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PA/03673/21

INSTALLATION OF GREENHOUSES FOR SNAIL FARMING, TRIQ TAL-BALAL, IN-NAXXAR

ENVIRONMENTAL RISK ASSESSMENT

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Quality Assurance

Installation of Greenhouses for Snail Farming, Triq Tal-Balal, In-Naxxar (PA/03673/21)
Environmental Risk Assessment
May 2022

Report for: **Cammast Properties Ltd**

Revision Schedule

Rev	Date	Details	Written by:	Checked by:	Approved by:
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INTRODUCTION

1. A Project Description Statement (PDS) was submitted to the Environment and Resources Authority (ERA) as part of application PA/03573/21 in January 2022. Following review of the PDS, in its letter dated 13/04/2020 (ERA Ref: EA 00011/2022) ERA concluded that the project, hereafter referred to as 'the Scheme', does not require an EIA as per the EIA Regulations 2017 (S.L. 549.46). ERA did, however, request that an environmental risk assessment is carried out. This document presents the environmental risk assessment.

Terms of Reference

2. Annex I of ERA's letter makes the following qualification with regards to the requirement of an environmental risk assessment:

> *6.3 The proposed area is surrounded by agricultural fields to the east. Given the nature of the project and the nature of the site surroundings, there is a potentially significant risk of adverse impacts on the surroundings in the event of any accidental escapes into the wild, as the snails' foraging would be expected to be deleterious to natural and cultivated vegetation. The magnitude and probability of such impact on the environment is unclear and thus an environmental risk assessment is required.*

LOCATION OF THE SCHEME

3. The Scheme site is located in the south-eastern corner of In-Naxxar between Triq Tal-Balal and Triq Margaret A. Murray, see **Figure 1.**

4. The Scheme site is owned by the Applicant's family and fits the purposes of the snail's farms technology provider. Notably, the Scheme site is located close to another site that has been approved for snail farming[1] and which will also be operated by Malta Snails Ltd.

CHARACTERISTICS OF THE SCHEME SITE

5. The Scheme site has a total area of 10,400 m^2. It is located in former quarries that have long since been converted into agricultural fields. Some areas are fallow whereas other areas are currently being worked. The site also includes a number of derelict rural structures, see **Figure 2**.

6. The site includes a number of trees, mainly fruit trees. The plan shows that the area has six clumps of prickly pears, 27 almond trees, five citrus trees, four olive trees,

[1] PA/04059/19: *Proposed installation of three greenhouses for snail farming. To demolish existing dilapidated stores and to construct an agricultural store and gate*. Permit granted on the 10th March 2021.

and one fig tree; see also **Figure 2**.

7. The Central Malta Local Plan (CMLP) (2006), through policy CG24, designates the Scheme site as part of an Agricultural Area (awaiting classification of agricultural value), see **Figure 3**. It also falls within a Strategic Open Gap (Policy CG25), see **Figure 4**.

