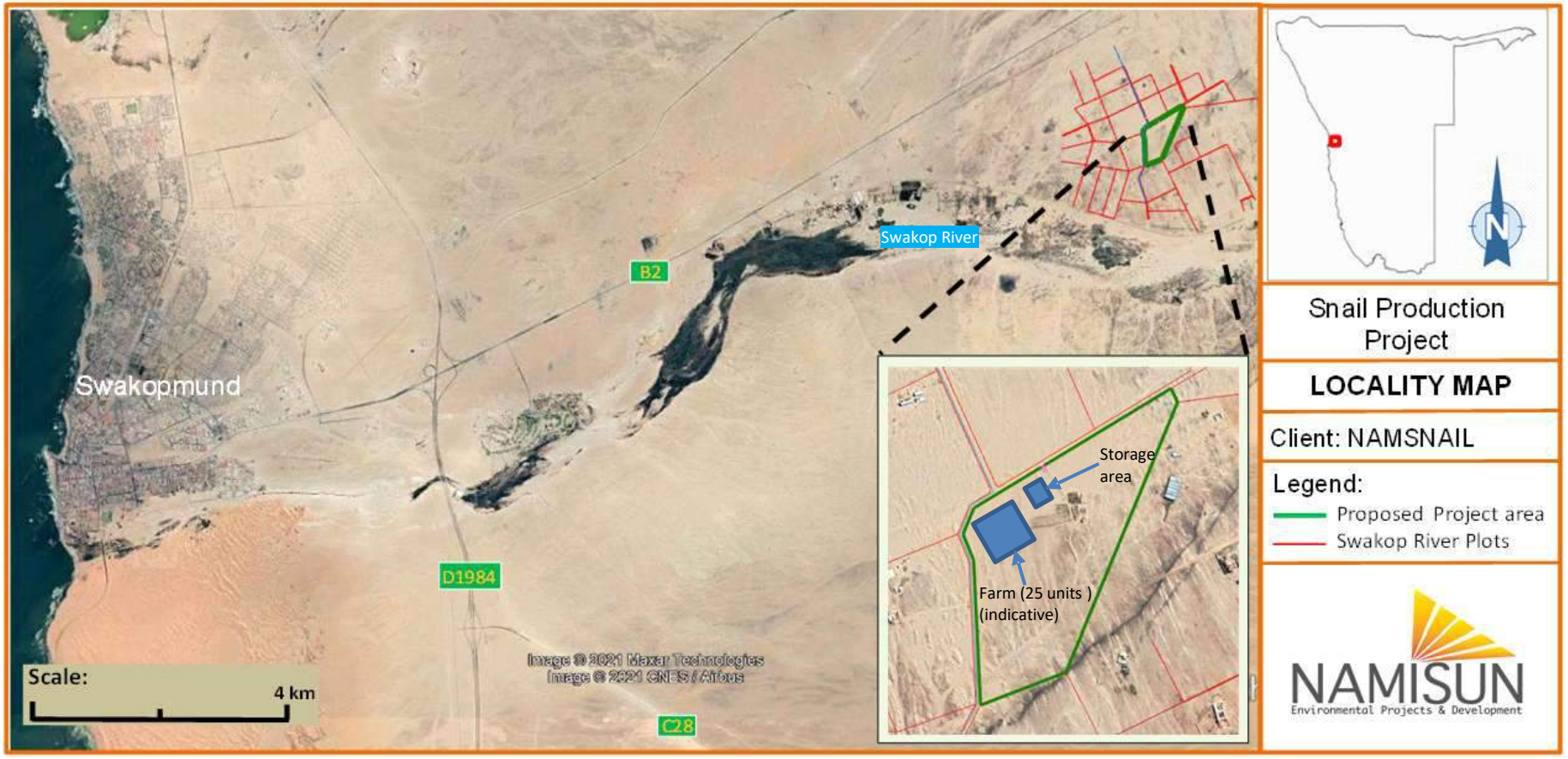


FIGURE 1: LOCATION OF THE SNAIL PRODUCTION PROJECT
(Ref: Google Earth)

1.3 INTRODUCTION TO THE EIA PROCESS

EIAs are regulated by the Ministry of Environment, Forestry and Tourism (MEFT) in terms of the Environmental Management Act, 7 of 2007. This Act was gazetted on 27 December 2007 (Government Gazette No. 3966) and its associated regulations were promulgated in January 2012 (Government Gazette No. 4878).

Prior to the commencement of the proposed activities of the snail production project, an application for an environmental clearance was submitted in terms of this Act and the associated EIA Regulations to the MAWLR, as the competent authority. MAWLR reviews the application and relevant reports and submits comments to the MEFT for their final review and decision.

The EIA process includes a screening phase and a scoping phase, which includes an impact assessment and an Environmental Management Plan (EMP) for the proposed project.

This report is the EIA Scoping (including Impact Assessment) Report. The main purpose of this report is to provide information relating to the proposed activities and to indicate which environmental aspects and potential impacts have been identified during the process, to assess the potential impacts and to develop effective management and mitigation measures to ensure impacts are avoided or minimised.

Existing information provided by Rainy Day Investments for the proposed snail production project (where available and relevant) was referred to and was further augmented by additional site observations, a specialist assessment and the results of stakeholder consultation. The potential impacts of the proposed activities (and associated infrastructure and facilities) could therefore be assessed, and the assessment is also included in this report. The potential impacts were cumulatively assessed, where relevant, taking the existing environment and other relevant activities into consideration.

This EIA Scoping and Impact Assessment Report, together with the EMP (Section 10), will therefore provide sufficient information for the MAWLR as the competent authority and the MEFT to make an informed decision regarding the proposed project, and whether an environmental clearance certificate can be issued or not.

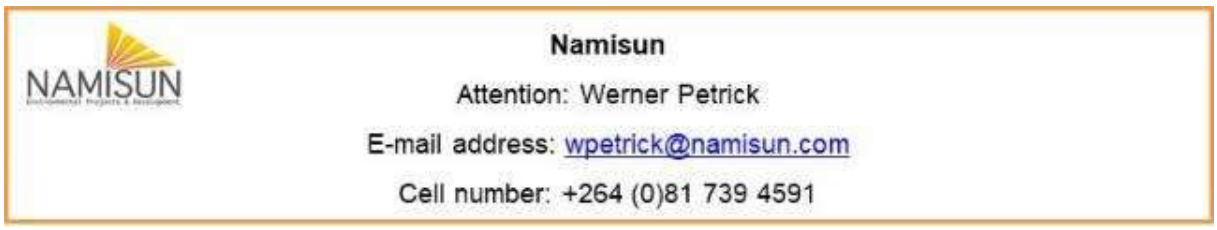
One specialist study that was conducted as part of this EIA process include the following:

- Biological impact specialist study, prepared by Peter Thorpe of Mykiss Fisheries Consultancy (Pty) Ltd (Mykiss).

The specialist study is included as Appendix F.

1.3.1 OPPORTUNITY TO COMMENT

Interested and Affected Parties (I&APs) were invited to comment on this EIA Scoping Report, which was available for a review & comment period from **27 September to 25 October 2021**. Comments had to be sent to Namisun at the address, telephone number, or e-mail address shown below by no later than **25 October 2021**.



1.3.2 LIMITATIONS AND ASSUMPTIONS

Assumptions and limitations are presented in the specialist report (Appendices F), where relevant, and will not be repeated in this report. Some general assumptions are described below.

1.3.2.1 TECHNICAL INFORMATION SHARED BY RAINY DAY INVESTMENTS

The findings and conclusion are based upon the information provided. Namisun therefore assumes that the technical (project) information provided by Rainy Day Investments and their Technical Team is accurate.

1.3.2.2 SPECIALIST STUDIES

- The information presented and the study findings in the Biological Specialist Impact Study report are assumed to be accurate.
- No other specialist studies were conducted or deemed relevant/required for this project.

2 MOTIVATION (NEED AND DESIRABILITY) FOR THE PROPOSED SNAIL PRODUCTION PROJECT

2.1 DEMANDS FOR SNAIL PRODUCTS

Global consumption of land snails is estimated at more than 400,000 tons per annum. Hereof the farmed supply is estimated at about 50,000 tons per year, with 350,000 tons of snails that are naturally collected. The trade of snails is known to be segmented – fresh snails represent 30%, frozen snails 50% and canned snails 20%.

The growth in the popularity of healthy eating and the benefits of incorporating snail's meat in humans' diets, the marketing of products made from snail slime, the emergence of new products like snail caviar, and the growing demands for organic products in the pharmaceutical and

cosmetic industries contribute to an upward trend in the snail market performance. Based on these trends, the future of the snail market seems to be very strong.

The flesh of snails is relatively high in proteins (13.5% versus 8.5% in chicken meat). In addition, the flesh is a source of essential fatty acids, calcium, iron, selenium, magnesium and are a rich source of vitamins E, A, K and B12. It has anti-inflammatory effects, aids to the prevention of allergies, depression and other diseases of the nervous system. An average snail also contains a glycoprotein which is believed to contain cancer-fighting properties and it is assumed to inhibit atherosclerosis and thrombosis.

Considering the growing global demand for the commercial production of snail meat because of its good properties, and the upward trend in the snail market performance, there is good reason to establish a snail breeding facility in Namibia.

2.2 MULTINATIONAL PARTNERSHIPS AND SUPPORT

The intent by Rainy Day Investments is to establish a commercial land snail breeding facility for export purposes in Namibia, based on a strategic partnership between various role players. Shareholders include Lithon Holdings (Pty) Ltd (Lithon), a project management and consulting engineering firm in Namibia; ED Value Consortium, an agri-business development firm with strong strategic linkages to agriculture experts including Touchstone Snail Technologies (Pty) Ltd (Touchstone) a company based in Lanarca in Cyprus, which specializes in snail farming and snail processing; and Hyperception Properties (Pty) Ltd (Hyperception), an expert in project development and with a wide range of business networks. The project is also supported by the consultancy firm Urban-Econ Development Economists (Pty) Ltd (Urban-Econ) from South Africa, which specializes in the field of investment, sectoral research, development economic and industrial development.

Moreover, the project is based on Touchstone's two main attributes – its pioneering experience and knowledge of snail breeding and its vast experience and business network in trading of snails. Touchstone will act as off taker for this project too.

Touchstone has developed an innovative breeding method, the so-called "curtain method". This method has proven to be the most efficient snail breeding method and is one of the highest production breeding methods available. Currently Touchstone utilizes the experience and academic background of its staff to provide extensive specialized consulting services and support to 207 breeders and 293 snail breeding units in 14 countries world-wide.

In this proposed project Touchstone will provide a design and technological know-how service including, amongst others:

- Comprehensive information on the construction of the snail breeding units, materials and the equipment needed to be used for operations.
- Training and operational manuals for the proper management of the project.
- Inspection and certification of the project's production units according to adequacy criteria.
- Continuous consulting services during construction and operations.
- Help with the operation of an IT network and infrastructure, and a monitoring and control system.
- Off taking of all yield produced by the project from Year One at a fix price and according to agreed (and inspected) product specifications.

With its local and international investors, this multinational and local sponsors' consortium showcases Namibia as an investment-friendly destination, enhancing the country's reputation to attract investments in eco-tech ventures.

2.3 MARKET AND FEASIBILITY

Touchstone will purchase 650 tons of snails per annum as per offtake agreement, for export to the European market. Rainy Day Investments will be allowed to develop its own market with any excess stock, over and above the 650 tons taken up by Touchstone. This allows the company to enter the African snail market and increase capacity of the farm to 1,200 tons per annum in future.

This project has a unique business concept that was specifically agreed with Touchstone to be developed and to ensure that the investment opportunity is viable, sustainable, and profitable over the long term.

2.4 EMPLOYMENT AND EMPOWERING OF NAMIBIANS

During the construction phase approximately 30 workers will be employed for a period of ~four months. During the production phase 16 full-time employees and approximately 60 additional temporary employees for a period of two months per year (during the harvest time) will be employed.

Relevant employees of Rainy Day Investments will be provided with full training at Touchstone's snail breeding units in Cyprus, for a period of seven days. During the training period, the employees will be trained for the full range of services offered by the company and will be provided with all the operation manuals, the construction plan, the formula of the snails' feed and with all the technological know-how to be able to create its own successful business in the breeding, production, and marketing of *Cornu aspersum*. With more than 15 years of experience and innovation relevant to the commercial production of snails and a proven business model in place, Touchstone will provide ongoing support and training on demand.

The benefits from employment and empowering opportunities that may stem from this project are closely aligned to national priorities of Namibia.

3 EIA METHODOLOGY

3.1 EIA PROCESS

The EIA process and corresponding activities are outlined in Table 1 below.

TABLE 1: EIA PROCESS

Objectives	Corresponding activities
Project initiation and screening phase (May – June 2021)	
• Identify environmental aspects and potential impacts internally • Notify the decision-making authorities of the proposed project and process • Initiate the EIA Scoping process.	• Project initiation meetings between Rainy Day Investments and the environmental team; review of project information and related studies by the environmental team to familiarise themselves with the proposed project and baseline environmental conditions. • Identify environmental and social issues. Determine further legal requirements. • Notify MAWLR and MEFT (DEA) of the proposed project and submit a background information document (BID). • Register the application on MEFT's online system.
Scoping and impact assessment phase (July – October 2021)	
• Identify interested and or affected parties (I&APs), develop a stakeholder database and involve I&APs in the EIA process through information sharing. • Further identify potential environmental issues in liaison with I&APs. • Consider alternatives.	• Notify authorities and I&APs of the project and EIA process (telephone calls, e-mails, distribution of BIDs, newspaper advertisements and site notice). Refer to Appendix B. • I&AP registration and comments. • Focus group and one-on-one meetings with relevant authorities and I&APs. • Conduct a specialist study. • Compilation of EIA Scoping and Impact Assessment Report and EMP.

Objectives	Corresponding activities
• Provide a description of the potentially affected environment. • Assessment of potential environmental impacts associated with the proposed project activities. • Develop management and mitigation measures.	• Distribute Scoping Report and EMP to relevant authorities and I&APs for review. • EIA Feedback meeting with MAWLR (Directorate of Veterinary Services (DVS)) during the report review period. • Forward finalised Scoping Report with EMP and I&APs comments to MAWLR and MEFT for decision making.

The abovementioned EIA process is explained diagrammatically in Figure 2. More details regarding the public participation process are provided in Section 3.5.

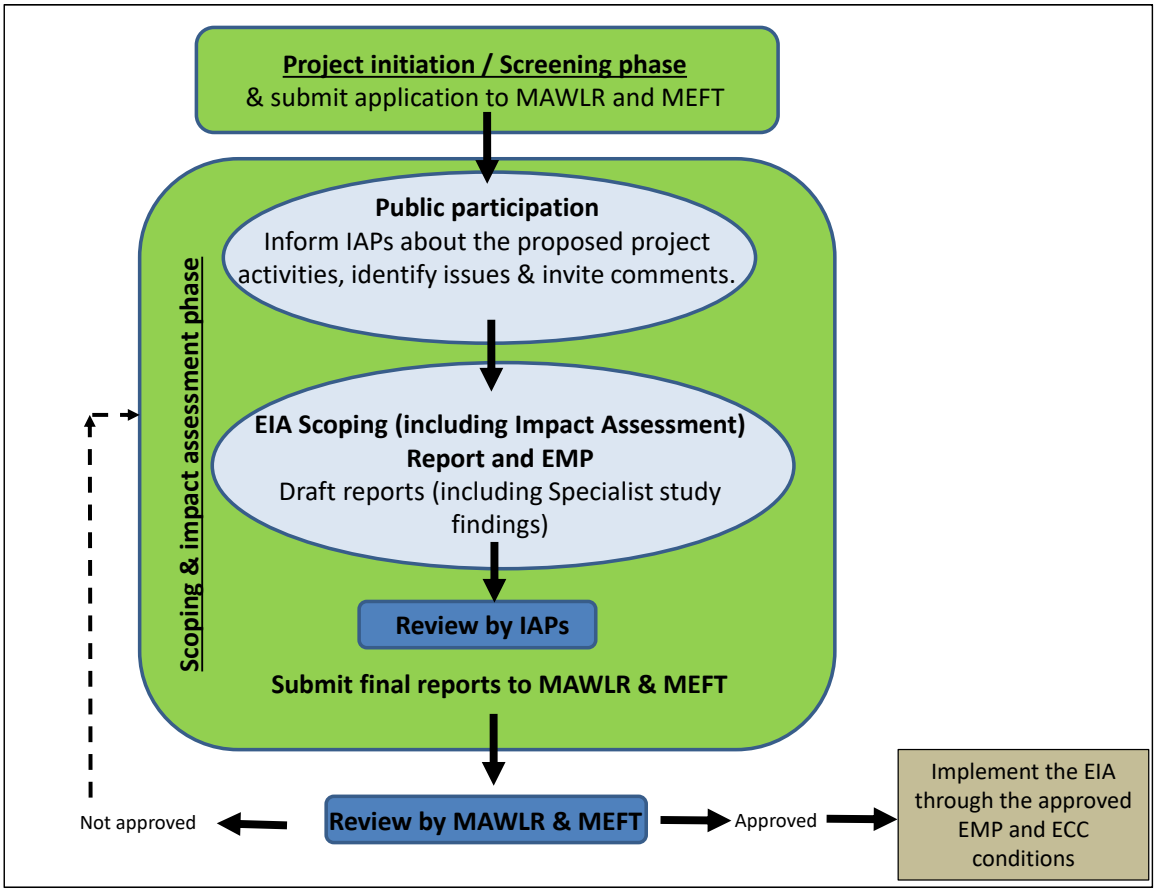


FIGURE 2: THE EIA PROCESS

3.2 EIA TEAM

Namisun Environmental Projects and Development (Namisun) is an independent environmental consultancy firm appointed by Rainy Day Investments to undertake the EIA. Werner Petrick, the EIA project manager, has over twenty two years of relevant experience in conducting / managing EIAs, compiling EMPs and implementing EMPs and Environmental Management Systems. Werner is certified as lead environmental assessment practitioner (EAP) and reviewer under the Environmental Assessment Professionals Association of Namibia (EAPAN). He holds a B.Eng. (Civil) Degree and a Master's degree in Environmental Management.

Dr Pierré Smit, the project coordinator holds a PhD in Landscape Ecology and has over twenty years of experience in environmental management, managing environmental assessment and the implementation of EMPs and Environmental Management Systems in Namibia.

The relevant curriculum vitae documentation is attached in Appendix A. The environmental project team for the EIA process is outlined in Table 2.

TABLE 2: EIA PROJECT TEAM

Team	Name	Designation	Tasks and roles	Company
Project Proponent	Adriaan Grobler	Executive Chairman and CEO	Technical input to the EIA Team relating to the proposed project activities Implementation of EIA requirements	Lithon / Rainy Day Investments
	Gert Grobler	CFO		
	Judex Oberholzer	CEO		Urban-Econ
EIA Project Management Team	Werner Petrick	Project Manager	Management of the process, project administration, interaction with stakeholders, process and report review.	Namisun
	Pierré Smit	Project Assistant	EIA project assistant and reporting.	
Specialist investigation	Peter Thorpe	Specialist	Biological Impact Specialist Study	Mykiss Fisheries Consultancy (Pty) Ltd

3.3 INFORMATION COLLECTION

Namisun used various sources to identify both the environmental issues associated with the proposed project and the terms of reference for specialist investigations. The main sources of information for the preparation of the EIA Scoping and Impact Assessment Report include:

- Site visits by Namisun;
- Relevant information relating to the proposed Project activities and associated infrastructure (provided by Rainy Day Investments);
- Relevant documented and online sources with information relating to the proposed project;
- Consultation with and input from the specialist[1];
- Consultation with I&APs / stakeholders; and
- Consultation with relevant authorities.

All sources consulted are listed in the references (see Section 13).

3.4 EIA SCOPING AND IMPACT ASSESSMENT REPORT

The main purpose of this report is to indicate which environmental aspects relating to the proposed project might have an impact on the environment. Due to reasons mentioned in Section 1.3, these potential impacts could also be assessed, and the findings presented in this report (see Section 9).

Table 3 outlines the Scoping Report requirements as set out in Section 8 of the EIA Regulations that were promulgated in January 2012 in terms of the Environmental Management Act, No. 7 of 2007.

TABLE 3: SCOPING REPORT REQUIREMENTS STIPULATED IN THE EIA REGULATIONS

Requirements for a scoping report in terms of the EIA Regulations of February 2012	Reference in report
(a) the curriculum vitae of the EAPs who prepared the report;	Section 3.2 and Appendix A
(b) a description of the proposed activity;	Section 5
(c) a description of the site on which the activity is to be undertaken and the location of the activity on the site;	Sections 5 & 6

[1] Various references were made in the Specialist Report, which will not be repeated in this report. For the detailed list of references refer to section 9 of the Biological Impact Specialist Report (Appendix F).