Figure 1: Location of site

Figure 2: Existing and proposed plan

Figure 3: In-Naxxar North Environmental Constraints Map

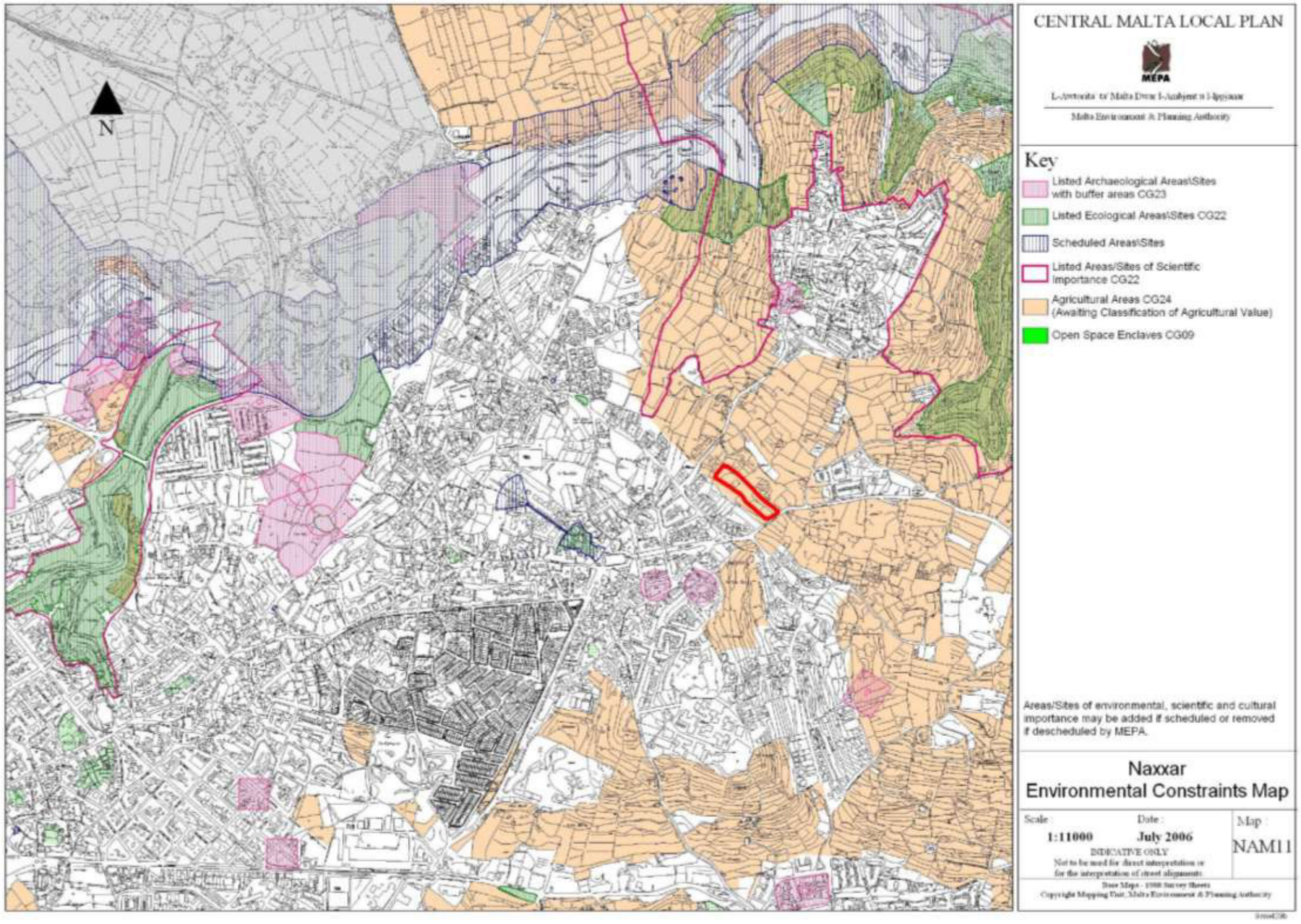
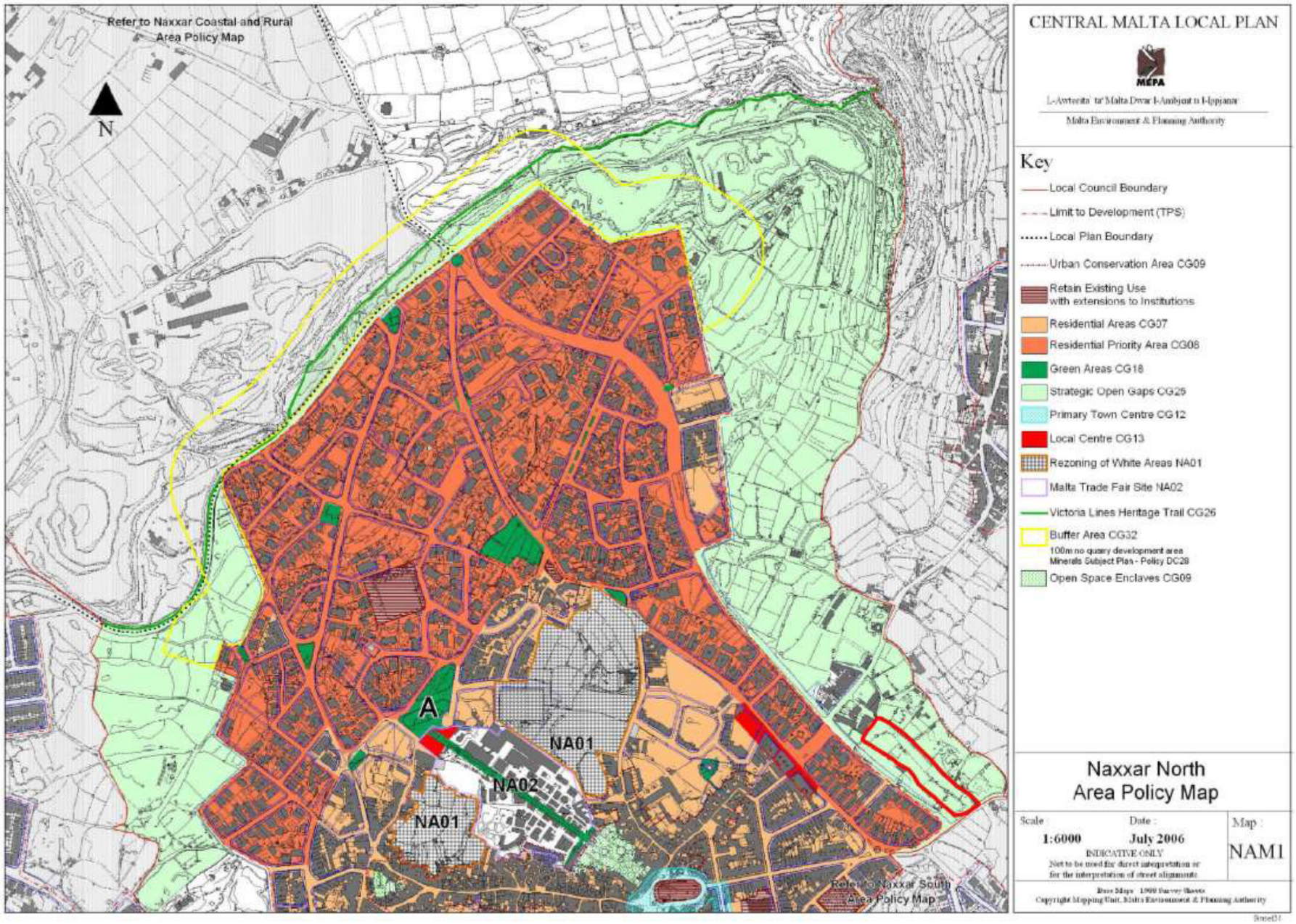