Requirements for a scoping report in terms of the EIA Regulations of February 2012	Reference in report
(d) a description of the environment that may be affected by the proposed activity and the manner in which the geographical, physical, biological, social, economic and cultural aspects of the environment may be affected by the proposed listed activity;	Sections 6, 8 and 9
(e) an identification of laws and guidelines that have been considered in the preparation of the report;	Section 4
(f) details of the public consultation process conducted in terms of Regulation 7(1) in connection with the application, including - (i) the steps that were taken to notify potentially interested and affected parties of the proposed application; (ii) proof that notice boards, advertisements and notices notifying potentially interested and affected parties of the proposed application have been displayed, placed or given; (iii) a list of all persons, organisations and organs of state that were registered in terms of Regulation 22 as interested and affected parties in relation to the application; and (iv) a summary of the issues raised by interested and affected parties, the date of receipt of and the response of the EAP to those issues;	Section 3.5 and Appendices B, C, D and E.
(g) a description of the need and desirability of the proposed listed activity and any identified alternatives to the proposed activity that are feasible and reasonable, including the advantages and disadvantages that the proposed activity or alternatives have on the environment and on the community that may be affected by the activity;	Sections 2 and 7
(h) a description and assessment of the significance of any significant effects, including cumulative effects, that may occur as a result of the undertaking of the activity or identified alternatives or as a result of any construction, erection or decommissioning associated with the undertaking of the proposed listed activity;	Sections 8 and 9
(i) terms of reference for the detailed assessment; and	Section 8 & 9 (However, not applicable due to the fact that this is the final report, which includes an

Requirements for a scoping report in terms of the EIA Regulations of February 2012	Reference in report
	assessment and specialist input. No further assessment is required).
(j) a management plan, which includes - (i) information on any proposed management, mitigation, protection or remedial measures to be undertaken to address the effects on the environment that have been identified including objectives in respect of the rehabilitation of the environment and closure; (ii) as far as is reasonably practicable, measures to rehabilitate the environment affected by the undertaking of the activity or specified activity to its natural or predetermined state or to a land use which conforms to the generally accepted principle of sustainable development; and (iii) a description of the manner in which the applicant intends to modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation remedy the cause of pollution or degradation and migration of pollutants.	Section 10

3.5 PUBLIC PARTICIPATION PROCESS

The public participation process for the proposed project is aimed at ensuring that all persons and or organisations that may be affected by, or interested in, the proposed activities were informed of the project and could register their views and concerns. By consulting with relevant authorities and I&APs, the range of environmental issues to be considered in the study has been given specific context and focus.

Included below is a summary of the people consulted, the process that was followed, and the issues that were identified.

3.5.1 INTERESTED AND AFFECTED PARTIES

A broad list of stakeholders (I&APs) that are relevant to the proposed project:

- Regulatory authorities (relevant government departments).
- Swakopmund farmers / Swakop River Plot owners.
- Other businesses; and

- I&APs that registered on the project.

These stakeholders were informed about the proposed project activities and the EIA process, including the public consultation, being conducted.

The full stakeholder database for this project is included in Appendix D of this report.

3.5.2 STEPS IN THE PUBLIC PARTICIPATION PROCESS

The steps that were followed as part of the consultation process are described below.

3.5.2.1 NOTIFICATION TO MEFT AND MAWLR (JUNE 2021)

- Namisun notified MEFT and MAWLR of the proposed project through a background information document (BID).
- The application was registered onto MEFT's online registration system.
- MAWLR was informed about the Application and the EIA process and the Application for Authorization form (i.e. Form 1) will be submitted to the Ministry (as the competent authority) with the final report submission.

3.5.2.2 I&AP IDENTIFICATION (JUNE 2021 AND THROUGHOUT THE PROCESS)

- Namisun developed an EIA-specific I&AP stakeholder database for the project. This database is updated as and when required, throughput the EIA process. A copy of the I&AP database is attached in Appendix D.

3.5.2.3 INTERACTIONS WITH I&APS (JUNE - JULY 2021)

- BIDs were distributed via email to relevant authorities and I&APs on the stakeholder database and copies were made available on request. A copy of the BID is attached in Appendix B.
- The purpose of the BID is to inform I&APs about the proposed project activities, the EIA process being conducted, possible environmental impacts and ways in which I&APs could provide input to Namisun. Attached to the BID was a registration and response form, which provided I&APs with an opportunity to submit their names, contact details and comments on the project.
- Namisun contacted (telephonically) various key stakeholders to confirm their e-mail addresses, to obtain further input and to share the relevant information. Focus group meetings were also arranged this way and new I&APs were added to the database.

3.5.2.4 E-MAIL NOTIFICATIONS, SITE NOTICE AND FLYERS (JULY 2021)

- E-mails were sent to all I&APs on the database; a site notice was placed at the entrance gate to Plot 88 (i.e. the proposed project location); and flyers were delivered to neighbouring plots - to notify I&APs of the proposed project, the EIA process being following and who to contact for further information requirements. A copy of the e-mail notification and photos of the site notice that were displayed are attached in Appendix B.

3.5.2.5 NEWSPAPER ADVERTISEMENTS (JULY 2021)

- Block advertisements were placed on the 22nd and again the 29th of July 2021 in the Market Watch as part of the following newspapers:
    - Die Republikein
    - Allgemeine Zeitung
    - The Namibian Sun
- Copies of the advertisements are attached in Appendix B.

3.5.2.6 KEY STAKEHOLDER AND FOCUS GROUP MEETINGS (JULY 2021)

- The following meetings were held with I&APs:
    - Focus Group meetings with the MAWLR (Agriculture Directorate and DVS) on the 16th of July 2021.
    - Focus group meeting with Swakop River Plot Owners on the 28th of July 2021.
    - Focus group meeting with Swakopmund Municipality on the 29th of July 2021. Further discussions and e-mail correspondence with the Swakopmund Municipality Environmental Officer / Engineering & Planning Services are attached in Appendix c (including a letter received).
- The proposed project information was presented / shared in the form of a PowerPoint presentation at the above meetings. A copy of the slides is included in Appendix C. Minutes of the meetings are also attached in Appendix C.
- Various (informal) telephone calls were held with other plot owners, interested parties as well as a Ministry of Fisheries and Marine Resources representative in Swakopmund (Ms Anja Kreiner). Further e-mail correspondence with Ms Kreiner is included in Appendix C.

3.5.2.7 COMMENTS AND RESPONSES (JULY - AUGUST 2021)

- Minutes of the meetings and all comments received during the meetings, as well as by email and comment sheets, are attached in Appendix C. A Summary Issues and Response Report (IRR) is attached in Appendix E.

3.5.2.8 REVIEW OF DRAFT SCOPING AND IMPACT ASSESSMENT REPORT AND EMP BY I&APS AND AUTHORITIES (SEPTEMBER – OCTOBER 2021)

- A hard copy and electronic (soft) copy of the Draft Scoping and Impact Assessment Report and EMP (including all appendices) were made available for review at the Swakopmund Public Library.
- Electronic copies of the Scoping (including Impact Assessment) Report and EMP (excluding the appendices) were distributed to all register I&APs and relevant regulatory authorities via e-mail.
- Electronic copies of the full report (including Appendices) were available on request to Namisun.
- Authorities and I&APs had the opportunity to review the draft report and submit comments in writing to Namisun. The closing date for comments was 25 October 2021.

3.5.2.9 EIA FEEDBACK MEETING WITH MAWLR: DVS

A meeting was held with the MAWLR: DVS on the 21st of October 2021, during the review period by I&APS of the draft report. The objectives of the meeting were as follows:

- Discuss the draft EIA report.
- Initial comments received from the MAWLR (DVS) via e-mail on the 29th of September 2021.
- Discuss any further comments / requirements from the MAWLR.
- Discuss the way forward in terms of the submission of the final report.

Minutes of this meeting is attached in Appendix C.

3.5.2.10 MAWLR AND MEFT REVIEW OF SCOPING (INCLUDING IMPACT ASSESSMENT) REPORT AND EMP

Namisun (and the appointed Environmental Specialist) considered the comments from I&APs and regulatory authorities after the closing date for comments. Where relevant, the report was updated. The IRR was also finalised to incorporate all comments received (see Appendix E). A

copy of the final report, including authority and I&AP review comments, will be delivered to MAWLR, who will forward it, with their recommendations, to MEFT for their review and decision.

3.5.3 SUMMARY OF COMMENTS AND ISSUES RAISED

All comments, questions and issues that have been raised throughout the process by authorities and I&APs are provided in Appendix C of this report. A summary IRR is attached in Appendix E. Various I&APs provided positive comments relating to the proposed project.

General questions / comments relate to:

- The motivation for the proposed project.
- Licencing requirements.
- Concerns about potential negative biological and socio-economic impacts that may stem from the project and associated biosecurity measures.
- Certification requirements for “disease free” animals.
- Treatment of sick animals at the farm.
- Odours and related impacts to neighbours.
- Waste management issues.
- Water requirements.
- Worker education and skills transfer.
- Worker management and people staying on site.

4 ENVIRONMENTAL LAWS AND POLICIES

The Republic of Namibia has five tiers of law and a number of policies relevant to environmental assessment and protection, which include the Constitution of the Republic of Namibia, statutory law, common law, customary law and international law.

As the main source of legislation, the Constitution of the Republic of Namibia (1990) makes provision for the creation and enforcement of applicable legislation. In this context and in accordance with its constitution, Namibia has passed numerous laws intended to protect the natural environment and mitigate against adverse environmental impacts.

The section below summarises the various applicable laws, plans and policies.

4.1 NAMIBIAN INSTITUTIONAL AND ADMINISTRATIVE STRUCTURE

4.1.1.1 MINISTRY OF ENVIRONMENT, FORESTRY AND TOURISM (MEFT)

MEFT develops, administers and enforces environmental legislation and policy. MEFT: DEA gives effect to Article 95L of the Constitution of the Republic of Namibia (1990) by promoting environmental sustainability. The Environmental Commissioner serves as head of the DEA. The DEA is responsible for, inter alia, the administration of the EIA process undertaken in terms of the Environmental Management Act, 2007 and the associated EIA Regulations (2012).

The DEA will be responsible for issuing a decision on the application for the environmental clearance (and the EIA process) based on the recommendation from MAWLR.

If approved, the DEA will issue an Environmental Clearance Certificate (ECC).

4.1.1.2 MINISTRY OF AGRICULTURE, FORESTRY AND LAND REFORM (MAWLR)

The MAWLR aims “to realize the potential of the Agricultural, Water and Forestry sectors towards the promotion of an efficient and sustainable socio-economic development for a prosperous Namibia” (https://mawf.gov.na/).

Two of the Directorates within the MAWLR, relevant to proposed snail production project are the Directorate of Agricultural Production, Extension and Engineering Services and the Directorate of Veterinary Services (DVS).

The objective of the DVS is to “maintain and promote optimal animal health and production and to ensure access of Namibian animals and animals products to regional and international markets” https://mawf.gov.na/). The DVS (i.e. Chief Veterinary Officer) is responsible for the administration of the Animal Health Act, 2011 (see section 4.2.1.4) and exercises the powers and performs the duties conferred or imposed on him or her by or under this Act subject to the control and directions of the Minister.

A directive from MEFT (March 2017), in line with the EIA Regulations, requires that applications for ECC must be submitted to relevant Competent Authority for a specific listed activity. On conclusion of the EIA process, the MAWLR will therefore make a recommendation on the application to MEFT, who in turn is required to make the final decision on the application.

General responsibilities of veterinary officials under the abovementioned Act include:

- The detection and investigation of disease.
- The prevention of disease.
- The controlling of disease.
- The surveillance of disease.
- Where appropriate, the eradication of disease.
- Ascertaining whether the provisions of this Act have been or are being complied with and determining whether a person may have contravened any provision.
- Other functions as are assigned to a veterinary official by or under this Act.

4.2 SUMMARY OF KEY LEGISLATION APPLICABLE TO THE PROPOSED PROJECT

In the context of the project, there are several laws and policies currently applicable. The key policy and legislative requirements and guiding principles underpinning the EIA process and requirement for permissions are outlined below.

4.2.1 POLICY AND LEGAL FRAMEWORK FOR THE EIA

4.2.1.1 ENVIRONMENTAL ASSESSMENT POLICY FOR SUSTAINABLE DEVELOPMENT AND ENVIRONMENTAL CONSERVATION, 1995

Namibia's Environmental Assessment Policy was published in 1995 and provides for the promotion of sustainable development and economic growth while protecting the environment in the long-term. The government recognises, amongst others, that an EIA (termed Environmental Assessment in Policy) is a key tool to further the implementation of a sound Environmental Policy that strives to achieve Integrated Environmental Management. EIAs are required to ensure that the consequences of development projects are considered and incorporated into the planning process. The introduction and or propagation of invasive alien animal species are listed in the policy as activities that require an EIA, as well as the genetic modification of organisms, and the releases of such organisms. This EIA aims to fulfil the requirements of this Policy.

4.2.1.2 ENVIRONMENTAL MANAGEMENT ACT, 2007

The Environmental Management Act (No. 7 of 2007) was promulgated in December 2007 and came into effect in January 2012. The main objectives of this Act are to ensure:

- The careful and timeous consideration of activities that can cause significant effects on the environment.
- Opportunities for timeous participation by I&APs throughout the assessment process.
- Findings are considered before any decision is made in respect of activities.

Section 3(2) of the act provides a set of principles which give effect to the provisions of the Constitution for integrated environmental management. Decision-makers must take these principles into account when deciding on a proposed project. This act stipulates that no party, whether private or governmental, can conduct a listed activity without an environmental clearance certificate (ECC) obtained from the Environmental Commissioner.

4.2.1.3 EIA REGULATIONS 2012

The EIA regulations were gazetted on 6 January 2012 (Government Gazette No. 4878) in terms of Section 56 of the Environmental Management Act, No. 7 of 2007. Government Notice (GN) No. 30 sets out the procedures and documentation that need to be complied with when an EIA process is undertaken. The regulations provide for, amongst others, the control of certain "listed activities". These listed activities are provided in GN No. 29 and are prohibited until an ECC has been obtained from the DEA of the MEFT. The issuing of ECCs will only be considered by the DEA once there has been compliance with the EIA regulations.

Listed activities applicable to the proposed project, with corresponding numbers in the regulations, are summarised below[2]:

"**AGRICULTURE AND AQUACULTURE ACTIVITIES**

7.8 The introduction of alien species into local ecosystem."

4.2.1.4 THE ANIMAL HEALTH ACT, 2011

This Act provides for the following:

- Prevention, detection and control of animal disease.
- The maintenance and improvement of animal health.

[2] Numbering corresponds with the EIA Regulations

- Incidental matters.

The act stipulates the legal requirements and conditions to import animals, animal products or restricted material; application for the import and transit permits for conveyance in transit through Namibia; and the general requirements for the export of animals, animal products or restricted materials, and includes quarantine requirements as well as disease control.

The Act is implemented by (amongst others) the following Regulations:

- Animal Identification Regulations (GN No. 29 of 2009) on 17 Feb 2009.
- Animal Identification Regulations (GN No. 307 of 2017) on 23 Nov 2017.
- Animal Health Regulations on 30 Dec 2016.
- Animal Health General Regulations 1958 on 09 Aug 1958.
- General Regulations 1963 on 01 Jan 1986.
- Regulations relating to Government Veterinary Officers and Stock Inspectors: Services to the Public (GN 113 of 1966) on 01 Jul 1966.
- General Regulations on 06 Mar 1981.

(https://leap.unep.org/countries/na/national-legislation/animal-health-act-2011-no-1-2011)

4.2.1.5 PREVENTION OF UNDESIRABLE RESIDUE IN MEAT ACT, 1991 (ACT NO. 21)

This Act provides for the control over the administration of certain products to animals which may cause undesirable residue in meat and meat products. It further regulate the slaughtering of animals and the marketing of meat and meat products and provides for incidental matters.

4.3 SUMMARY OF OTHER LAWS AND POLICIES RELEVANT TO THE PROJECT

4.3.1 OTHER RELEVANT LEGISLATION

Other legislation that was considered to be potentially relevant to the proposed project are summarised in Table 4 below.

TABLE 4: RELEVANT LEGISLATION FOR THE SNAIL PRODUCTION PROJECT

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes & dust)	Emissions to land (non-hazardous & hazardous)	Emissions to water	Visual	Traffic	Noise	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	3rd Party Safety & Health	Other
1956	Water Act, 1956, (No. 54 of 1956), as amended	X										X		
1969	Soil Conservation Act	X			X				X					
1973	Agriculture Pest Act									X				X
1975	Nature Conservation Ordinance, (No. 14 of 1975)	X			X					X	X			
1976	Atmospheric Pollution Prevention Ordinance, (No. 11 of 1976)		X											
1990	The Constitution of the Republic of Namibia of 1990	X	X	X	X	X	X	X	X	X	X	X	X	
1990	Nature Conservation General Amendment Act 1990	X			X					X	X			
1996	Nature Conservation Amendment Act 5;	X			X					X	X			
1999	Road Traffic and Transport Act, (No. 22 of 1999)						X							

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes & dust)	Emissions to land (non-hazardous & hazardous)	Emissions to water	Visual	Traffic	Noise	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	3rd Party Safety & Health	Other
2001	The Forestry Act, (No.12 of 2001)	X							X	X				
2001	The Parks and Wildlife Management Bill of 2001									X				
2003	Pollution Control and Waste Management Bill (3rd Draft September 2003)		X	X	X			X						
2004	National Heritage Act, (No. 27 of 2004										X		X	
2007	Labour Act, 2007 (No. 11 of 2007)											X		
2007	Environmental Management, Act, (No. 7 of 2007	X	X	X	X	X	X	X	X	X	X	X	X	
2011	Animal Health Act, (No.1 of 2011)									X			X	
2012	Regulations promulgated in terms of the Environmental Management Act, (No. 7 of 2007)	X	X	X	X	X	X	X	X	X	X	X	X	X

YEAR	NAME	Natural Resource Use (energy & water)	Emissions to air (fumes & dust)	Emissions to land (non-hazardous & hazardous)	Emissions to water	Visual	Traffic	Noise	Impact on Land use	Impact on biodiversity	Impact on Archaeology	Socio-economic	3rd Party Safety & Health	Other
2013	Water Resources Management Act, (No. 11 of 2013)	**X**			**X**							**X**		
2015	Public and Environmental Health Act, (No. 1 of 2015)							**X**					**X**	
2017	Nature Conservation Amendment Act 3	**X**			**X**					**X**	**X**			

4.3.2 RELEVANT POLICIES AND PLANS

Relevant policies and plans currently in force include:

- Policy for the Conservation of Biotic Diversity and Habitat Protection, 1994.
- SADC Environmental Policy and Regulatory Framework for Mining (2001).
- Namibia's Green Plan – Environment and Development (1992).
- Namibia's Unwanted Biodiversity: Alien Invasive Species ((Griffin and Simmons 1998).
- National Environmental Health Policy (2002).
- National Biodiversity Strategy and Action Plan (NBSAP) 1 (2002) and 2 (2014).
- The National Climate Change Policy of Namibia (2010).
- National Waste Management Policy (2010).
- New Equitable Economic Empowerment Framework Policy, 2011.
- Namibia Vision 2030.
- Namibia Food Safety Policy (2014).
- National Agriculture Policy (2015).
- Fifth National Development Plan, 2017/18 – 2021/22 (NDP5).

4.3.3 INTERNATIONAL LAWS AND CONVENTIONS

International conventions and treaties which have been ratified by the Namibian Government are listed below:

- The Stockholm Declaration on the Human Environment, 1972.
- United Nations Framework Convention on Climate Change – UNFCCC, 1992.
- United Nations Convention on Biological Diversity (UNCBD), 1992.
- Cartagena Protocol on Biosafety to the Convention on Biological Diversity, 2000.
- Kyoto Protocol on the Framework Convention on Climate Change, 1997.
- Montreal Protocol on Substances that Delete the Ozone Layer, 1987.
- Paris Agreement (United Nations Framework Convention on Climate Change), 2016.
- Vienna Convention for the Protection of the Ozone Layer, 1985.

- African Convention for the Conservation of Nature and Natural Resources (Algeria, 1968) and the revised version (Maputo, 2003).
- World Trade Organization Agreement on Sanitary and Phytosanitary Measures. 1995.
- Convention on the Conservation of Migratory Species of Wild Animals, also known as the Convention on Migratory Species (CMS) or the Bonn Convention, 1983.
- Convention on International Trade of Wild Fauna and Flora Endangered Species, 1971) (CITES).
- Convention concerning the Protection of the World Cultural and Natural Heritage (Paris, 1972).

5 DESCRIPTION OF THE PROPOSED PROJECT ACTIVITIES

5.1 GENERAL INTRODUCTION

Rainy Day Investments plans a snail production project on Plot 88 (Swakop River Plots) within the Swakopmund Townlands in the Erongo Region, Namibia.

Cutting edge technology will be applied to breed the *Cornu aspersum* snail for export to Europe. *Cornu aspersum* is also commonly known as the (brown) "garden snail", which is a species of land snail in the family Helicidae. Previously this species was classified under the name *Helix aspersa*, but the prevailing classification places it in the genus *Cornu*.

5.2 DETAILS OF THE APPLICANT

Company name:	Rainy Day Investments 47 (Pty) Ltd (Rainy Day Investments)[1]
Contact (responsible) person:	Gert Grobler
E-mail:	gert.grobler@lithon.com
Business address:	PO Box 40902, Ausspanplatz, Windhoek

Note:

[1] During the execution of the EIA process, the Applicant changed their name from "Rainy Day Investments 47 (Pty) Ltd" to "Namsnail farming (Pty) Ltd". The original name (i.e. Rainy Day Investments) were kept in the report for constancy in the process. However, MEFT should issue their decision regarding the application in the new name (i.e. Namsnail farming (Pty) Ltd). The relevant documents, relating to the name change is included in Appendix G.

5.3 SHAREHOLDERS

Shareholders of Rainy Day Investments include Lithon Holdings (Pty) Ltd (Lithon), a project management and consulting engineering firm in Namibia; ED Value Consortium, an agri-business development turnkey firm with collective experience of over 25 years of work in Africa; and Hyperception Properties (Pty) Ltd (Hyperception), an expert in project development and with a wide range of business networks. ED Value Consortium has strong strategic linkages to agriculture experts including Touchstone Snail Technologies (Pty) Ltd (Touchstone) a company based in Lanarca in Cyprus, which specializes in snail farming and snail processing.

5.4 PROJECT LOCATION

The location of the proposed snail production project is planned on Plot No. 88 (Swakop River plots), approximately 15 km to the east of Swakopmund's urban centre, within the Swakopmund Townlands, in the Erongo Region of Namibia (see Figure 1).

The terrain of Plot No. 88 is almost flat, above the flood line of the Swakop River and the proposed site is located more than a kilometre away from any nearby animal farming activity. Rainy Day

Investments believe this location is feasible due to its suitable climate conditions, the spacious plot size (>28 ha), proximity to the port of Walvis Bay, and its easy access to the main road (B2) and international airports – Hosea Kutako at Windhoek (~four-hour drive) and Walvis Bay (les than one-hour drive).

5.5 PROJECT DESIGN AND PROPOSED ACTIVITIES

The proposed project will involve the construction and operation of a snail breeding facility, of which the following specifications apply:

- Total land area required for 25 breeding units: ~2.5 ha.

  Another ~2.5 ha would be required for storage and other related infrastructure, including the house to accommodate up to 5 people, making the total land required ~5 ha on the plot.

- Dimensions of one breeding unit:
  - Area: 1,000 m²
  - Width: ~20 m
  - Length: ~50 m
  - Number of arches: 16
  - Minimum height: 1.6 m
  - Maximum height: 3.4 m
  - Distance between arches: 3 m.
- All 25 units will be developed at Year One and will be fully operational from that year.
- One production cycle of about 9 months is planned. At the end of the cycle the farm will yield 650 tons of snails ready for harvest.
- Each breeding unit will consist of a closed nethouse. The nethouses will be surrounded by a metal sheet installed (50 cm into the ground) around the perimeter of the nethouse to prevent animals entering the units and snails to escape.
- Each breeding unit bottom would include cultivated local grass species to be used as a natural habitat setup for the snails.

Figure 3 indicates a breeding unit like the ones proposed. The proposed site layout is shown in Figure 4.

Live snails will be imported from Cyprus. At the start of the production cycle, the 25 units will each receive 1,200 kg of brood stock snails (total 30,000 kg) imported from Cyprus where they have been cultivated in a closed system. The import company is then assured that the snails are

healthy, disease free and within the first year of life can therefore monitor the breeding production cycles. Documentation from veterinary services in the country of origin will ensure that the stock is certified disease free and healthy.

FIGURE 3: EXAMPLE OF A BREEDING UNIT

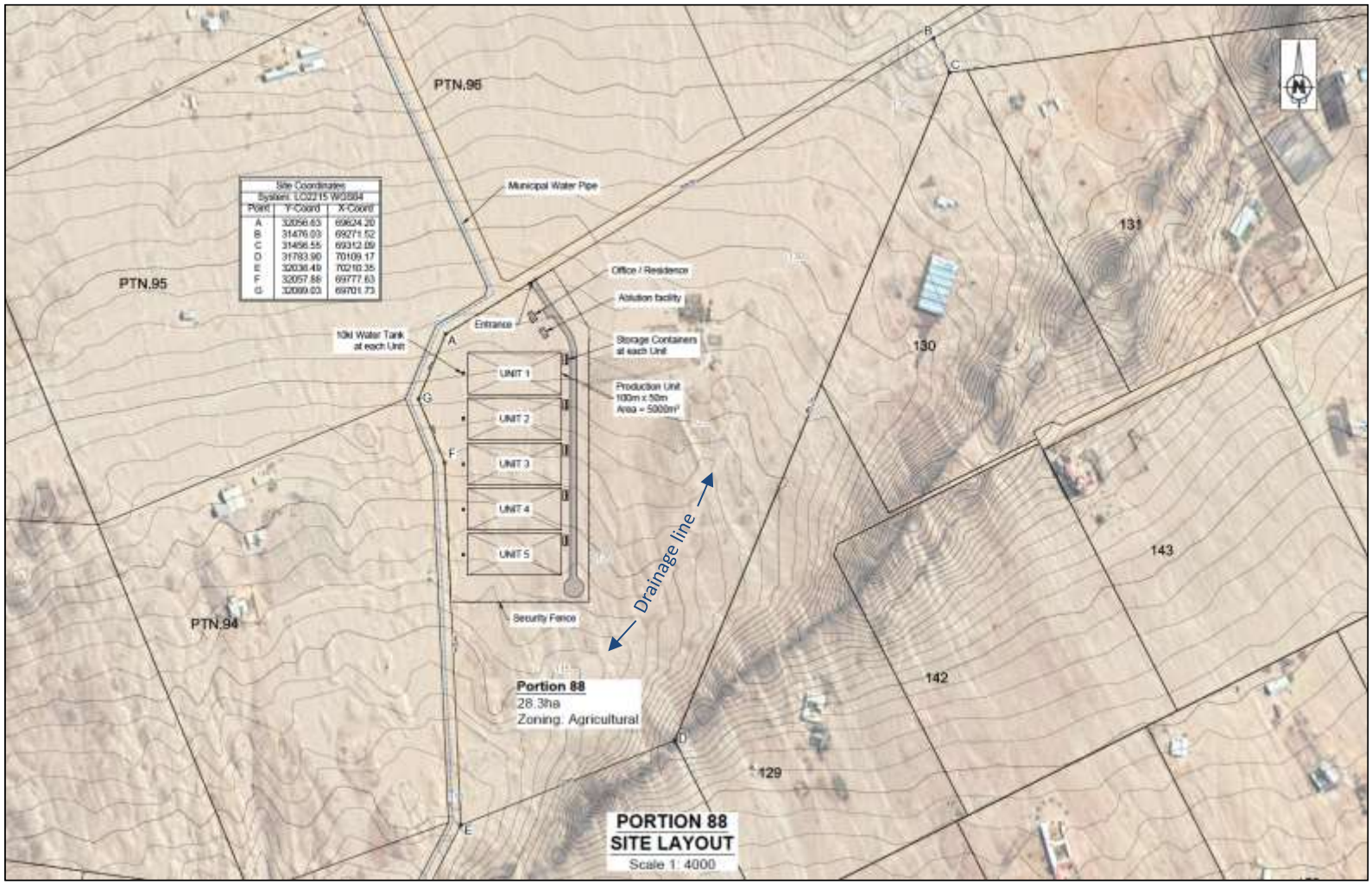


FIGURE 4: PROPOSED SITE LAYOUT

Delivery will be from the Walvis Bay port to the farm via trucks, following strict biosecurity protocols. The snails will be delivered in cooling containers, packed in a net bag inside plastic boxes on a pallet. Once the containers arrive onsite, the snails will be released inside the breeding units. It is envisaged that regulations relating to the import and export of agricultural organisms and products and health certificates would apply in the case of snail brood stock.

The snail production stages are presented in Figure 5 and further described in the sections below.

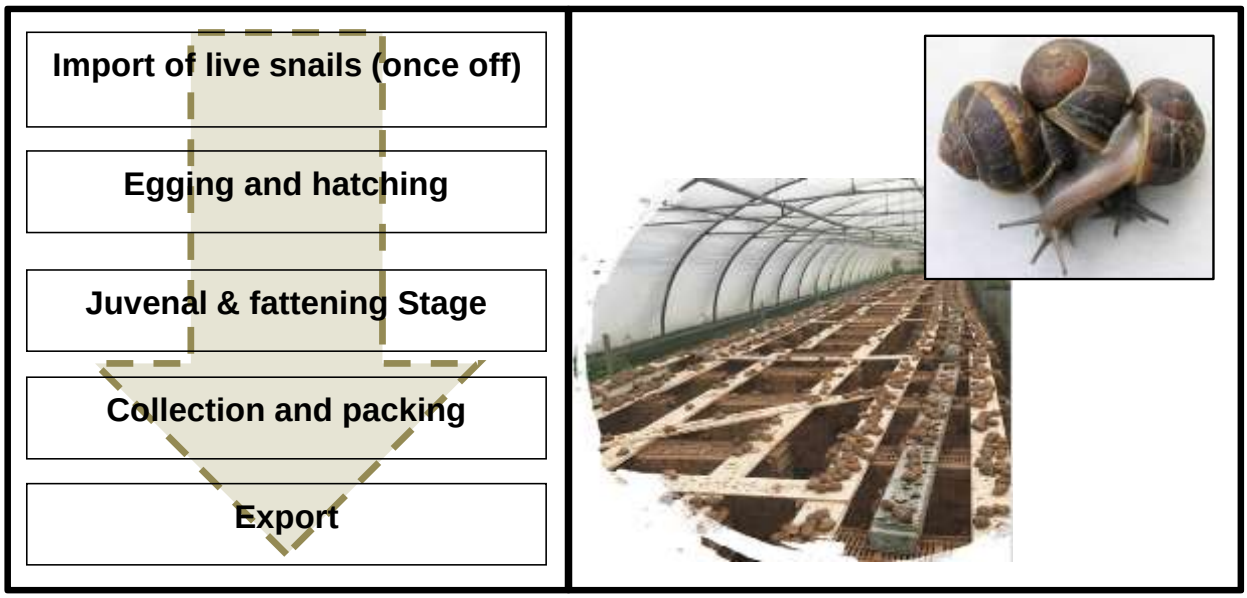


FIGURE 5: SNAIL PRODUCTION STAGES

5.5.1 EGGING AND HATCHING

During this stage baby snails are hatched and grow to a juvenal size. The hatched snails would occur on the bottom of the grass (referred as the "parking" area).

5.5.2 JUVENAL AND FATTENING STAGE

During this stage the juvenal snails are fed daily with a formulated feed to gain weight. At a weight of 8 – 10 g each, the snails are ready for harvesting.

5.5.3 HARVESTING AND PACKING

Matured snails are harvested once a year over a two-month period. The harvested snails are packed in net bags and placed in a plastic box, loaded on a pallet and put into cooling containers.

5.5.4 EXPORT

The snails are exported alive to the European market as per offtake agreement. A truck will transport the loads of export snails from the site to an agreed warehouse owned by the offtaker, which will be further handled via the Walvis Bay port as exported goods.

5.6 WATER REQUIREMENTS

The maximum water consumption for the proposed snail production activities is estimated at 45,000 m^3 per annum, which will be obtained from the municipal supply network. A new HDPE pipeline will be connected to the main supply pipeline.

5.7 POWER SUPPLY

Electricity requirements are calculated at a maximum of 21,000 KW per year. Power supply will be obtained by means of a grid connection to Erongo Red.

5.8 EFFLUENT / WASTE MANAGEMENT

5.8.1 CONSTRUCTION WASTE

Construction wastes include typical discarded items encountered during similar construction activities on urban land. This waste would include amongst others:

- General domestic waste such as food and packaging, pallets and wooden crates, paper, rubber, plastics, cardboard and metal offcuts.
- Building rubble and small volumes of waste concrete.
- Limited volumes of hazardous waste, including paints and empty pain containers.

Waste will be sorted onsite.

During the construction phase recyclable waste will be sent to or collected by a reputable recycling company. The remainder of the construction waste will be transported to a permitted general landfill facility for disposal.

Hazardous waste will be disposed of at the permitted hazardous disposal site (Walvis Bay).

5.8.2 WASTE GENERATED DURING THE OPERATIONAL PHASE

5.8.2.1 GENERAL DOMESTIC WASTE

Limited volumes of general domestic waste such as kitchen and food rests and packaging will be generated and removed from site by means of the normal municipal waste collection system (i.e., wheely bins weekly collected by the municipality for disposal at the Swakopmund landfill facility).

5.8.2.2 WASTE FROM THE SNAIL BREEDING UNITS

The breeding units are designed in such a way that the waste of the snails stays on wood surfaces when they are out and active. The wood (with waste) gets cleaned daily and any waste would be reused as organic fertilizer for cultivating the needed grass. Wood will only be replaced during routine maintenance activities.

Furthermore, any dead snails are also removed daily and similarly disposed. Waste on the soil will be reused as an additional fertilizer for the grass.

Therefore, the waste that will be generated (i.e. mix of deposit, feces, and dead remains of snails) will be recycled within the farm. This implies that the waste would only be managed/handled/treated inside the actual farm net houses parameters. This practice would be applicable throughout the entire 9 months production cycle and the 3 month of maintenance thereafter.

Between the production cycles (i.e. during the 3 remaining months) and when required, the entire farm (i.e. the project area) would be disinfected from any organic matters (including eggs and the like) using special designated chemical materials, whereby the stock for the next cycle would be kept in a strict biosecurity area within the actual farm boundaries. The entire farm (i.e. 25 production units) will be covered and closed by the net houses structure (refer to section 5.10). Disinfection would be done by local spraying method, and only inside the net houses (under no-wind condition) to ensure no external spraying effects.

Any possible odd disposed materials during operations (e.g. due to maintenance) would be disinfected firstly before removed from the farm and transported out to the nearest approved municipal disposal area.

5.9 DISINFECTANT CHEMICALS

With reference to section 5.8, the likely list of key required disinfectant chemicals to be applied during the disinfection process is provided in Table 5.

TABLE 5: CHEMICALS TO BE APPLIED DURING THE DISINFECTION PROCESS

Chimical name	Application	Function
Vertimec	spray	pesticide
Copper	spray	Fungicide
Chlorine	spray/Soaking	tools disinfection
Cypermethrin	spray	Insecticid/fungicid

Notes:

- The required chemicals are standard agriculture materials used in the industry.
- The use/application of the above chemicals is subject to best practice guidelines which are prescribed by the manufacturers and when needed by a qualified agronomist (as been applied in any agriculture operation).
- The storage of the chemical would be within a dry dedicated container. The actual storage would be very limited only to a bio-monthly period use as and when needed.
- The chemicals to be used will be as per the list above (Table 5) or equivalent active ingredients as per the available approved brand in Namibia.

5.10 BIOSECURITY AND ACCESS CONTROL

Daily cleaning of the units, as well as various strict biosecurity protocols, will be implemented to prevent the spreading of diseases and viruses (see the EMP in section 10 of this report). To prevent insects, birds and other predators of snails from entering the breeding units, the units are covered and closed. This also prevents any snails from escaping the breeding units.

The internal growing pens will be surrounded by an electric fence in order to prevent the snails to escape and specifically to secure the biosecurity protocols.

People entering the farm will be required to follow relevant health protocols to avoid the transfer of bacteria to the snails. Control of staff and visitors would be done through the farm manager and recorded continuously.

5.11 PRODUCTION MANAGEMENT

A specifically designed online system will be implemented to monitor all activities of the project daily, including aspects such as temperature and humidity, feed quality and management protocols to ensure growth and harvesting. Cold chain management is also monitored to ensure secured offtake and to assure product quality.

Being scalable and modular, the project will be developed with options to expand and produce more than 650 tons per annum as per offtake agreement.

5.12 TRANSPORT REQUIREMENTS

Workers will be transported to and from the site on a daily basis. During the initial construction phase, and during the annual production phase, the additional staff would be travelling daily to and from the site on similar arrangement. Private vehicles of workers will not be allowed onsite. Workers will be dropped off and pick up at the site's perimeter.

Feed deliveries would be done twice a week by a truck.

A maximum of five truckloads (20 – 40 feet size) per day will transport the harvested snails to the warehouse during the two-month harvesting period.

5.13 EMPLOYMENT

The project would include two phases of employment:

- Construction phase – approximately 30 workers for a period of four months.
- Operational phase – 16 full-time employees (including a manager, supervisors and general workers) and approximately 60 additional temporary employees for a period of two months per year (during the harvest time).

No provision is made for all staff to reside onsite – only key staff (up to ~5 people) (i.e. the manager, security and relevant visitors) would likely reside on site.

5.14 THE BIOLOGY, ECOLOGY AND CULTURE OF BROWN GARDEN SNAILS

The section below provides background regarding *Cornu aspersum (i.e. C. aspersum)*, in general; risk of introduction; etc. It includes, extracts from the Biological Impact Specialist Study Report[3] (the full report is include as Appendix F).

5.14.1 TAXONOMY

The family Helicidae includes 17 genera of large snails with globular shells. They include *Cornu, Helix, Cepaea* and *Arianta*. Some are cultivated for consumption (e.g. *Cornu aspersum, Helix pomatia, Helix lucorum, Otala punctata, Theba pisana, Iberus gualterianus alonensis*) and many other species are eaten by humans. *C. aspersum* is highly variable morphologically and several distinct morphotypes exist, based on size, shape, thickness and colour of the shell.

C. aspersum was first described by Müller (1774) as *Helix aspersa* (meaning “spotted” snail in reference to the shell patterning). The genus *Helix* is now widely considered incorrect for the species because of differences in the structure of the reproductive organs. The International Commission on Zoological Nomenclature (ICZN, 2015), ruled under Articles 78.2.3 and 80.2.1 that the wording of Article 1.3.2 be interpreted to confirm the nomenclatural availability of Cornu Born, 1778 for a genus of land snails (family Helicidae), that was based on a

[3] Various references were made in the Specialist Report, which will not be repeated in this report. For the detailed list of references refer to section 9 of the Biological Impact Specialist Report (Appendix F).

teratological specimen of *Helix aspersa* Müller, 1774. Thus the correct name for the species is now *C. aspersum*. The common name in Namibia is brown garden snail or bruinslak.

5.14.2 DISTRIBUTION

C. aspersum has been the subject of extensive studies leading to the recognition of several endemic forms. Whilst the origin of the one form considered distinct, i.e.; the farm reared form *maxima*, is in doubt as its range is unknown. The other common form, *aspersa sensu stricto*, is probably native to North Africa where genetic discontinuities indicate differentiation of well-defined eastern and western lineages. The western lineage would have then expanded from north Africa to Europe via both the Tyrrhenian route and the Straits of Gibraltar. Historical events involving vicariant and dispersal processes would explain the 'east-west' genetic split and the northward expansion of the western clade. The distribution essentially reflects both Pliocene/Pleistocene climatic changes and Tertiary geomorphological events.

Currently the western lineage of *C. aspersum* have populations transported as aliens to geographical areas by the direct or indirect, typically inadvertent, action of humans (anthropochorous).

It has spread throughout the world in regions having Mediterranean, temperate and subtropical climates. It is found in North and South America and Africa, as well as in the Mascarene Islands, Oceania and Asia. The western form has successfully established itself in agricultural, urban and suburban areas, and it is considered an important agricultural and garden pest in lands where it has been recently introduced and naturalised.

C. aspersum was first introduced into South Africa in 1855 (Swart *et al*., 1976), it is presumed it was introduced shortly after that into Namibia.

5.14.3 HABITAT

The habitat of *C. aspersum* is primarily in countries with a Mediterranean climate. However, it has colonised other countries where conditions permit. *C. aspersum* is also a cosmopolitan invasive pest of a large range of agricultural crops in the Americas, south-eastern parts of Australia, New Zealand, South Africa and elevated areas (>1000 m) of many tropical and subtropical islands. Since the 1970s and 1980s, it has emerged as a viticultural pest in South Africa and Australia.

C. aspersum inhabits sheltered places and is generally found in areas of base rich soils, hedge banks, sea cliffs, quarries, graveyards, urban gardens and neglected disturbed ground.

5.14.4 Host Plants Affected and Damage Caused

C. aspersum is a polyphagous grazer (an animal able to feed on a wide range of food) with a highly varied diet. It feeds on wild plants such as *Urtica dioica* or *Hedera helix*, which is also used for shelter in its natural habitat. In disturbed habitats, a wide range of crops and ornamental plants are reported as hosts, which include vegetables, cereals, flowers and shrubs as well as vineyards and citrus orchards.

Extensive damage is caused by *C. aspersum* in orchards (creating holes in the fruit and leaves), vegetable crops, garden flowers and cereals.

In California, USA, populations established in citrus groves feed essentially on the foliage of young citrus and ripe fruits, creating small holes allowing the entry of fungi and decay of the fruit. Larger holes result in fruit dropping from the tree or being rejected for consumption during sorting and packing.

In South African viticultural regions, *C. aspersum* feeds essentially on the developing foliar buds and young leaves of the vines. In kiwifruit vineyards (California, New Zealand), damage occurs on the flowers, not the fully developed fruit, since snails consume only the sepal tissue around the receptacle area. Damage to the sepals can be detrimental by increasing the development of the fungus *Botrytis cinerea* during cold storage of fruits, and moreover, the slime trail mucus stimulates germination of *B. cinerea conidia*.

5.14.5 Natural Enemies

Terrestrial snails are a food source for many animals, including mammals, many bird species, reptiles, amphibians, myriapods, insects, planarians, spiders and predatory terrestrial snails.

Some ectoparasite species have also been described, such as the hematophageous mite *Riccardoella limacum*, living in the lung cavity of terrestrial gastropods. When the mite population is sufficiently high, there is high mortality among snails. It has also been shown to influence life history (decreased activity, reproductive output and winter survival) in a related species

Endoparasitic nematodes (*Alloionema appendiculatum*, *Nemhelix bakeri*, *Phasmarhabditis hermaphrodita*, *Rhabditis maupasi*, *Angiostoma aspersae*) can also affect reproduction or cause mortality, particularly in rearing farms.

Epizootic diseases, regularly appearing during the dry season in *C. aspersum* rearing farms, has been related to pathogenic strains of the bacterium *Aeromonas hydrophila* and yellow

fluorescence leading to death could be caused by pigment-forming bacteria of the genus *Pseudomonas*.

Eggs of *C. aspersum* can be invaded by microbes, notably fungi. The most frequently described fungus is a *Fusarium* species, responsible for 'pink clutches', triggering egg degradation.

5.14.6 DISPERSAL

5.14.6.1 NATURAL DISPERSAL

At a local scale, *C. aspersum* are deemed to have developed a dispersal strategy involving a fluctuating sexual asymmetry. Only a low proportion of large protandrous snails (male reproductive organs mature first), were involved in exchanges between subdivisions in a metapopulation and in the colonization of new area. This dispersal tendency is promoted by an increase in population density. Such a strategy could explain the successful colonization of agrosystems, which could be considered stressful for snails because of many unpredictable (predation, agricultural practices) and predictable (climate) mortality factors. However, dispersal has to be set against the cost of locomotion, which is high in snails. *C. aspersum* has a well-developed homing behaviour. Thus, active dispersal in *C. aspersum* allows only slow local diffusion through fragmented landscapes.

5.14.6.2 VECTOR TRANSMISSION

Human activities have caused the wide distribution of *C. aspersum*, throughout the world. It seems that initial colonization of north-western Europe by the Romans, who initiated snail farming, largely contributed to the massive and rapid dissemination of the species throughout the northern part of its range.

No other species known to be involved in the local dissemination of other species of snails, especially some bird species, seems to be an efficient vector for the passive dispersal of *C. aspersum*.

5.14.6.3 ACCIDENTAL INTRODUCTION

Few accidental introductions have been recorded. Although often initially intentionally imported for culture, the snails may then escape from the farming facilities, as has happened in California, Colombia and probably many other places. In Austria, the species may have been introduced accidentally with vegetables. In the Pacific islands, it was intercepted in in Niue and Samoa (in 2002 and 2006, respectively) on containers originating from New Zealand, and in Fiji on wooden pallets (origin not specified). Also intercepted on plant shipments to Florida, it has not become established in this state.

5.14.6.4 INTENTIONAL INTRODUCTION

C. aspersum has been deliberately introduced to many countries (north-eastern Europe, North and South America, Asia, etc.) for economic reasons (source of human food and cosmetics).

6 DESCRIPTION OF THE CURRENT ENVIRONMENT

This chapter describes the existing (i.e., baseline) biophysical and human environment of the site where the location of the snail production project is planned (see Figure 1). The information presented in the sections below was derived from the following sources:

- Visual observations during site visits by Namisun.
- Biological Impact Specialist Study prepared by Peter Thorpe (Appendix F).
- Atlas of Namibia.
- Google Earth.

Further input was obtained from the focus group meetings with key stakeholders and I&APs (see Section 3.5 for details) as well as from various other documented sources – all listed in the references (see Section 13).

6.1 CLIMATE

The climate of the central Namib Desert is strongly influenced by the quasi-stationary South Atlantic High off the southern Namibian coast. As a result of the sinking air over the cold Atlantic, temperatures close to the coast are moderate, the humidity is high, and overcast days and foggy nights are common. Sea temperatures along the central part of the Namibia coast are rarely warmer than 20°C. The cold sea has a profound climatic influence over the land that borders it – climatically this part is referred to as Cool Desert.

6.1.1 TEMPERATURE

Table 6 was composed to compare temperatures recorded in 2019 and 2020. From this table the lowest minima were recorded between April and October, varying between 6°C and 11°C. In both years the lowest minima were recorded in August. Ironically, the highest maxima were also recorded in August 2019, and in the case of 2020 the second highest maxima were recorded in August. The months June, July and August are marked by both the lowest minima and highest maxima, resulting into the widest potential diurnal temperature ranges, sometimes more than 30°C. During the other months, maxima are not exceeding 30°C and the potential diurnal temperature range is between 10°C and 20°C, the narrowest between December and March. During these months the maxima are not higher than 28°C.

In summary, the average minima are between 10°C and 11°C, the average maxima are between 28°C and 29°C and the average potential diurnal range is between 17°C and 18°C. Summer months (December, January and February) are not necessarily marked by higher temperatures,

whereas the winter months (June, July and August) are marked by a possibility of recording the highest temperatures and a wide fluctuation between minimum and maximum temperatures.

Important, the proposed site is located within a part of Namibia that is climatologically described as Cool Desert – beyond it temperatures soar and the land becomes highly inhospitable to a mollusc such as *Cornu aspersum*.

TABLE 6: COMPARISON OF TEMPERATURES RECORDED IN 2019 AND 2020
(Source - Lithon, 2021)

	2019			2020		
Month	**Lowest minimum recorded**	**Highest maximum recorded**	**Potential range**	**Lowest minimum recorded**	**Highest maximum recorded**	**Potential range**
January	14.6	24.6	10.0	15.4	24.1	8.7
February	15.3	27.1	11.8	16.2	25.7	9.5
March	14.1	28.2	14.1	14.8	24.2	9.4
April	9.4	22.3	12.9	9.3	28.7	19.4
May	10.2	28.8	18.6	9.0	40.1	31.1
June	7.3	35.7	28.4	7.1	35.2	28.1
July	6.7	33.3	26.6	8.3	36.0	27.7
August	6.0	39.2	33.2	6.3	37.1	30.8
September	8.9	25.6	16.7	6.9	26.1	19.2
October	10.9	24.4	13.5	7.8	19.7	11.9
November	13.3	28.6	15.3	11.1	21.1	10.0
December	13.7	23.9	10.2	13.0	22.7	9.7
Averages	10.9	28.5	17.6	10.4	28.4	18

units in °C

6.1.2 PRECIPITATION

Rainfall over the central Namib Desert can be described as extremely variable, patchy, unreliable and marked by a deviation coefficient of more than 100%. Rainfall events are rare and the total annual rainfall seldomly exceeds 50 mm. The long-term average rainfall for Swakopmund is less than 20 mm per annum. To the contrary, the relative humidity is high – with a long-term monthly average higher than 70% (Mendelsohn, et al., 2002).

According to Table 7, the lowest relative humidity readings are recorded in June, July and August, i.e., the same months during which the highest temperatures – to the contrary – are recorded. The average lowest relative humidity is 44%. However, this figure is strongly influenced by the low readings for June (8%), July (11%) and August (7%). With the exception of May (28%), the

readings for the other months remain above 40%. In contrast, the average highest relative humidity is more than 96%, remaining above 95% in all months.

The high relative humidity is closely coupled to the frequent occurrence of fog episodes, which has a profound influence on the coastal parts of the central Namib Desert. Relative humidity reduces markedly towards the interior and as the annual average rainfall increases, the frequency of precipitating fog episodes diminishes. Inland the aridity of the interior becomes increasingly noticeable and at an elevation of higher than 600 m above mean sea level, fog episodes are a rarity. Inland the temperatures show wider diurnal and seasonal ranges, winter and summer is better defined, rain is the main source of precipitation (exceeding 50 mm per annum), and insolation is higher (SPC, 2020).

Precipitating fog occurs, on average 65 days per year at Swakopmund, producing a total precipitation of 35 mm per year. The occurrence of fog peaks between August and October (Viles, 2004).

TABLE 7: RELATIVE HUMIDITY RECORDS FOR SWAKOPMUND DURING 2019
(Source – Lithon, 2021)

	2019	
Month	**Lowest reading recorded**	**Highest reading recorded**
January	67	95
February	61	96
March	59	97
April	71	97
May	28	98
June	8	98
July	11	99
August	7	98
September	49	97
October	63	97
November	42	96
December	63	95
Averages	44.1	96.9

units in %

6.1.3 WIND

Along the coast the southwest wind which originates from the South Atlantic High and blows over the cold ocean, dominates >20% of the time, and mostly during the day. Although the highest wind speed in all months exceeds 20 km/h (see Table 8), windspeed of between 10 and 20 km/h is more common – in 40% of all cases, when the wind direction is southwest. Windspeed above 20 km/h occurs in 25% of all cases when the southwest wind blows (retrieved from www.meteoblue.com). As the distance from the coast increases, wind speed decreases and the direction become more variable.

Occasional eastwinds (more accurately, from the northeast) blow during winter, as a result of cold sinking air over the interior that flows towards the coast. This air heats up as it blows towards the coast, and result in the recording of higher temperatures, often exceeding 30°C (see Table 6). Important, these hot, dry winds have a strong desiccation effect on the coast, and relative humidity figures drop noticeably during these events (see Table 7).

Eastwinds occur 12.5% of the time and in 40% of the cases, have a speed of 5 - 10 km/h and in 30% of the cases have a speed of 10 – 20 km/h (retrieved from www.meteoblue.com).

TABLE 8: WIND SPEED AND WIND GUST RECORDS FOR SWAKOPMUND DURING 2019
(Source – Lithon, 2021)

	2019	
Month	**Highest wind speed**	**Highest wind gust**
January	24.1	37
February	27.4	40.2
March	25.7	37
April	27.4	41.8
May	25.7	37
June	35.4	53.1
July	32.2	53.1
August	41.8	61.2
September	25.7	35.4
October	35.4	56.3
November	29	43.5
December	33.8	45.1
Averages	30.3	45.1

units in km/h

According to Table 8, the highest wind speeds as well as the highest wind gusts are recorded in August, i.e., when the potential diurnal range of temperatures are the widest. This situation is associated with eastwind episodes. In April, from June to August, and in October wind gusts are the highest, most likely associated with eastwind episodes between April and August and most likely associated with strong southwest winds during October. During eastwind episodes wind speed may exceed 20 km/h and the wind gust may exceed 40 km/h. Except the higher temperatures and drier conditions, eastwinds are loaded with dust from the interior.

6.1.4 AIR QUALITY

Emissions from fuel combustion or production processes as well as noise, vibration, light, heat and other forms of radiation are possible in any human settlement. Emissions may also result into pollutants, impurities, fumes and odours. Dust generation in Namibia is quite common, due to the aridity. Therefore, it is quite common to manage dust (as health and nuisance factor) as minimum requirement of an air quality management plan. Air quality of any place is closely coupled to the local climate conditions, and specifically the wind regime.

In the absence of Namibian legislation with reference to air quality, standards and guidelines derived from the World Bank, World Health Organization, European Commission, and South African National Standards are used in Namibia. Standards from these guidelines are used to measure and monitor particulate matter less than 10 µm in aerodynamic diameter (PM_{10}), and Total Suspended Particulates such as dust fall, sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3) and carbon monoxide (CO).

Whereas other towns in Namibia have a particular problem with dust generated from unsealed surfaces such as roads, ambient dust over Swakopmund is associated with eastwinds, i.e., from the interior.

In a recent study it was found that PM_{10} concentrations were the highest along the coast during eastwind conditions over the Namib Desert. Over the coastal towns the ambient dust conditions are also prolonged because of the north-easterly / south-westerly wind conversion lines and cyclonic circulation associated with coastal troughs and coastal lows. $PM_{2.5}$ does not seem to be a pollutant of concern at the coastal towns, though (Ministry of Mines and Energy, 2019).

6.2 GEOMORPHOLOGY, TOPOGRAPHY AND SOILS

Except for the coastline, two distinct geomorphological units characterize the Swakopmund Townlands – the plains and the river. Close to the sea the plains flatten and become a coastal peneplain, which is sandier and occasionally dotted with hammocks. Away from the coast, the

plains become undulating and increasingly covered with gravel and gypsum-encrusted soils – also the dominant landform on the land of the proposed project.

The underlying formations cover a geological period from the Late Proterozoic to the Early Cretaceous (Schneider, 2004), consisting of schists, quartzites, meta-greywackes, marbles and calc-silicates. These rocks form part of the central zone of the Damara Sequence, have been intensely folded and have an NNE/SSW strike. Part of the pre-Damaran basement, gneiss and granite lithologies are quite common, and intrude the Damara metasediments as outcrops. Karoo-age dolerite dykes also intrude the Damara metasediments occasionally. A dolerite ridge borders Plot 88 to the southeast.

FIGURE 6: GRADIENT ON THE PROPOSED SITE

Gradients within the townlands are low, dipping gently towards the ocean and towards the Swakop River (see also Figure 6). The riverbed of the Swakop River forms a stark boundary with the dune belt to the south and no dune cuts across. Inside the Swakopmund Townlands the valley of the Swakop River is flat and open. Upstream, and outside the townlands, the landscape that

flanks the river is dissected as a result of heavy erosion by the same river during wetter times, over millennia.

Gypsum is a common surficial sediment on the plains, forming as a result of the frequent sulphurous mists blowing off the sea and reacting with the calcareous sediments derived from Damaran marbles or calcrete to form gypsum as a replacement of calcite. These soils are distinctively darker and have in general a high concentration of salts and hydrogen sulphide, which has an influence on the fog and in return intensifies chemical processes and soil genesis. Gypsum-content (petric gypsisols) dominate soils close to the coast, while gravel-covered and concrete surfaces characterize soils further inland (SPC, 2020).

On the land of the proposed project the soils are generally thin and covers a hard rock sub-surface which consists of a mix of schists, quartzites and marbles. As the land dips gently from an elevation of 134 m above mean sea level towards 116 m at the lowest point, more surficial material has accumulated within a prominent drainage line present on the land, and here the soil layer is subsequently deeper. In general, the soils on the land are highly calcareous and can be best described as leptosols. These soils appear to be derived in situ, but are often mixed with accumulated weathered material and are coarse-textured, containing gravel, pebbles or unweathered pieces of rock from the local surroundings. Leptosols are poorly developed and thin, lack appreciable quantities of accumulated clay and organic material and are susceptible to erosion (Mendelsohn et al., 2002).

6.3 HYDROLOGY

The Swakop River is one of Namibia's prominent western flowing ephemeral drainage lines. The river originates to the east of Okahandja in central Namibia and receives run-off from a number of important tributaries, of which the Khan River is the largest, along its way to the coast. Both the Von Bach Dam and the Swakoppoort Dam are located in the Swakop River, providing water to the central parts of Namibia, including Windhoek, Okahandja and Karibib. Below the Swakopport Dam the river functions ephemerally, reaching the coast only episodically. Despite the absence of surface water, the presence of subsurface water sustains elementary riverine vegetation, predominantly halophytes.

The Swakop River (see Figure 1) forms the southern boundary of the Swakopmund Townlands and act as a physical barrier of the dune belt south of it. Urban development into the channel of the Swakop River is not allowed but restricted to a safe distance away from the northern bank of the river. Presently there is no structural interference (e.g., impoundment) with the natural flow of surface water in the river within the townlands, nor is it foreseen. Within the townlands the land between the river and the existing built area forms an unoccupied strip of land, up to a point where

the C28 road to Walvis Bay crosses the river. East from this point the unoccupied strip of land is less defined as built structures encroached to distances of a few meters from the northern river bank (SPC, 2020).

The mouth of the Swakop River is cut-off from the sea by a sand bar which results a semi-permanent wetland, sustaining aquatic life. Inland, a few more pools are present in the last five kilometres of the river, also sustaining aquatic life. Despite the proximity of human activities and built structures, the Swakop River mouth is a popular bird-watching area. Upstream from the mouth, the river is a popular zone for all sorts of recreational activities. Since the river forms a natural boundary of the dune belt to the south, it is also an important transition zone and provides access to the recreational activities into the dune belt (SPC, 2020).

Over the largest part of the townlands the local drainage is oriented towards the valley of the Swakop River. A number of dry drainage lines exist, which rarely contains runoff. They can be inactive for several years but can transform into torrent streams during a rare rain event – due to the barren desert surface which forms their catchments. A prominent dry drainage line in a north-south direction is also present on Plot 88 (see Figure 4). The proposed snail production project infrastructure is located well without this drainage line (to the western side of the plot).

Surface drainage over the built parts of Swakopmund during an occasional downpour is in most cases problematic, simply because the sudden accumulation of run-off from the sealed surfaces and the low gradient cause damming and overflows, even flooding in some cases (SPC, 2020).

The dry Swakop River sustains a porous aquifer, from which water is abstracted since the existence of Swakopmund. As recharge has diminished due to the impoundments upstream, water quality from this source deteriorates over time and is so saline that it is not extracted for human consumption anymore. Groundwater potential on the gravel plains is very low and limited. If present, the groundwater is saline and not suitable for human consumption in most cases (Christelis and Struckmeier, 2001). The land where the project is proposed is supplied with municipal water.

6.4 BIODIVERSITY

Swakopmund Townlands form part of the (central) Namib Desert Biome. Vegetation structure is dominated by grassland and dwarf shrubland with a couple of dominant annual grass species. Cover is generally sparse and plant production low. Overall plant diversity is estimated as < 50 species, and in total representing less than 10% of the flora of Namibia. Although not classified as a centre of endemism, endemics occur more inland and include *Arthraerua leubnitziae* (Pencil bush), *Adenia pechuelii, Commiphora dinteri, C. saxicola, C virgate* and *Euphorbia damarana*.

Plant endemism is viewed as medium. The flagship plant of the Namib Desert, *Welwitschia mirabilis*, also occurs more inland while the iconic! Nara (*Acanthosicycos horridus*) is more associated with the dunes of the Namib Desert. A few aloe species occur in the central Namib Desert and are all protected but do not really occur along the coast (SPC, 2020). On the site minimal plant life exists. Only sparse stands of *Zygophyllum stapfii* (Dollar bush) and *Arthraerua leubnitziae* (Pencil bush) are present, neither of which are endangered (see Figure 7).

FIGURE 7: VEGETATION PRESENT ON THE PROPOSED SITE

The extensive gypsum crusts of the central Namib Desert support the most diverse lichen fields in the world, with many of the rarest and interesting species not officially described (Burke, 2003). More than 100 species are expected to occur. Lichen fields are particularly vulnerable to pollution and mechanical damage, specifically at risk from off-road driving. Inside the adjacent Dorob National Park, lichens are protected as core conservation areas – directly as fenced-in area (e.g., north of Wlotzkas Baken), or indirectly by discouraging access. Lichens occur abundantly within the townlands too but are not directly or indirectly protected. In combination with other flora and fauna, lichens occur on the dolerite ridges located on the townlands. One such a ridge is located adjacent to Plot 88. On Plot 88 itself, several lichen concentrations are present but are not

protected (see Figure 8). The lichens observed on site is largely present in the southern part of the plot, which falls outside the proposed project development area.

FIGURE 8: A ROCK COVERED WITH LICHENS ON THE PROPOSED SITE

The ephemeral rivers that cross the central Namib Desert are home to a number of common riparian plants. It is estimated that 20 – 39 species plants higher than 1 m occur in the central Namib Desert, not all of which occurs along the coast but more inland. This includes six endemics and several protected species (UNAM, 2011). None of these plants occur on Plot 88.

The central Namib Desert is rich in arachnids, but this part of Namibia is regarded as relatively low in overall terrestrial biodiversity, although endemism is moderate to high. Large herbivorous mammals are scarce, with overall diversity of large carnivorous mammals determined as four species, with brown hyena (*Hyaena brunnea*) the most important. Springbok and Oryx have the highest density. Overall, it is estimated that 54 reptiles, seven amphibians, and 42 mammals occur in the central Namib Desert, of which a high proportion are endemics (UNAM, 2011).

At least 50% of the expected reptiles are endemic, of which the Rock Monitor (*Varanus albigularis*) is vulnerable, two species are rare, and four species have some sort of international conservation status. Six snake species are endemic, 50% of all lizards are endemic, and 13 of the 16 expected geckos are endemic. Three of the expected amphibian species are endemic to Namibia but classified as of least concern in terms of conservation. Most of Namibia's endemic mammal species are associated with the Namib Desert, especially the transitional zones such as

the escarpment and inselbergs, are rock-dwelling and are mostly rodents and small mammals. Two species are classified as vulnerable, and eight species are near threatened.

Although it is possible that some of the mentioned species may occur occasionally within the Swakopmund Townlands – and also on Plot 88 – they are more confined to the surrounding Dorob National Park.

Bird diversity is viewed as medium in the central Namib Desert with 141-170 species (this would include migrant species) estimated with at least three species being endemic to the general area (Mendelsohn, et al., 2002). Both the Walvis Bay and Sandwich Harbour wetlands are Ramsar sites. The Walvis Bay wetland is considered as the most important coastal wetland in southern Africa and one of the top three in Africa. Within the Swakopmund Townlands, the Salt Works is classified as an Important Birding Area, whereas the mouth of the Swakop River and the old sewage works sustain wetlands of a supplementary role. Together, the wetlands are extremely important for waders, migrant shorebirds, flamingos, and breeding residents with several species classified as vulnerable, near threatened or endangered, and home to many species that occur in high numbers (Barnard, 1998). Several Red Data and / or endemic breeding bird species and migrants visit and reside at the wetlands, including Lesser Flamingo (vulnerable, globally threatened); Greater Flamingo (vulnerable); Cape Cormorant (near threatened, globally threatened); Great White Pelican (vulnerable); Black-necked Grebe (near threatened).

One species is of critical importance – 98% of the Damara Tern (*Sterna balaenarum*) breeding population occurs on the gravel plains and sandy beach areas of the central coastal areas of Namibia (Braby, 2010). Damara Terns are endemic to Namibia, near threatened and globally threatened, and considered a flagship species of the central coastal area of Namibia. At the Salt Works about 2% of the entire population of Damara Terns occur, including a breeding colony site. This location is of conservation significance and not formally protected yet. The presence of other breeding sites within the townlands is unlikely. Some of the potential impacts that may affect the bird sites are destruction / modification of habitat; physical disturbance to roosting / breeding birds; noise disturbances; collisions of birds with power line structures; and electrocutions of birds on power line structures (ACS, 2014).

The wetlands are some distance away from Plot 88 – subsequently the presence of the mentioned bird species, albeit possible, would be a rarity.

Overall, five bird species are classified as near-threatened; three species as vulnerable; 34 species as near-endemic; twelve species as endemic and three species as endemic. Seven of the species which are endemic to Namibia are expected to occur in the central Namib Desert.

Two species are classified as specially protected; three species as vulnerable and one species as endangered (UNAM, 2011). Gray's Lark (*Ammomanopsis grayi*), an iconic species of the gravel plains of the central Namib Desert, is a near-endemic and may be expected on Plot 88.

Development and recreation activities are possibly the biggest threats to vertebrate fauna, especially reptiles and ground breeding birds, in the central Namib Desert. Species most likely to be adversely affected by habitat alteration, specifically associated with urban built-up areas, would be mammals and avian fauna (UNAM, 2011). On the other hand, development may lead to the introduction of new, and even invasive, species. The house mouse (*Mus musculus*) and the rats *Rattus rattus* and *Rattus norvegicus* are viewed as invasive to the central Namib Desert (UNAM, 2011). Despite the introduction of many new plant species, also on the small-holding area where Plot 88 is located, invasive alien species is not a major concern in the Swakopmund Townlands though.

6.5 HERITAGE

Heritage refers to the legacy of intangible attributes as well as physical artefacts of Namibian society inherited from past generations, maintained in the present generation, and preserved for the benefit of future generations. "Heritage significance" includes cultural, historical, social, scientific, aesthetic, archaeological, and architectural significance, according to the National Heritage Act, No. 27 of 2004. The Act compels the reporting of any such finds to the National Heritage Council.

Although some of the buildings in the old part of Swakopmund are regarded as of heritage significance, and some even proclaimed as national monuments, the existence of archaeological features within the boundaries of the Swakopmund Townlands is unknown, but possible.

It is unlikely that significant archaeological evidence of precolonial occupation will be found in the areas away from the Swakop River, mainly due to the absence of fresh water in the immediate area. Possible evidence of early human occupation may include shell middens or tools, but disturbance as a result of urban development over a period of more than 100 years prevented most of these recordings within the existing built area (QRS, 2014).

Against this background and the site visits undertaken by Namisun, it is highly unlikely that any heritage resource is present on Plot 88.

6.6 SOCIO-ECONOMIC ENVIRONMENT

Swakopmund is located in the Erongo Region, which is located on the central part of the coast, bordering the Kunene and Otjozondjupa Regions in the north, the Khomas Region to the east and the Hardap Region to the south. The region is named after the Erongo Mountains which

dominates the central section of Namibia's escarpment. The region covers a great part of the central Namib Desert, the main reason why this region has a small rural population. In 2016 the region accommodated 7.8% of the national population total (NSA, 2017).

6.6.1 DEMOGRAPHIC CHARACTERISTICS

The last national census was conducted in 2011 and counted 2.1 million Namibians. An inter-censal demographic survey was conducted in 2016 and estimated the total population at 2.3 million (NSA, 2017).

National population growth rate is estimated at less than 2%, lower than most African countries. Namibia's population is young. Although 57% falls in the age group 15 – 59, 37% of the total population is younger than 15 (NSA, 2017). Since 2005 there is a steady improvement in life expectancy, currently estimated at 65 years.

Namibia is one of the least densely populated countries in the world (2.8 person per km^2). Vast areas of Namibia are without people, in contrast to some fairly dense concentrations, such as the central-north and along the Kavango River. Urban areas attract Namibians from all parts of the country in search for a better live, resulting accelerated urbanization on the one hand but de-population of the rural parts on the other hand. Moreover, it means that urban areas develop to the cost of rural parts. In 2018 it was estimated that 50% of all Namibians are urbanized, in other words living in an urban settlement (retrieved from www.worldpopulationreview.com).

The dominance of Walvis Bay and Swakopmund in the Erongo Region is apparent – most of the region's businesses and industrial activities are registered in these two towns, and both towns attract Namibians from elsewhere in the country to reside here. Swakopmund functions also as regional capital and hosts most of the administrative and governmental headquarters of the region.

Only the Khomas Region (95%) has a more urbanized population than Erongo Region (92%). Due to the size of the Erongo Region the population density in the region is low and only marginally higher (2.9) than the national figure. The region had a projected total population of 195,652 in 2018, 8% of the total population of Namibia (NSA, 2019). Oshiwambo is the most spoken language (44% of all households) followed by Afrikaans (19%). Average household size is 3.1 and the literacy rate is 96% for people older than 15. Living in an urban environment implies better living conditions – 98% of all households have access to safe water, only 13% have no toilet facility, 76% have electricity for lighting and only 15% of all household make use of open fires to prepare food (NSA, 2017).

The urban population pyramid for Namibia shows a very clear dominance of the age group 20 – 35 as well as for infants (0 – 4 years of age). Not surprisingly, the urban population of the region is also young, most of them in the child-bearing age (NSA, 2017).

6.6.2 GOVERNANCE

Namibia is divided in 14 regions, subdivided by 121 constituencies. Erongo Region is divided into seven constituencies, of which Swakopmund is one. Each region has a regional council, elected during regional elections per constituency. Towns are governed through local authorities, in the form of municipalities.

Although Walvis Bay is the biggest urban area in the Erongo Region, and the industrial hub of the region, the administrative capital of the region is Swakopmund. Other towns of the region are Henties Bay, Omaruru, Karibib, Usakos and Uis. Walvis Bay is the principal home of Namibia's fishing industry, boasts the only deep-sea port of the country and the international airport located outside the town ensures a direct link to the rest of the world. Thirty kilometres north of Walvis Bay, Swakopmund is strategically located on the linkages between Walvis Bay and the rest of Namibia and its neighbours via the Trans-Kalahari and Trans-Caprivi Highways as a well as the national railway.

6.6.3 EMPLOYMENT

The labour force participation rate is the proportion of the economically active population, given as a percentage of the working age portion of the population (i.e., older than 15 years of age). The rate of labour force participation for the Erongo Region was 80.9% in 2018, the highest in the country, compared to the average of 71.2% for Namibia (NSA, 2019).

In 2018, 53.4% of all working Namibians were employed in the private sector and 21.5% by the state. State-owned enterprises employ a further 7.6% and private individuals 16.6%. Agriculture (combined with forestry and fishing) is the economic sector with the most employees – 23% of all employed persons in Namibia work in this sector. Wages and salaries represented the main income source of 47.4% of households in Namibia. In the Erongo Region wages and salaries were the main source of income to 67.5% of all households in 2018 (NSA, 2019).

In 2018 the employment to population ratio of the Erongo Region was the highest in the country – 56.9%, compared to the national average of 47.4%. Low education levels affect employability and prevents many Namibian households to earn a decent income. Of all people employed in Namibia, 63.5% are not higher qualified than junior secondary level (Grade 10 and lower). In total 11.8% of all people employed had no formal education. In total 29.1% of all people employed fall

in the category “elementary occupation” and 15.2% in the category “skilled agriculture” (NSA, 2019).

Overall, the rate for unemployment is estimated at 33.4% for Namibia, using the broad definition of unemployment. The unemployment rate in rural and urban areas is almost the same – 33.4% in urban areas and 33.5% in rural areas. The highest unemployment rates are found amongst persons with education levels lower that junior secondary. The unemployment rate of persons with no formal education is 28.6%, with primary education 34.6% and with junior secondary education 32.7%. The unemployment rate in the Erongo Region was estimated at 29.7% in 2018. Compared to the national average of 46.1%, the unemployment rate for youth aged 15 to 34 years was 36.8% in 2018 – the lowest in the country (NSA, 2019).

Although declining over time, agriculture (combined with forestry and fishing) is the sector that employs most Namibians (23%) and is also the sector with the most employers. It is also the sector that employs the most informal workers in Namibia, calculated at 87.6%. Wages of employees in this sector are lower than all other sectors except for workers in accommodation and food services and domestic work in private households (NSA, 2019).

6.6.4 ECONOMY

Mining plays a pivotal role in the economy of Namibia, well accentuated in the Erongo Region Since independence, it has consistently been the biggest contributor to Namibia’s economy in terms of revenue and accounts for 25% of the country’s income. Mining is one of the main contributors to GDP, and one of the largest economic sectors of Namibia. Mining is a pronounced industry in the Erongo Region and the main commodities are uranium, gold, salt and dimension stones. Swakopmund serves as residential town of many mineworkers, who are employed at Rössing Uranium, Husab Uranium, Langer Heinrich Uranium and Trekkopje Mine (currently Langer Heinrich Uranium and Trekkopje Mine both are on care and maintenance), Namib Lead and Zinc and Swakopmund Saltworks. The town is also residence to many workers employed in the mine-supporting services (maintenance, drilling, civil works, etc.).

The economy of the Erongo Region is dominated by the local economies of Swakopmund and Walvis Bay. Several new government offices have been established in Swakopmund as part of an effort to accentuate the town as regional capital. In some the rural parts of the region extensive livestock farming is a common activity, but intensive farming is also practiced along the lower part of the Swakop River and at Omaruru. Several fresh crops are produced here, mainly for local consumption.

Considering that 67.5% of all households in the Erongo Region depend on salaries and wages as the main source of income in 2018, this high percentage is an indication of the high percentage of people that live in an urban environment and can be ascribed to the dominance of the mining, fishing and manufacturing and processing sectors (NSA, 2019). Exact figures do not exist, but together with the prominence of state departments and the administrative sectors in Swakopmund, more than two-thirds of all households in the town depend on salaries and wages as a source of income thus. A total of 12.6% of households receive their income from business activities (NSA, 2019).

Since 2016 Namibia recorded slow economic growth, registering an estimated growth of only 1.1% in 2016. The primary and secondary industries contracted by 2.0 and 7.8% respectively. During 2017 the economy contracted by 1.7, 0.7 and 1.9% in the first, second and third quarters respectively (NSA, 2018). Despite the more positive expectations, the economy retracted to an average growth of not more than 1% annually since 2017.

6.6.5 NEIGHBOURING LAND USE

Land use in the Swakopmund Townlands, and also on the small-holding area of Swakopmund, is guided in terms of the current Zoning Scheme, previously known as the Town Planning Scheme.

Although the main land use is agricultural, a mix of related land uses is allowed in the small-holding area. It is possible to consider non-agricultural activities on unoccupied land, including densification options such as estate developments even – subject to feasibility and desirability (SPC, 2020).

The current land use zoning of the small holdings as “agriculture” (and related activities) has many ecological benefits. Among these count the introduction of new (mainly agricultural) species, the creating of new habitats, the attracting of new species and the availability of food, water, and shelter. Moreover, the small holdings create important ecological transitions and connectivity between the gravel plains and the Swakop River, and somehow aligns the urban use of land with the land use in the adjacent Dorob National Park (SPC, 2020).

The small holdings cover almost all the land east of the C28 between the B2 and the Swakop River. Some of the small holdings to the northeast, furthest from the Swakop River, are not occupied. Most of the small holdings on the bank of the river are occupied though. These small-holdings are well-established with houses, out-buildings, sheds and other infrastructure such as greenhouses, stables, pens, etc. A variety of crops are produced, among which olives and

asparagus count. Tourism- and leisure-related activities are also popular. Plot 88 is in an area where agricultural-related activities are practiced on the neighbouring land.

In the past sand mining in the Swakop River was allowed in an area between the small-holdings and close to the southeast corner of the townlands. These activities have been terminated but left behind a piece of unrehabilitated land close to and within the riverbed.

The Swakopmund Townlands are bordered by the Dorob National Park on the northern, eastern and southern sides. The Park was gazetted under the Nature Conservation Ordinance No. 4 of 1975 on 1 December 2010, replacing the former National West Coast Tourist Recreation Area. Like Walvis Bay, Henties Bay and Wlotzkas Baken, the Swakopmund Townlands are excluded from the park. Other exclusions comprise infrastructure (railway and roads), private farmland and properties owned by parastatal entities.

The Nature Conservation Ordinance, under which the Dorob National Park was proclaimed, protects and preserves fauna and flora, fisheries, and objects of geological, archaeological, historical and other scientific interest and for the benefit and enjoyment of the inhabitants of Namibia.

The main objective of the park is to implement conservation measures, in particular to regulate tourism and recreational zones and activities. For this reason, the park is divided into specific land use zones, core conservation areas and multiple use areas. Zones of relevance to Swakopmund (because of proximity) are the Damara Tern breeding sites, the gravel plains, birding areas and the lichen fields. The entire Swakop River is a core conservation area of the park and is recognized as such by the current Zoning Scheme. Except for the gravel plains, all the zones of relevance are exclusionary areas.

Although not directly managed, the Swakopmund Municipality discourages access onto unoccupied land within the townlands. Off-road driving on the gravel plains has proven to be harmful as vehicle tracks can harm the gypsum-rich desert crust detrimentally, leaving imprints for many years. In recognition of this concern, off-road driving is only allowed on designated routes, like within the surrounding Dorob National Park – i.e., not permitted in no go zones.

7 ALTERNATIVES

7.1 ALTERNATIVE SITE LOCATION

Climatic conditions were the main set of prerequisites to select a suitable site for the proposed snail project for Rainy Day Investments in Namibia. Climatic conditions along the central coast favoured this part above the rest of Namibia and Plot No. 88 (of the Swakop River Plots) within the Swakopmund Townlands was selected eventually as the preferred location for the project.

Additional factors in favour of Plot No. 88 include its spacious size (>28 ha), the easy access by means of road, the fact that the selected site is more than one kilometre away from the nearest farming activity, and that the site is almost flat. Furthermore, the proximity to the B2 main road, which provides easy access to alternative points of export – the port of Walvis Bay Port, the international airport of Walvis Bay or Hosea Kutako International Airport near Windhoek, counted also in favour of the selected site.

No alternative site location is considered.

7.2 ALTERNATIVE TECHNOLOGY AND SUPPORT

By entering an agreement with Touchstone, cutting edge know-how technology will be made available to Rainy Day Investments to ensure successful farming practices, the best quality products, and a growing market share. Part of this agreement states that Touchstone will provide training to staff, continuously monitor aspects such as humidity and temperature, feed quality, cold chain management and product quality, and plan activities such as harvesting and export. This relationship ensures the support of Touchstone's know-how technology as well as the purchasing of 650 tons of snails per annum as per consultancy agreement, for export to the European market.

Therefore, and based on the due diligence the project's sponsors have done on Touchstone, it was collectively agreed that the support of Touchstone's know-how technology is superior to any other potential competitive expert in the industry, and as such no other alternative technologies were considered.

7.3 ALTERNATIVE POWER SUPPLY

Currently, a grid connection to Erongo Red is considered to provide power to the project with an emergency generator as a temporary backup solution possible. A small-scale off-grid solar power system might be considered for the future but is not part of the initial investment. Considering the spacious size of Plot No. 88, the accommodation of a nearby solar power plant on the same land

lot is possible. From a carbon footprint point of view, the use of solar power is strongly recommended.

7.4 ALTERNATIVE FODDER / FEED

According to agreement, Touchstone provides the formula of the snails' feed. Staff will also be trained on its formula. Feed is a vital aspect of the production, and it is foreseen that Rainy Day Investments will be able to investigate alternatives and to manufacture snails' feed in the future for its own use.

7.5 ALTERNATIVE POINTS OF EXPORTS

The export of snails is considered through the port of Walvis Bay. Considering the bulk export requirement (650 tons within a two-month period), shipping from the Walvis Bay Port might be the most cost-effective, and subsequent only option.

7.6 ALTERNATIVE MARKETS

The project is scalable and will be developed in a modular way, with options to expand. This is in line with the offtake agreement with Touchstone to develop an own market. Various international markets options would be considered although the main market is likely to remain in Europe for some years.

7.7 THE "NO-GO" OPTION

The assessment of this option requires a comparison between the alternative of proceeding with the proposed snail production project, with that of not proceeding with the proposed project.

With reference to Section 2, Rainy Day Investments intents to establish a commercial land snail breeding facility for export purposes. The proposed project would present various benefits as presented in section 2.

Should the proposed project not proceed, the situation would remain as is and the potential positive and negative environmental impacts associated with the project as described in Section 2 and further addressed in Sections 8 and 9 would not occur.

8 IDENTIFICATION AND DESCRIPTION OF POTENTIAL ENVIRONMENTAL IMPACTS

8.1 ASPECT AND IMPACT IDENTIFICATION

Table 9 provides a summary of all the construction and operational activities / facilities; the environmental aspects and the potential impacts associated with the proposed project.

The decommissioning objectives and requirements of the proposed project facilities will be in line with the specifications laid out in the EMP.

The relevance of the potential impacts ("screening") is also presented in Table 9 to determine which aspects need to be assessed in further detail (Section 9). This section must be read with the project description (Section 5) and the description of the current environment (Section 6).

TABLE 9: ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED PROJECT ACTIVITIES

ACTIVITY / INFRASTRUCTURE	ENVIRONMENTAL ASPECTS AND POTENTIAL IMPACTS	RELEVANCE (SCREENING) OF POTENTIAL IMPACT
Construction / set up: • 25 breeding units on 5 ha for production, storage and related infrastructure	• Spilling or leaking of hydrocarbons causing pollution on land. • Increased road traffic • Noise and pollution	Machinery, vehicles and equipment will be used during construction. Construction will be of a short duration (four months) and of relatively small scale (comparable to other construction activities on the plots). Machinery and equipment will only be used onsite. Vehicles will be used for transporting people and goods. The related management and mitigation measures are stipulated in the EMP (see Section 10). No further assessment is required.
	• General disturbance of biodiversity during construction	The existing biodiversity of the site can be disturbed during construction (removal, harming or killing of species and the fragmentation of habitats). The period of construction is of short duration though and of relatively small scale. Furthermore, limited flora and fauna are present on site. Several lichen concentrations are present but are not protected and are largely present in the southern part of the plot, which falls outside the proposed project development area. The related management and mitigation measures are stipulated in the EMP (see Section 10). No further assessment is required.
	• Damage to heritage resources	Although the potential presence of heritage resources is limited, hidden (buried) finds might be exposed as the project proceeds. Although unlikely, there is a potential that heritage objects might be found. Section 55 of the National Heritage Act, No. 27 of 2004 compels any party to report heritage findings to the National Heritage Council after which a heritage permit needs to be issued, and before heritage resources may be relocated. In the case of a finding, the stipulations of the Act must be considered, in addition to a Chance Finds Procedure which is provided for in the EMP (see Section 10). No further assessment is required.
	• Nuisance impacts such as noise, smoke, odours and dust	The use of machinery, vehicles and equipment during construction can have a potential negative impact on third parties.

	can cause disturbance to third parties.	The construction phase will be of a short duration and of relatively small scale (comparable to other construction activities on the plots). Management and mitigation measures are stipulated in the EMP (see Section 10), and would further assist in avoiding / minimizing nuisance impacts. No further assessment is required.

	• Contamination of soil or water as a result of
	  ○ Waste generation
	  ○ Effluent discharges
		Limited volumes of waste are expected from the construction activities.
		Waste will be separated at source and contained to prevent accidental discharge, pollution or emissions. Some waste types will be recycled or reused where possible. Where recycling / re-using is not possible, waste will be disposed of at the Swakopmund landfill facility.
		Limited volumes of hazardous waste is expected and will be disposed of at the permitted hazardous disposal site (Walvis Bay).
		No process waste is expected. Effluent and sewerage will be discharged as per municipal requirements.
		The related management and mitigation measures are stipulated in the EMP (see Section 10).
		No further assessment is required.

Operations: • Import and delivery of live snails • Egging and hatching • Juvenile and fattening stage • Harvesting and packing	• Biosecurity risks of the accidental introduction of a non-native snail species into the ecosystem. • Biosecurity risks of introducing and spreading of associated diseases, parasites, and pests.	The possibility of an accidental introduction and spreading of a non-native snail species and the potential direct and indirect impacts on the ecosystem and the neighbouring agricultural activities was one of the key concerns raised by the environmental team as well as at most of the key stakeholder and focus group meetings. Furthermore, the risks of introducing associated diseases, parasites and biofouling pests were raised as a concern by both the environmental team and stakeholders. Potential impacts have been assessed in more detail in Section 9. The related management and mitigation measures are stipulated in the EMP (see Section 10).
	• Attracting of insects, birds and other predators of snails	Attracting insects, birds and other predators of snails was raised as a concern by both the environmental team and stakeholders, despite the fact that the breeding units will be covered and closed. Potential impacts have been assessed in more detail in Section 9.

• Export		The related management and mitigation measures are stipulated in the EMP (see Section 10).

	• Contamination of soil or water because of:
	  ○ Waste generation
	  ○ Effluent discharges
		Waste will be separated at source and contained to prevent accidental discharge, pollution, or emissions. Some waste types will be recycled or reused where possible. Recyclable items will be collected by a reputable recycling company. Where recycling / re-using is not possible, waste will be collected by means of the municipal system and disposed of at the Swakopmund landfill facility.
		Effluent and sewerage will be discharged as per municipal requirements.
		The related management and mitigation measures are stipulated in the EMP (see Section 10).
		No further assessment is required.

	• Negative impacts on neighbouring land use activities from snail farming activities	The possibility of an accidental escape of snails, associated parasites, diseases and pests and the possibility to attract insects, birds and other snail predators were raised as concerns that may affect the neighbouring land use activities at the meetings with stakeholders and focus group meetings. Potential impacts have been assessed in more detail in Section 9. The related management and mitigation measures are stipulated in the EMP (see Section 10).

	• Use of disinfection chemicals:
	  ○ Soil and water contamination
	  ○ Negative impacts on neighbouring land use activities and other third parties
		With reference to section 5.8.2, between and during the production cycles the entire farm (i.e. project area) would be disinfected from any organic matters using special designated chemical materials. This activity could cause negative impacts to neighbouring land uses if not correctly implemented.
		The disinfectants to be applied can also lead to pollution and environmental degradation if not correctly stored and handled onsite and if the empty containers are not appropriately disposed of.
		Potential impacts have been assessed in more detail in Section 9.
		The related management and mitigation measures are stipulated in the EMP (see Section 10).

	• Odours	The potential odours from the snail breeding facility was raised by the Environmental Team as another environmental aspect. Potential impacts have been assessed in more detail in Section 9.

		The related management and mitigation measures are stipulated in the EMP (see Section 10).
Production activities • Harvesting and packing • Export	• Noise and pollution effects from vehicles and equipment during harvesting, packing and export. • Increased road traffic and related impacts to other road users.	Workers will be transported to and from the site on a daily basis. Private vehicles of workers will not be allowed onsite. During the initial construction phase, and during the annual production phase, the additional staff would be travelling daily to and from the site, on similar arrangement. Workers will be dropped off and pick up at the site's perimeter. There will be an increase in traffic between Swakopmund and the proposed project site (i.e. Plot 88), with the peak increase during construction and the two months harvesting period every year. This additional traffic relating to workers would, however, only be twice a day and the number of additional vehicles are not significant. However, these additional vehicles could cause limited disturbances to other road users and typical safety hazards if normal road safety rules and regulations are not followed (in line with the legal requirements for any other road user). Feed deliveries would be done twice a week by a truck. A maximum of one truckload (20 – 40 feet size) per day will transport the harvested snails to the point of export during the two-month harvesting period, which is not regarded significant in terms of traffic related impacts. Management and mitigation measures are stipulated in the EMP (Section 10) and would further assist in avoiding / minimizing nuisance impacts and potential impacts to other road users. No further assessment is required.
Unplanned events	• Rainstorm damage to structures • Pollution and accidental spills	Prevention of rainstorm damages, pollution and accidental spills are incorporated in the design and construction of the breeding facility. The proposed snail production project infrastructure is located well without the dry drainage line, in a north-south direction, on Plot 88. The related management and mitigation measures are stipulated in the EMP (see Section 10). No further assessment is required.

Socio-economic • Employment, training during construction and operations	• Income • Job creation and skills development • Empowerment of people.	With reference to Section 5.12, Rainy Day Investments will employ approximately 30 employees during the construction phase for a period of four months. During the operational phase, 16 full-time staff and 60 temporary workers for a period of two months per year (during harvesting) will be employed. The creation of jobs and the upliftment of Namibians through training are positive impacts. The related management and mitigation (i.e. enhancements) measures are stipulated in the EMP (see Section 10). No further assessment is required.
	• Impacts to community health, safety and security.	Various potential negative social impacts could be associated with the construction workers and permanent employees in the area, as was raised during the public participation process by IAPs. There could also be job-seekers coming to the area; many will not be successful but with no other prospects, they may wait in the area in the hope that a job is forthcoming. This could lead to negative social issues. Potential impacts have been assessed in more detail in Section 9. The related management and mitigation measures are stipulated in the EMP (see Section 10).

With reference to Table 9, the following issues were identified as requiring further assessment (see Section 9):

- Potential impacts of introducing a non-native snail species.
- Potential impacts of introducing associated diseases, parasites, and pests.
- Potential impacts of attracting insects, birds, and other predators of snails.
- Potential negative impacts on current (surrounding) land use activities during production (i.e. neighbouring agricultural activities).
- Potential negative impacts associated with the application of disinfection chemicals.
- Potential odours from the snail breeding facility.
- Impact relating to community health, safety and security as a result of temporary and permanent workers and job seekers.

9 IMPACT ASSESSMENT

The activities that are summarised in this chapter are linked to the descriptions provided in Sections 5 and 8 (Table 9). This section must further be read in the context of the baseline conditions described in Section 6.

Management and mitigation measures to address the identified (potential) impacts are presented in the EMP (see Section 10).

Both the criteria used to assess the impacts and the method of determining the significance of the impacts are outlined in Table 10, 11 and 12.

This method complies with the Environmental Management Act, No. 7 of 2007 and its regulations. Table 10 provides the impact assessment criteria and the approach for determining impact consequence (combining nature and intensity, extent and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Table 11 and Table 12 respectively. The interpretation of the impact significance is given in Table 12. Both mitigated and unmitigated scenarios are considered for each impact.

The potential impacts are cumulatively assessed, where relevant, taking the existing environment into consideration.

TABLE 10: IMPACT ASSESSMENT CRITERIA

IMPACT ASSESSMENT CRITERIA		
SIGNIFICANCE determination	**Significance = consequence x probability**	
CONSEQUENCE	**Consequence is a function of:** • **Nature and Intensity of the potential impact** • **Geographical extent should the impact occur** • **Duration of the impact**	
Ranking the NATURE and INTENSITY of the potential impact		
Negative impacts		
Low (L)	The impact has no / minor effect/deterioration on natural, cultural and social functions and processes. No measurable change. Recommended standard / level will not be violated. (Limited nuisance related complaints).	
Moderate (M)	Natural, cultural and social functions and processes can continue, but in a modified way. Moderate discomfort that can be measured. Recommended standard / level will occasionally be violated. Various third party complaints expected.	
High (H)	Natural, cultural or social functions and processes are altered in such a way that they temporarily or permanently cease. Substantial deterioration of the impacted environment. Widespread third party complaints expected.	
Very high (VH)	Substantial deterioration (death, illness or injury). Recommended standard / level will often be violated. Vigorous action expected by third parties.	
Positive impacts		
Low (L) +	Slight positive effect on natural, cultural and social functions and processes Minor improvement. No measurable change.	
Moderate (M) +	Natural, cultural and social functions and processes continue but in a noticeably enhanced way. Moderate improvement. Little positive reaction from third parties.	
High (H) +	Natural, cultural or social functions and processes are altered in such a way that the impacted environment is considerably enhanced /improved. Widespread, noticeable positive reaction from third parties.	
Very high (VH) +	Substantial improvement. Will be within or better than the recommended level. Favourable publicity from third parties.	
Ranking the EXTENT		
Low (L)	Local (confined to within the project concession area and its nearby surroundings).	
Moderate (M)	Regional (confined to the region, e.g. coast, basin, catchment, municipal region, district, etc.).	
High (H)	National (extends beyond district or regional boundaries with national implications).	
Very high (VH)	International (Impact extends beyond the national scale or may be transboundary).	
Ranking the DURATION		
Low (L)	Temporary/short term. Quickly reversible. (Less than the life of the project).	
Moderate (M)	Medium Term. Impact can be reversed over time. (Life of the project).	
High (H)	Long Term. Impact will only cease after the life of the project..	
Very high (VH)	Permanent	
Ranking the PROBABILITY		
Low (L)	Unlikely	
Moderate (M)	Possibly	
High (H)	Most likely	
Very high (VH)	Definitely	
SIGNIFICANCE Description		
	Positive	**Negative**
Low (L)	Supports the implementation of the project	No influence on the decision.
Moderate (M)	Supports the implementation of the project	It should have an influence on the decision and the impact will not be avoided unless it is mitigated.
High (H)	Supports the implementation of the project	It should influence the decision to not proceed with the project or require significant modification(s) of the project design/location, etc. (where relevant).
Very high (VH)	Supports the implementation of the project	It would influence the decision to not proceed with the project.

TABLE 11: DETERMINING THE CONSEQUENCE

DETERMINING THE CONSEQUENCE					
INTENSITY OF IMPACT = LOW					
DURATION	VH	Moderate	Moderate	High	High
	H	Moderate	Moderate	Moderate	Moderate
	M	Low	Low	Low	Moderate
	L	Low	Low	Low	Moderate
INTENSITY OF IMPACT = MODERATE					
DURATION	VH	Moderate	High	High	High
	H	Moderate	Moderate	High	High
	M	Moderate	Moderate	Moderate	Moderate
	L	Low	Moderate	Moderate	Moderate
INTENSITY OF IMPACT = HIGH					
DURATION	VH	High	High	Very High	Very high
	H	High	High	High	Very High
	M	Moderate	Moderate	High	High
	L	Moderate	Moderate	High	High
INTENSITY OF IMPACT = VERY HIGH					
DURATION	VH	Very high	Very High	Very High	Very high
	H	High	High	Very High	Very high
	M	High	High	High	Very High
	L	Moderate	High	High	Very High
		L	M	H	VH
		EXTENT			

TABLE 12: DETERMINING THE SIGNIFICANCE

DETERMINING THE SIGNIFICANCE					
PROBABILITY	VH	Moderate	High	High	Very high
	H	Moderate	Moderate	High	Very high
	M	Low	Moderate	High	High
	L	Low	Low	Moderate	High
		L	M	H	VH
		CONSEQUENCE			

9.1 Potential negative biological impacts

The biosecurity risk of an accidental introduction of the non-native snail *Cornu aspersum* and its potential direct and indirect impacts was a key concern raised by the environmental team as well as at most of the key stakeholder and focus group meetings.

With reference to Table 9, the main impact to be assessed further relates to the introduction of a non-indigenous species and its possible consequences.

The information in this section was sourced from the Biological Impact Specialist Study by Mr Perter Thorpe of Mykiss (see Appendix F).

9.1.1 ISSUE: INTRODUCTION OF A NON-NATIVE SNAIL SPECIES

There is a level of uncertainty concerning the establishment and invasion success of an introduced species. Although similar to other types of natural and human hazards, biological invasions are very different because it can have long lag times from introduction and establishment to successful invasion. Management of invasive species requires multifaceted interventions, one of them being to prevent the introduction of new species with a high risk of becoming invasive.

An increasingly important component of the management of invasive species involves a formal assessment of risks associated with a particular species becoming invasive and causing negative impacts. Risk assessments are a formal, legal requirement in various countries to prevent potentially harmful non-native species from being introduced. In addition, three standards are recognized under the World Trade Organization's agreement on the application of sanitary and phytosanitary measures, when it comes to the assessment of risks pertained to introduced species - the Office International des Épizooties (OIE), the *Codex Alimentarius Commission* (human health), and the International Plant Protection Convention (IPPC).

In identifying the potential risks related to the introduction of *Cornu aspersum*, objective and accurate screening is crucial – as the prevention of potential biological invasions is the most cost-effective intervention.

9.1.1.1 INTRODUCTION

Cornu aspersum is highly variable morphologically and several distinct morphotypes exist, based on size, shape, thickness and colour of the shell. *Cornu* is one of the genera of large snails with globular shells of the family Helicidae, and among those that are cultivated for human consumption. It was first described in 1774 as *Helix aspersa* (referring to its spotted shell patterning as being distinctive). The genus *Helix* is now widely considered incorrect for the species because of differences in the structure of the reproductive organs. The correct

name for the species is now *C. aspersum.* The common name is brown garden snail, or *tuinslak* (Thorpe, 2021).

The origin of the species is uncertain, but it has spread throughout the world, to areas very different in climate – as a direct result of human activities. Apparently, it was first introduced into South Africa in 1855 and presumably into Namibia shortly after.

Although *Cornu aspersum* is cultivated commercially as a source of food and for the manufacturing of skin care products in several countries, it has colonised in many other countries where conditions permit and is a cosmopolitan invasive pest of a large range of agricultural crops in the Americas, Australia and New Zealand, South Africa and elevated areas of many islands. Invasive populations exhibit increased genetic diversity, due to multiple introductions to the affected areas. Snails are hermaphrodites and able to reproduce fast. However, dispersal is slow, and its presence is marked by the fragmented landscapes in which it occurs.

Snails prefer microhabitats with greater light intensity and structural complexity. They inhabit sheltered places, where they are protected against predators, and is often to be found in areas with base rich soils, hedge banks, sea cliffs, quarries, graveyards, urban gardens and neglected disturbed ground. *Cornu aspersum* are most active at temperatures between 7 and 28°C, and an air humidity of 75 – 90%. Adult snails can remain dormant for several months. Snails cannot withstand long period of frost. Eggs are sensitive to dehydration and cold temperatures.

With a very adaptable diet, the species is a polyphagous grazer (an animal able to feed on a wide range of food) and predominantly feeds during the night but only when relative humidity is sufficient (>80%). A wide range of plants are reported as hosts, which include vegetables, cereals, flowers, and shrubs as well as vineyards and citrus orchards. The diet of snails varies over the life cycle and diversity varies quantitatively and qualitatively, with the season and the availability of food. In general juveniles feed more often on fresh plant material than do adults. Snails on breeding facilities are also fed with dry food (pellets or powder) which is composed of cereal flour, enriched in vitamins and calcium.

Enemies of snails include a wide range of animals (refer to section 5.13.5).

Invasive potential of Cornu aspersum

The distinction between ‘introduced’ and ‘invasive’ species is important. There are different scientific definitions, but here an introduced species (sometimes called an alien species) is one that is not native to a specific location. An invasive species is an introduced species that

tends to spread to a degree believed to cause environmental damage, to affect human health negatively or to trigger adverse economic impacts. Although many introduced species are essential for bringing diverse benefits to human societies, some introduced species become invasive and create negative consequences. Also, some species introduced to areas outside their native ranges are a growing threat to biodiversity, albeit that they are not invasive.

Vectors for the accidental introduction of snails include commercial, domestic and military shipments, and agricultural and horticultural products, with the horticultural pathway one of the most important. Agriculture and tourism provide several mechanisms for its spread and distribution as well. Accidental introductions are recorded because of escapes from farming facilities, because of the transport of vegetables and because of infested containers used during shipment.

In most of the human-disturbed habitats where *Cornu aspersum* occurs, the species is essential a pest. The species can cause extensive damage to crops such as ornamental plants, vegetables such as cabbage, lettuce and tomato, and fruit such as citrus, avocado, grapevines and kiwifruit. Other impacts include the substantial deposit of mucus and faecal material on fruit, affecting its quality, or alternatively leading to increasing bacterial and fungal biomass, and hence increased decomposition rates; the introduction of new associated parasites, such as the mite *Riccardoella limacum*, which could infect indigenous species; attracting predators as a new source of food; and the ability of the species to monopolise food resources that are critical to indigenous mollusc species. In habitats where the species are regarded as a pest, molluscicides are often applied which can lead to secondary impacts.

To evaluate the risk and impact factors, Thorpe (2021) lists the species' invasiveness:

- Proved invasive outside its native range.
- Has a broad native range.
- Abundant in its native range.
- Highly adaptable to different environments.
- Is a habitat generalist.
- Tolerates, or benefits from, cultivation, browsing pressure, mutilation, fire etc.
- Tolerant of shade.
- Capable of securing and ingesting a wide range of food.
- Benefits from human association (i.e., it is a human commensal).
- Fast growing.
- Has high reproductive potential.
- Gregarious; and
- Has high genetic variability.

The impact outcomes are:

- Ecosystem change/ habitat alteration.
- Host damage.
- Infrastructure damage.
- Negatively impacts agriculture.
- Negatively impacts livelihoods; and
- Damages animal/plant products.

The likelihood of entry/control are listed as follows:

- Highly likely to be transported internationally accidentally.
- Highly likely to be transported internationally deliberately.
- Highly likely to be transported internationally illegally.
- Difficult to identify/detect as a commodity contaminant; and
- Difficult / costly to control.

Most species that are recorded as invasive are considered so because of damage to the environment, but in many cases the introduction of some species may become economically beneficial. An example of this is the Mediterranean mussel *Mytilus galloprovincialis.* This species is invasive on the rocky shores of South Africa, but in Saldanha Bay on the west coast of South Africa a mussel aquaculture industry is based on the commercial cultivation of this particular species.

Similarly, *Cornu aspersum* could be classified as an invasive species in some countries, but commercially cultivated at the same time in the same countries, or elsewhere in the world.

9.1.1.2 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

Thorpe (20210 states that, despite its broad distribution world-wide, *Cornu aspersum* is not recorded in the literature as having any impact on the Namibian environment, nor is it listed as an invasive species. It is not known as an agricultural pest in Namibia, and no known environmental impacts are evident for Namibia in the current literature.

Snails are regarded as a minor social pest due to its feeding on ornamental and garden plants and is found in gardens in the coastal towns of Namibia. As the species prefers soft, leavy plant material it is suggested that it is not found in native plant populations of Namibia. Consequently, it is highly unlikely to spread if it escapes or is accidentally introduced to the environment (Thorpe, 2021).

In addition, the environmental conditions (see Section 6) are not favourable to the potential spread of *Cornu aspersum* from the proposed snail breeding facility near Swakopmund.

Climatic conditions beyond the parts that can be described as Cool Desert are arid (due to the low rainfall, low humidity, and high summer temperatures), soils are highly calcareous leptosols, which are poorly developed and thin, lack appreciable quantities of accumulated clay and organic material, resulting sparse plant life and causing sheltered, favourable habitats to be scarce or entirely absent in the areas outside the breeding facility. Although unlikely, in the event of accidental escapes of snails the chances of survival are thus low. The possibility of *Cornu aspersum* to hybridise with other species, and so affecting the genetics of natural populations of snails are also not a threat (Thorpe, 2021).

The intensity of the impact is therefore rated as LOW for both the mitigated and unmitigated scenarios. The duration of the impacts is considered LOW for both the unmitigated and mitigated scenarios because dispersal would be restricted by the environment conditions and the scarcity of suitable habitats outside the breeding facility. Accidental introduction further afield in Namibia would also be low for similar reasons. The extent is primarily local and MEDIUM without mitigation, and LOW with mitigation.

Consequence

The determining consequence can thus be considered LOW for both the mitigated and unmitigated scenario.

Probability

Due to the scarcity of suitable habitats outside the breeding facility the probability that the species may become introduced to ecosystems in Namibia is LOW for both the mitigated and unmitigated scenario.

SIGNIFICANCE

The significance of the impact is thus rated as **LOW to MODERATE** for the unmitigated scenario and **LOW** for the mitigated scenario. Cumulative impacts are not expected.

Tabulated summary of the assessed impact – Introduction of non-native snails into the ecosystem

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**L**	**L**	**M**	**L**	**L**	**L-M**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.1.1.3 MANAGEMENT AND MITIGATION MEASURES

- Ensure strict biosecurity controls are in place in all components of the breeding facility.
- Monitor the breeding facility for any sign of escape.
- Refer to the EMP in Section 10.

9.1.2 ISSUE: INTRODUCTION OF ASSOCIATED DISEASES, PARASITES AND PESTS

9.1.2.1 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

A major concern of biosecurity risks by introducing a non-native species is the potential for introducing and spreading of associated diseases, parasites and pests. Assumedly, imported snails would be certified disease-free and all controls will be implemented to maintain this by measures taken to mitigate this in the breeding facility.

According to Thorpe (2021) *Cornu aspersum* is a known host of nematodes of the Angiostronglidae family (lungworms), many species of which are associated with diseases in pets and other mammal species. As many of these lungworm species are already present in Namibia, including the rat lungworm *Angiostrongylus cantonensis*, there is a low risk of further impact from introduced snails, due to the sanitary measures and other requirements for the importation of live animals into Namibia set out under the Animal Health Act, No. 1 of 2011.

The intensity of the impact is therefore rated as MEDIUM to LOW for the unmitigated scenario and LOW when mitigated. The duration of the impacts is considered LOW for both the unmitigated and mitigated scenarios because dispersal would be restricted by the environment conditions and the scarcity of suitable habitats outside the breeding facility, as well as the lack of vectors to spread diseases and pests. The extent is primarily local due to the lack of vectors and the harsh habitats outside the breeding facility and thus MEDIUM without mitigation, and LOW with mitigation.

Consequence

The determining consequence can thus be considered LOW for both the mitigated and unmitigated scenario.

Probability

The probability that associated diseases, parasites and pest may become introduced to ecosystems in Namibia is possible, i.e., MEDIUM for the unmitigated scenario and LOW for the mitigated scenario.

SIGNIFICANCE

The significance of the impact is rated as **LOW to MEDIUM** for the unmitigated scenario and **LOW** for the mitigated scenario. Cumulative impacts are not expected.

Tabulated summary of the assessed impact – Introduction of associated diseases, parasites and pests

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**M-L**	**L**	**M**	**L**	**M**	**L-M**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.1.2.2 MANAGEMENT AND MITIGATION MEASURES

- Ensure strict biosecurity controls are in place in all components of the breeding facility.
- Monitor the production processes for any sign of disease, parasites or pests.
- Refer to the EMP in Section 10.

9.1.3 ISSUE: ATTRACTION OF INSECTS, BIRDS AND OTHER PREDATORS OF SNAILS

9.1.3.1 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

About all forms of agricultural activities with animals will attract insects and scavengers to some extent, depending on the cultivation methods, the location of the enterprise and situational circumstances. Although intensive production methods such as heliciculture seem to pose a greater risk at first impression, the intense production methods and limited area required enable more control and intervention as opposed to more extensive forms of agriculture. To prevent birds and other animals from entering the breeding units, the facility is closed and covered, surrounded by electric fences and enclosed with metal sheets. These installations minimize the transfer of potential diseases to other fauna.

The intensity of the impact is therefore rated as MEDIUM for the unmitigated scenario and LOW when mitigated. The duration of the impacts is considered MEDIUM to HIGH for the

unmitigated scenario, but with the implementation of good practice (barriers, frequent removal of waste, etc.) it is LOW for the mitigated scenario. The extent is primarily local and thus MEDIUM to HIGH without mitigation, but LOW with mitigation (due to the ease of control on a small area).

Consequence

The determining consequence can thus be considered MEDIUM to HIGH for the unmitigated and LOW for the mitigated scenario.

Probability

The probability that insects, bird and other predators of snails can be attracted is possible, i.e., MEDIUM to HIGH for the unmitigated scenario and LOW for the mitigated scenario.

SIGNIFICANCE

The significance of the impact is rated as **MEDIUM to HIGH** for the unmitigated scenario and **LOW** for the mitigated scenario. Cumulative impacts are not expected.

Tabulated summary of the assessed impact –

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**M**	**M-H**	**M-H**	**M-H**	**M-H**	**M-H**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.1.3.2 MANAGEMENT AND MITIGATION MEASURES

- Ensure that the facility is closed and covered, surrounded by electric fences and enclosed with metal sheets.
- Monitor the operational processes for any sign of attracting insects, birds or other predators of snails.
- Refer to the EMP in Section 10.

9.2 POTENTIAL NEGATIVE SOCIO-ECONOMIC IMPACTS

With reference to Table 9, the operational activities may trigger some positive socio-economic impacts, which include employment and upliftment of Namibians and attracting investment. Some negative socio-economic impacts are also possible and are further assessed here.

The information in this section was sourced from the Biological Impact Specialist Study by Mr Perter Thorpe of Mykiss (see Appendix F) and considered as well.

9.2.1 ISSUE: POTENTIAL NEGATIVE IMPACTS ON CURRENT (SURROUNDING) LAND USE ACTIVITIES DURING PRODUCTION (I.E. NEIGHBOURING AGRICULTURAL ACTIVITIES)

9.2.1.1 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

Although the main activity of the small holdings is agriculture, and a variety of crops are produced (among which olives, asparagus and vegetables count) several non-agricultural activities such as tourism and leisure-related activities are also practiced on the neighbouring land.

The establishment of a snail breeding facility can trigger several potential negative effects on the neighbouring land, including the escape of snails and the infestation of greenhouse production units, attracting of insects, birds and predators and the introduction of associated diseases, parasites and pests which may affect the neighbouring activities.

No reference in literature is made to *Cornu aspersum* as a pest in the production of asparagus, but it may affect vegetables and orchards (Thorpe, 2021).

Attraction of insects, birds and mice etc., is possible if the biosecurity control measures fail and if the disposal / composting of waste deviates from good practice. However, the movement and intensity effect of snails will be severely restricted and are rated as MEDIUM to LOW even if unmitigated due to the restriction of suitable habitats outside the breeding facility. Other negative impacts such as attraction of insects, birds and other predators to the snails as a source of food will be MEDIUM to HIGH if unmitigated. Mitigation measures such as biosecurity control, enclosure of the breeding units, electric fences, steel barriers, and a broken oyster shell band on the perimeter reduce the intensity to LOW. The duration will be MEDIUM for an unmitigated scenario and LOW for a mitigated scenario. The extent is local and thus MEDIUM without mitigation, but LOW if mitigated.

Consequence

The determining consequence can thus be considered MEDIUM for the unmitigated and LOW for the mitigated scenario.

Probability

The probability of the operation having negative impacts on the neighbouring land is MEDIUM to HIGH for the unmitigated scenario and LOW for the mitigated scenario.

SIGNIFICANCE

The overall significance of the impact is thus considered **MEDIUM** in the unmitigated scenario and **LOW** in the mitigated scenario.

Cumulative impacts are not expected.

Tabulated summary of the assessed impact – Potential negative impacts on the neighbouring land use activities

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**M-L**	**M**	**M**	**M**	**M-H**	**M**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.2.1.2 MANAGEMENT AND MITIGATION MEASURES

- Ensure strict biosecurity controls are in place in all components of the breeding facility.
- Monitor the production processes for any sign of escape, associated disease, parasites or pests, or attraction of insects, birds and other snail predators.
- Refer to the EMP in Section 10.

9.2.2 ISSUE: POTENTIAL ODOURS FROM THE SNAIL BREEDING FACILITY

9.2.2.1 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

According to the specialist report snail dung is not regarded as being strongly pungent as other farmed animals (for example pig and chicken farms) and subsequently would not be a big issue to neighbouring areas even if unmitigated (Thorpe, 2021). The closest neighbouring plots and houses are at least a few hundred meters away and the closest animal farming activity is more than one kilometre away – reducing the potential impact. The prevalent wind direction is southwest, which means that only the neighbouring land northeast of Plot 88 might be affected. In comparison, residences on these parts of the small holdings are further from each other and some land is unoccupied even.

Provision is made for composting and re-use of the waste for the cultivation of grasses and will result in minimizing the potential odours further. The intensity is thus LOW for both the mitigated and unmitigated scenarios.

Consequence

The determining consequence can thus be considered LOW for both the unmitigated and mitigated scenarios.

Probability

The probability of the operation having negative impacts on the neighbouring land is LOW for both the unmitigated and mitigated scenarios.

SIGNIFICANCE

The overall significance of the impact is thus considered **LOW** for both the unmitigated mitigated scenarios.

Cumulative impacts are not expected

Tabulated summary of the assessed impact – Damage to and Loss of Arrays

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**L**	**L**	**L**	**L**	**L**	**L**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.2.2.2 MANAGEMENT AND MITIGATION MEASURES

- Implement the composting and re-use of the waste for the cultivation of grasses
- Monitor the production processes for any sign of odours.
- Refer to the EMP in Section 10.

9.2.3 ISSUE: IMPACT RELATING TO COMMUNITY HEALTH, SAFETY AND SECURITY AS A RESULT OF TEMPORARY AND PERMANENT WORKERS AND JOB SEEKERS

9.2.3.1 INTRODUCTION

Community health, safety and security are issues of concern with the neighbouring community due to the workers at the snail production facility, as well as possible job seekers.

The presence of the snail production project with associated construction workers and employees (during operations) could lead to an increase in crime such as theft at the neighbouring plots. These issues were also raised as concerns by the neighbouring plot owners. The higher risk stems from an increase in strangers coming into the area, notably job seekers, criminals and temporary-workers.

Rainy Day investments should conform to the IFC's Performance Standard PS-4: Community Health, Safety and Security which recognises that project activities, equipment, and infrastructure can increase community exposure to risks and impacts. In addition, it addresses the client's responsibility to avoid or minimize the risks and impacts to community health, safety, and security that may arise from project related-activities, with particular attention to vulnerable groups.

The objectives of PS-4 are:

- To anticipate and avoid adverse impacts on the health and safety of the potentially Affected Community during the project life from both routine and non-routine circumstances.
- To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.

The project management plan must be compliant with health and safety regulations. Of relevance here is the need to minimise community and employee exposure to disease – particularly HIV. PS-4 states "The client will avoid or minimize transmission of communicable diseases that may be associated with the influx of temporary or permanent project labour".

The Project area will be fenced off and the control of staff and visitors would be done through the farm manager and recorded continuously. The entrance gates will be locked and manned by security personnel.

9.2.3.2 ASSESSMENT OF IMPACT

Nature and intensity

The proposed Snail Production Project is a small scale project with a relatively small numbers of people (both construction and operation), however, 60 temporary workers will be employed for a period of two months per year (during harvesting). The proposed project site is located

near other plots (i.e. residents) but relatively far from the main roads and few job seekers are expected. The intensity is therefore high in the unmitigated scenario and low in the mitigated scenario.

Duration

The impact on the surrounding area could last after the life of the project, therefore high in the unmitigated scenario. With mitigation the impacts can be avoided.

Extent

In the unmitigated scenario, impacts could extend to the community (i.e. neighbouring plots) surrounding the Project. Therefore, the extent is moderate in the unmitigated scenario but low in the mitigated scenario.

Consequence

The unmitigated consequence is of the impact is high in the unmitigated scenario and low in the mitigated scenario.

Probability

The possibility of negative impacts occurring is ranked as moderate to high in the unmitigated scenario and low in the mitigated scenario.

Significance

The significance of the potential impacts on community health, safety and security is high in the unmitigated scenario and low in the mitigated scenario.

Tabulated summary of the assessed impact – Community Health, safety and security

Mitigation	Severity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**H**	**M**	**H**	**L**	**M-H**	**H**
Mitigated	**M**	**L**	**L**	**L**	**L**	**L**

9.2.3.3 DESCRIPTION OF MITIGATION MEASURES

Objective

The mitigation objective is to avoid incidents that could impact on community health, safety and security of the neighbouring plots.

Management and Mitigation measures

- Operate an alcohol and drug - free site and will conduct random testing of employees/contractors on entry to site.
- Operate and publicise among all workers and visitors a detailed safety and security plan for the Project.
- Develop a contingency plan to protect the local community if labour goes on strike.
- Enforce a zero tolerance policy on loitering on any neighbouring plots.
- Implement a comprehensive employee wellness programme, including HIV/AIDS information in all changing rooms.
- Ensure all security personnel are well trained.

9.3 POTENTIAL IMPACTS ASSOCIATED WITH THE APPLICATION OF DISINFECTION CHEMICALS

With reference to Table 9, the application of disinfectants could cause negative impacts to neighbouring land uses if not correctly implemented. The disinfectants to be applied can also lead to pollution and environmental degradation if not correctly stored and handled onsite and if the empty containers are not appropriately disposed of.

9.3.1 ISSUE: POTENTIAL NEGATIVE IMPACTS ON CURRENT (SURROUNDING) LAND USE ACTIVITIES, SOIL / WATER POLLUTION, OTHER THIRD PARTY IMPACTS AND ENVIRONMENTAL DEGRADATION

9.3.1.1 ASSESSMENT OF IMPACT

Nature and intensity, duration of impact and geographical extent

With reference to Section 5.8.2, the entire farm (i.e. the project area) would be disinfected from any organic matters using the special designated chemical materials. Disinfection would be done by local spraying method, and only inside the net houses (under no-wind conditions) to ensure no external spraying effects. The chemicals to be used for disinfection will be standard substances, used in normal agricultural practices worldwide.

If the chemicals are not applied (and diluted) according to the product specifications, and when applied incorrectly (e.g. during windy conditions), it could be blown to neighbouring plots (i.e. other agricultural activities) and cause impacts to their crops.

Also, large spillages of the chemicals could cause pollution of soil and surface water (in the event of a rainstorm) as well as groundwater. Empty containers (with potentially some of the chemicals left) disposed of incorrectly could lead to impacts to third parties. Empty containers are often collected from general landfill sites for use, by third parties, as drinking water containers or to store food. Containers with chemical residue could thus lead to health problems of third parties.

Taking the abovementioned into consideration, the intensity of potential impacts associated with the handling, storage, application and disposal (of empty containers) of the disinfect chemicals are rated as MEDIUM to HIGH, in the unmitigated scenario. With mitigation and the strict implementation of the controls, the intensity reduces to LOW.

The duration will be MEDIUM to HIGH for an unmitigated scenario and LOW for the mitigated scenario. The extent is regional due to the issues relating to the disposal of the empty containers and thus MEDIUM without mitigation, but LOW if mitigated.

Consequence

The determining consequence can thus be considered MEDIUM to HIGH for the unmitigated and LOW for the mitigated scenario.

Probability

The probability of the potential impacts occurring, when handling, storage, application and disposal of the disinfect chemicals are not correctly implemented, is rate as MEDIUM to HIGH for the unmitigated scenario and LOW for the mitigated scenario.

SIGNIFICANCE

The overall significance of the impact is thus considered **MEDIUM to HIGH** in the unmitigated scenario and **LOW** in the mitigated scenario.

Tabulated summary of the assessed impact – Potential negative impacts associated with the application of disinfection chemicals

Mitigation	Intensity	Duration	Extent	Consequence	Probability of Occurrence	Significance
Unmitigated	**M-H**	**M-H**	**M**	**M-H**	**M-H**	**M-H**
Mitigated	**L**	**L**	**L**	**L**	**L**	**L**

9.3.1.2 MANAGEMENT AND MITIGATION MEASURES

- Only apply disinfection chemicals by local spraying method, inside the net houses – under no-wind conditions, to ensure no external spaying effects.
- Ensure that only products registered for use in Namibia is used for the disinfection activities.
- Adhere to product specification relating to the dilution of the chemicals.
- Chemicals to be stored in a locked bunded chemical store.
- Keep material safety datasheets (MSDS) for all disinfection chemicals on site.
- Dispose of empty chemical containers as per the MSDS. Where relevant, disposal of empty containers at a registered hazardous waste disposal facility and keep 'safe disposal certificates'.
- Dispose any disinfected materials (during operational and maintenance activities) at the nearest approved municipal waste disposal facility.
- Prevent spillages of chemicals to the environment. In the event of a spill, it must be cleaned immediately and the contaminated soil disposed of as per the product specifications.
- Consider using Sodium hypochlorite instead of chlorine for tools disinfection (as it breaks down quickly unlike chlorine and is as effective).

10 ENVIRONMENTAL MANAGEMENT PLAN

10.1 AIM

The aim of the EMP is to detail the actions required to effectively implement mitigation and management measures. These actions are required to minimise negative impacts and enhance positive impacts associated with the proposed snail production project.

The EMP gives the environmental commitments, which constitute the environmental contract between Rainy Day Investments and the Government of the Republic of Namibia; represented by the MEFT. These commitments need to be implemented by Rainy Day Investments.

It is important to note that an EMP is a living document in that it will be updated and amended (where relevant) as new information (e.g., environmental data), policies, authority guidelines, technologies and proposed activities develop.

10.2 KEEPING THE EMP CURRENT

Rainy Day Investments will conduct periodic reviews of the EMP, should circumstances change.

Should a listed activity(s), as defined in the Environmental Management Act, No. 7 of 2007 and its associated regulations of 2012, be triggered (because of future modifications or situational changes of the project), this EMP will be required to be updated through another EIA process as stipulated in the Act and associated regulations.

10.3 MANAGEMENT AND MITIGATION MEASURES (ACTION PLANS) TO ACHIEVE THE OBJECTIVES OF THE EMP

The management measures proposed to mitigate the potential impacts are detailed in the action plans in this section.

Rainy Day Investments will have overall accountability for ensuring that the EMP gets implemented, through agreements with contractor(s) and other relevant parties. However, Rainy Day Investments, all its contractors, and other relevant parties are expected to understand the EMP requirements and implement them. Relevant monitoring requirement are stipulated in Section 10.7.

10.3.1 POTENTIAL NEGATIVE BIOLOGICAL IMPACTS

10.3.1.1 INTRODUCTION OF A NON-NATIVE SNAIL SPECIES – MANAGEMENT AND MITIGATION MEASURES

- Comply with all relevant sanitary measures and other requirements for the importation of live animals into Namibia set out under the Animal Health Act, No. 1 of 2011, in consultation with the MAWLR.

- Develop and submit to the relevant authorities a Biosecurity Protocol and Management Plan. This plan must ensure that regular biosecurity monitoring is conducted.
- The Biosecurity protocol and measures (to ensure zero snail's escape) to include as a minimum the following:
    - The facility shall be protected by four safeties measures, as described below. (These measured are committed elements to be constructed and functional during the entire farm operation):
        1. Electric fence – the electric fence powered by battery (24v) and a charger is connected to it all the time. An addition (backup) battery will be in place in case of problems with the operational battery. The batteries and the functionality of the fence must be daily checked as part of the "operational manual".
        2. Net house – in the unlikely event of the electric fence not working, the net, surrounding the unit, will furthermore prevent the snails to escape, due to the snails being too big (even the hatched ones) to cross the net.
        3. Metal sheet – the metal sheet will prevent the snail from digging under the net and escape.
        4. Management protocols – the condition of the three measures described above must be checked on a daily basis and their effective functionality verified.
    - Make sure that no potential sheltered and potential microhabitats for snails are created outside of the breeding facility.
    - Ensure the absence of food resources for snails outside the breeding facility (for example leavy plants, shade, piling of snail food, etc).
    - Implement and enforce strict biosecurity controls for staff and visitors in all components of the breeding facility. Daily checklist of related control duties to be completed and signed off by management.
- The following logistics protocol will be implemented:
    1. Set an appropriate park area for vehicles (cars) to be located in an accepted safe zone.
    2. Ensure that the snail feed tucks park only for a short time next to the feed storage and will only unload the feed and go. This will be followed by a strict visual inspection.
    3. Export containers – based on strict management protocol, all containers management handling would be done exclusively by the farm operation. This will include firstly the disinfection of the containers from all biological agents, followed by a strict visual inspection of each container before and during the loading, as well as the loading on to the truck before leaving the farm.

4. Shipment - all containers leaving the farm would be sealed and reopened only once arrived to their final destination (at Cyprus).

- Adhere to Project design criteria as specified in section 5 of the EIA Scoping (including impact assessment) Report.
- Further develop (detailed) Biosecurity protocols and measures as part of the Operational Procedures / Management System prior to the implementation of the project.

10.3.1.2 INTRODUCTION OF ASSOCIATED DISEASES, PARASITES AND PESTS – MANAGEMENT AND MITIGATION MEASURES

- The snails must be certified as disease free in Cyprus by veterinary services. This must include all relevant diseases as per the EU standards.
- Comply with all relevant sanitary measures and other requirements for the importation of live animals into Namibia set out under the Animal Health Act, No. 1 of 2011, in consultation with the MAWLR.
- Ensure that the biosecurity measures and the logistics protocol (see section 10.3.1.1) are implemented.
- Adhere to Project design criteria as specified in section 5 of the EIA Scoping (including impact assessment) Report.
- Develop an Animal Health Strategy and Residue Control Program aligned with the EU Regulations. This must address (amongst others) the following:
    - Take into consideration the residue in meat, which has to start with production.
    - How sick snails will be treated (i.e. antibiotics). Also consider treatment of a single snail or a group.
    - How other key parties / stakeholders will be identified and informed (i.e. transparent communication is important).
    - The transmission of diseases from sick animals to healthy ones must be avoided / limited by means of specific quarantine area, etc. within the proposed breeding units.
    - Monitoring programme (in Cyprus and Namibia) of sick animals (i.e. first to identify any sick animals and then to further monitor when sick animals are treated). Meet the relevant EU requirements relating to the monitoring programme.
- Record keeping of all monitoring data, incidences, treatment on site, sick animals found etc. These records should be reflected in reports to be shared with the MAWLR: DVS.

- Rainy Day Investments to use a Private Vet for inspections and certification at the proposed snail production facility. The DVS shall be informed when site visits / inspections would be required prior to harvesting of snails. Testing on snails (once every three months) to be undertaken by an external laboratory(s).
- Between the production cycles (i.e.: during the 3 remaining months) disinfect the entire farm from any organic matters (including eggs and the like). The following measures are required (as a minimum):
    - The use/application of the chemicals must follow best practice guidelines, as prescribed by the manufacturers and when needed by a qualified agronomist (as been applied in any agriculture operation).
    - The disinfection process must only be applied by local spraying method - only inside the net houses (at no wind condition) to ensure no external spaying effects.
    - The storage of the chemicals would be within a dry dedicated container. The actual storage would be very limited only to a bio-monthly period use as and when needed.
    - Include further details on the use, handling and storage of the chemicals in the operational Procedures / Management System, also by referring to their specific Material Safety Data Sheets (MSDSs).
    - Refer to the management and mitigation measures relating to waste and effluent management in section 10.3.3.5.

10.3.1.3 ATTRACTION OF INSECTS, BIRDS AND OTHER PREDATORS OF SNAILS – MANAGEMENT AND MITIGATION MEASURES

- Prevent the entry of birds and other predators of snails by ensuring that the entire breeding facility is closed and covered, surrounded by electric fences and enclosed with metal sheets.
- Snail feed to be kept in sealed rat/scavenger proof room / containers.
- Prevent the attraction of insects, birds and scavengers by complying with the municipal requirements of handling, collecting and disposal of waste.

10.3.2 POTENTIAL NEGATIVE SOCIO-ECONOMIC IMPACTS

10.3.2.1 POTENTIAL NEGATIVE IMPACTS ON NEIGHBOURING LAND USE ACTIVITIES – MANAGEMENT AND MITIGATION MEASURES

- Ensure that the biosecurity measures and the logistics protocol (see section 10.3.1.1) are implemented to prevent the escape of snails and the entering of insects, birds and other predators of snails.

- Comply with the municipal requirements of handling, collecting and disposal of waste.
- Adhere to Project design criteria as specified in section 5 of the EIA Scoping (including impact assessment) Report.

10.3.2.2 POTENTIAL ODOURS FROM THE SNAIL BREEDING FACILITY – MANAGEMENT AND MITIGATION MEASURES

- Comply with the municipal requirements of handling, collecting and disposal of waste.
- Implement a practice of composting and re-use of organic waste for the enhancement of the snail habitat in the farm as per the operational manual.

10.3.2.3 IMPACT RELATING TO COMMUNITY HEALTH, SAFETY AND SECURITY AS A RESULT OF TEMPORARY AND PERMANENT WORKERS AND JOB SEEKERS

- Employment will be managed though an organised recruitment process – no jobs would be offered on site to avoid such job seekers arriving.
- Operate an alcohol and drug - zero tolerance site and conduct random testing of employees/contractors on entry to site.
- Operate and publicise among all workers and visitors a detailed safety and security plan for the Project.
- Develop a contingency plan to protect the local community if labour goes on strike.
- Enforce a zero tolerance policy on loitering on any neighbouring plots.
- Implement a comprehensive employee wellness programme, including HIV/AIDS information in all changing rooms.
- Ensure all security personnel are well trained.

10.3.3 OTHER IMPACTS DURING THE CONSTRUCTION AND OPERATIONAL PHASE

10.3.3.1 SPILLING OR LEAKING OF HYDROCARBONS – MANAGEMENT AND MITIGATION MEASURES

- Clean up / remediate ad hoc spills immediately.
- Dispose hydrocarbon contaminated material safely.
- Ensure that checking for hydrocarbon spills is included in daily inspections.

10.3.3.2 GENERAL DISTURBANCE OF BIODIVERSITY – MANAGEMENT AND MITIGATION MEASURES

- During the construction phase, demarcate all areas affected by clearance, earthworks, structures, and vehicle movements prior to any activity and restrict the disturbance to these areas.
- Restrict access to undisturbed areas and areas outside of Plot 88.
- Identify areas where lichens are present onsite:
    - Avoid areas where lichens are present as far as possible.
    - In areas subject for disturbance, remove stones covered with lichens to safer areas.
- Avoid structures and activities within drainage lines.
- Make all staff aware of species to expect onsite and report the presence of wild animals so that the most appropriate steps can be taken to avoid harm, damage or killing of native species.

10.3.3.3 DAMAGE TO HERITAGE RESOURCES – MANAGEMENT AND MITIGATION MEASURES

- In the unlikely event that an archaeological resource is discovered, a Chance Finds Procedure will be implemented which includes the following:
    - All work at the find will be stopped to prevent damage.
    - Mark and demarcate the area.
    - Appoint an appropriate heritage specialist to assess the find and related impacts.
- All employees will be made aware that under Section 55 of the National Heritage Act, No. 27 of 2004 any heritage finding needs to be reported to the National Heritage Council.

10.3.3.4 NUISANCE IMPACTS SUCH AS THE INCREASE IN ROAD TRAFFIC, AND THE GENERATING OF SMOKE, NOISE, ODOURS AND DUST – MANAGEMENT AND MITIGATION MEASURES

- Develop a grievance procedure which will be published and made available to neighbours and relevant stakeholders, so that issues and concerns can be addressed adequately and promptly.

- To reduce the noise and smoke from mobile equipment the following recommendations apply:
    - All equipment and vehicles should be kept at a high level of maintenance.
    - Avoid unnecessary revving of engines and switch off equipment when not required.
    - Audible reversing warning systems on mobile plant and vehicles should be of a type which, whilst ensuring that they give proper warning, have a minimum noise impact on nearby sensitive receptors.
- Workers will be transported to and from the site on a daily basis by minibuses / busses or best efforts to minimize traffic will be done if such vehicles would not be used.
- A driver trainer programme for all drivers will be implemented to include: complying with speed limits, holding valid licences, ensuring vehicles are roadworthy, zero tolerance for drinking and driving and using lights appropriately for night driving.
- All road users are required to comply with Namibian Roads Authority regulations.
- Any Project related road accident must be handled in accordance with an emergency response procedure (to be developed for the Project).
- Vehicles of workers will not be allowed onsite, with the exception of the Manager who will be allowed to use farm vehicle as and when needed. Workers will be dropped off and pick up at the site's perimeter.
- Feed deliveries would be done twice a week by a truck.
- A maximum of five truckload (20 – 40 feet size) per day will transport the harvested snails to the warehouse during the two-month harvesting period.
- All farm operational activities will be monitored daily for any sign of odours.
- Avoid construction during extreme dust storm conditions.
- In the case of causing dust during construction, suppression by means of water can be applied.

10.3.3.5 CHEMICALS, WASTE, EFFLUENT AND SEWAGE MANAGEMENT – MANAGEMENT AND MITIGATION MEASURES

- Implement a best practice management of waste onsite by collecting, sorting and arrangement for disposal waste correctly.
- During the construction phase:
    - Recyclable waste will be sent to or collected by a reputable recycling company
    - The remainder of the construction waste will be transported to a permitted general landfill facility for disposal
    - Hazardous waste will be disposed of at the permitted hazardous disposal site (Walvis Bay).
    - Ensure all working areas have proper toilet facilities.
- During the operational phase:
    - Recyclable waste will be sent to or collected by a reputable recycling company.
    - Bins with labels according to waste type, and with lids to prevent wind-blown litter, will be provided at strategic locations onsite.
    - Non-recyclable waste will be removed from the site by means of the municipal waste collection system (i.e., wheely bins weekly collected by the municipality for disposal at the Swakopmund landfill facility).
- Recycling will be promoted on site.
- No littering will be permitted.
- Effluent and sewerage will be discharged as per municipal requirements.
- Only apply disinfection chemicals by local spraying method, inside the net houses – under no-wind conditions, to ensure no external spaying effects.
- Ensure that only products registered for use in Namibia is used for the disinfection activities.
- Adhere to product specification relating to the dilution of the chemicals.
- Chemicals to be stored in a locked bunded chemical store.
- Keep material safety datasheets (MSDS) for all disinfection chemicals on site.

- Dispose of empty chemical containers as per the MSDS. Where relevant, disposal of empty containers at a registered hazardous waste disposal facility and keep 'safe disposal certificates'.
- Dispose any disinfected materials (during operational and maintenance activities) at the nearest approved municipal waste disposal facility.
- Prevent spillages of chemicals to the environment. In the event of a spill, it must be cleaned immediately and the contaminated soil disposed of as per the product specifications.
- Consider using Sodium hypochlorite instead of chlorine for tools disinfection (as it breaks down quickly unlike chlorine and is as effective).

10.3.4 POTENTIAL POSITIVE SOCIO-ECONOMIC IMPACTS

10.3.4.1 EMPLOYMENT – MANAGEMENT AND MITIGATION (ENHANCEMENT) MEASURES

- Use local Namibian suppliers of goods and services where possible.
    - Include local service providers in the tendering process for supplies and services.
    - Ensure that strategies and programmes are in place prior to construction which maximise use of the local labour force during construction and operations.
    - Give hiring priority to suitably qualified or experienced Namibian citizens (locals), as positions become available.
- Pay fair salaries and wages.
- Be gender sensitive and appoint women where possible.
- Promote continuous learning programmes to diversify and upgrade skills of employees.
- Upliftment of employees and contractors though continuous training, skills transfer, and talent development and awareness creation.
- Ensure a comprehensive HIV, AIDS, TB and COVID-19 workplace policy and wellness programme which will detail relevant prevention measures in the workplace and enable easy access to AIDS treatment, care and support for employees is developed and implemented.

- Promote public health and safety by supporting the authorities and other stakeholders' initiatives to reduce the spread of communicable diseases such as sexually transmitted diseases, including HIV, TB and malaria and COVID-19 by organising awareness programmes, ensuring that codes of conduct for workers are implemented and adhered to, and by promoting healthy lifestyles and in their health campaigns.
- All work areas will be operated as alcohol-free and drug-free areas. Random alcohol and drug testing of employees and contractors may be conducted upon entry to site.

10.3.5 General Stakeholder communication and reporting

- Maintain and update the I&AP / stakeholder register. Ensure that all relevant stakeholder groups are included. A representative database would include, as a minimum, surrounding plot owners and key Regulatory authorities.
- Devise and implement a stakeholder communication and engagement strategy. Regular meetings / correspondence with the relevant DVS Officials will be carried out (the frequency of the meeting will be determined between Rainy Day Investments and DVS). Rainy Day Investments to share detailed (relevant) Biosecurity protocols and measures as part of the Operational Procedures with DVS prior to the implementation of the project for their information and input (where relevant). Depending DVS requirements, this should form part of the permit application (see section 10.6).
- Rainy Day Investments to confirm reporting requirements with DVS, prior to the implementation of the project. As a minimum, submit annual Environmental Performance Reports (against the commitments of this EMP and records of all monitoring data, incidences, treatment on site, sick animals found etc.) to DVS and MEFT.
- Meetings with neighbouring plot owners to be arranged on an ad-hoc basis, depending specific complaints being raised. However, at the outset of the project, Rainy Day Investments will engage with the immediate plot neighbours (as a minimum) to inform them of the commencement of the activities and also to share relevant Operational Procedures.
- Develop and implement a concerns/complaints (grievance) process for stakeholders and publicise the channels through which issues can be submitted to Rainy Day Investments.
- Document all complaints in an external communications register.
- Respond immediately to acknowledge receipt of complaints and comments.

- Investigate and report on findings of issue to the complainant.
- Keep complete auditable records of complaints, responses and actions taken.
- Introduce an independent mediator if the grievance / complaint cannot be resolved between Rainy Day Investments and the affected party.

10.4 INTERNAL REVIEW AND AUDITING

An internal review process and procedure shall be established by Rainy Day Investments to monitor the progress and implementation of the EMP. Rainy Day Investments will ensure regular inspections and audits are carried out internally.

Annual (EMP compliance) audits to be conducted by an external Environmental Practitioner.

10.4.1 EMP COMPLIANCE

- Ensure that a copy of the EMP is provided to all contractors.
- Conduct and record monitoring of EMP compliance.
- Compile and submit annual environmental performance reports to MEFT and MAWLR (DVS).

10.5 ENVIRONMENTAL AWARENESS TRAINING

Before the commencement of relevant activities relating to snail breeding facility, Rainy Day Investments shall ensure environmental awareness-training (relating to the commitments of the EMP) are provided to all contractors and employees.

10.6 PERMITS AND OTHER REQUIREMENTS

- Comply with relevant legal requirements and all sanitary measures and quarantine requirements (where relevant / required by the MAWLR: DVS) for the importation of live animals into Namibia and export out of Namibia set out under the Animal Health Act, No. 1 of 2011.
- Confirm with the MAWLR (veterinary services) which other permits are required.
- Application for import/export permits must be done with the State Veterinary Services. Rainy Day Investments to share detailed (relevant) Biosecurity protocols and measures as part of the Operational Procedures with DVS as part of the permit application.

10.7 MONITORING

- Routinely monitor all biosecurity aspects of the breeding facility.
- Monitor the entire breeding facility for any sign of escape daily.
- Routinely monitor all farm operational activities for any sign of associated disease, parasites or pests via certified laboratory services.
- Monitor the entire breeding facility daily to prevent birds and other predators of snails from entering the breeding facility.
- Routinely monitor all farm operational activities for the attraction of insects, birds and other snail predators.
- Monitor all farm operational activities daily for any sign of odours.

10.8 DECOMMISSIONING

At a conceptual level, decommissioning can be considered a reverse of the construction phase with the demolition and removal of most of the structures. Being located within the Swakopmund Townlands, specific decommissioning requirements need to be specified by the local authority. Hereof the most important aspect would be the complete removal of all snails and the securing of no risk remaining for potential invasion by snails.

10.9 RESPONSIBILITIES

Rainy Day Investments shall ensure compliance to this EMP. Management will ensure:

- To implement all provisions of the EMP. If employees or contractors encounter difficulties with specifications, the matter should be addresses immediately.
- That all staff are familiar with the EMP.
- Ensure the environmental management plan is included in all contracts and to ensure that contractors adhere to the conditions of the EMP.
- To make personnel aware of environmental issues and to ensure they show adequate consideration of the environmental aspects of the project.

11 WAY FORWARD

The way forward is as follows:

- I&APs reviewed the report and sent their comments to Namisun.
- Namisun finalised the report, incorporating I&APs' comments.
- Submission of the final report (including I&APs' comments) to MAWLR and MEFT for their review and decision.

12 ENVIRONMENTAL IMPACT STATEMENT AND CONCLUSION

It is Namisun's opinion that the environmental aspects and potential impacts relating to the proposed snail breeding facility has been successfully identified and assessed as part of this EIA process. Relevant management and mitigation measures have been provided to ensure significant environmental and social impacts are avoided / minimised and positive social impacts enhanced, where relevant. These measures are included in the EMP (Section 10 of this report).

The following aspects and their potential impacts have been considered:

- Construction / set up:
    - Spilling or leaking of hydrocarbons causing pollution on land.
    - Increased road traffic.
    - Noise and pollution.
    - General disturbance of biodiversity during construction.
    - Damage to heritage resources.
    - Nuisance impacts such as noise, smoke, odours and dust can cause disturbance to third parties.
    - Contamination of soil or water as a result of waste generation and effluent discharges.
- Operations phase:
    - Biosecurity risks of the accidental introduction of a non-native snail species into the ecosystem.
    - Biosecurity risks of introducing and spreading of associated diseases, parasites, and pests.
    - Attracting of insects, birds and other predators of snails.
    - Contamination of soil or water because of:
        - Waste generation.
        - Effluent discharges.
    - Negative impacts on neighbouring land use activities.
    - Use of disinfection chemicals:
        - Soil and water contamination

        - Negative impacts on neighbouring land use activities and other third parties
    - Odours.
- Harvesting, packing and export:
    - Noise and pollution effects from vehicles and equipment during harvesting, packing and export.
    - Traffic related impacts.
- Unplanned events:
    - Rainstorm damage to structures.
    - Pollution and accidental spills.
- Socio-economic (positive):
    - Income.
    - Job creation and skills development.
    - Empowerment of people.
- Socio-economic (negative):
    - Impacts to community health, safety and security.

The issues that were identified as requiring further assessment; and the assessment findings are summarised in Table 13.

TABLE 13: SUMMARY OF POTENTIAL IMPACTS ASSOCIATED WITH THE PROPOSED SNAIL PRODUCTION PROJECT

Potential Impact	Significance	
	Before mitigation	After mitigation
Introduction of a non-native snail species	**L-M**	**L**
Introduction of associated diseases, parasites and pests	**L-M**	**L**
Attraction of insects, birds and other predators of snails	**M-H**	**L**
Potential negative impacts on the neighbouring land use activities	**M**	**L**
Potential odours from the snail breeding facility	**L**	**L**
Impact relating to community health, safety and security as a result of temporary and permanent workers and job seekers.	**H**	**L**
Potential negative impacts associated with the application of disinfection chemicals	**M-H**	**L**

It is recommended that, if MEFT provides a positive decision on the Application for the proposed Project, they should include a condition to the clearances that Rainy Day Investments must implement all commitments in the EMP.

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Note:

Various references were made in the Specialist Report (see Appendix F), which are not reflected here.

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APPENDIX A: CURRICULUM VITAE

APPENDIX B: INFORMATION SHARING RECORD

APPENDIX C: MINUTES OF MEETINGS

APPENDIX D: I&AP DATABASE

APPENDIX E: ISSUES & RESPONSE REPORT

APPENDIX F: BIOLOGICAL IMPACT SPECIALIST REPORT

APPENDIX G: NAME CHANGE DOCUMENTATION