Figure 4: In-Naxxar Area Policy Map



RISK ASSESSMENT METHODOLOGY

Scheme Phases

8. The Scheme will involve three major phases, as follows:

- Construction;
- Operation; and
- Decommissioning.

9. The Project Description Statement (PDS) prepared for this application outlines the construction phase of the proposed greenhouses and the technology within these structures. The Scheme will consist of 11 greenhouses. These structures will include concrete blocks that will serve as the foundations, a steel framework and shade netting.

10. Given the nature of the proposed structures and the materials used it is unlikely that the Scheme will result in any significant risk. Furthermore, a Construction Management Plan will guide how the construction phase will be undertaken.

11. In the eventuality that the Scheme will be decommissioned in the future, a Decommissioning Plan would be required. This should follow international practice. Assessing a decommissioning scenario at this stage would be premature and hypothetical since it would be based on several assumptions. The trajectory of an environmental risk assessment for this phase would depend on the state of the structures at the time of decommissioning, the presence of new sensitive receptors in the surroundings and any hazard pathways at the time of the decommissioning.

Objectives

12. This environmental risk assessment will thus focus on the Scheme operations and includes a twofold scope:

- Describing and evaluating the risks to the environment associated with the Scheme; and
- Describing the measures which will be undertaken to mitigate such risks and evaluating the residual risk levels.

Methodology

13. The environmental risk assessment has been based upon the methodology put forward by DEFRA's Guidelines on Environmental Risk Assessment and Management[2].

14. An environmental risk occurs when there is a means by which a hazard can result in a deleterious impact on the surrounding environment, that is, receptors. The presence of a hazard alone does not constitute a risk. A risk is only present if there is a pathway which links the source (hazard) to the receptor. This is known as the source-pathway-receptor linkage.

15. Environmental risk assessment is the process by which source-pathway-receptor linkages are identified and evaluated. If any of the three elements are absent then there is no complete linkage, and thus no unacceptable risk.

Risk Assessment Criteria

16. Once a source-pathway-receptor linkage is identified, the assessment must consider the magnitude of a risk. This is determined by taking into account the results of an environmental event (e.g., a pollution event) and the likelihood that the event will occur.

17. The risk criteria applied in this assessment is based on a matrix consistent with the Australian Standard AS4360 on Risk Management and ISO 31010: *Risk management: Risk assessment techniques*.

18. **Table 1** presents criteria for assessing environmental consequences; **Table 2** presents criteria for assessing the likelihood of the event occurring. The overall risk level is then determined by combining the two factors, using the matrix in **Table 3**.

Table 1: Criteria for Assessing Environmental Consequences

Severity Level	Effects on Natural Environment
1: Insignificant	Limited damage to minimal area of low significance.
2: Minor	Minor effects on biological or physical environment. Minor short/medium-term damage to small area of limited significance.
3: Moderate	Moderate effects on biological or physical environment (e.g., air, water) but not affecting ecosystem function. Moderate short/medium-term widespread impacts (e.g., significant spills).
4: Major	Serious environmental effects with some impairment of ecosystem function. Relatively widespread medium-long term impacts.

[2] Gormley, A., Pollard, S., Rocks, S. 2011. Guidelines on Environmental Risk Assessment and Management. Green Leaves III. Department of Environment, Food and Rural Affairs (DEFRA) & Cranfield University.

5: Catastrophic	Very serious environmental effects with impairment of ecosystem function. Long term, widespread effects on significant environment (e.g., national park).

Table 2: Measure of Likelihood

Level	Descriptor	Description	Guideline Frequency
A	Almost Certain	Consequence is expected to occur in most circumstances	Occurs more than once per month
B	Likely	Consequence will probably occur in most circumstances	Occurs once every 1 month - 1 year
C	Occasionally	Consequence should occur at some time	Occurs once every 1 year - 10 years
D	Unlikely	Consequence could occur at some time	Occurs once every 10 years - 100 years
E	Rare	Consequence may only occur in exceptional circumstances	Occurs less than once every 100 years

Table 3: Risk Matrix

Likelihood	Environmental Consequence					No Linkage
	1: Insignificant	2: Minor	3: Moderate	4: Major	5: Catastrophic	
A: Almost Certain	Low	Moderate	Extreme	Extreme	Extreme	None
B: Likely	Low	Moderate	High	Extreme	Extreme	
C: Occasional	Very low	Moderate	High	High	Extreme	
D: Unlikely	Very low	Low	Moderate	High	High	
E: Rare	Very low	Low	Moderate	Moderate	High	

Overview

19. The Scheme consists of the creation and operation of a snail farm. The main risk to the environment as highlighted in ERA's review are escapes of the farmed snails into the environment.

20. The farmed snail is *Helix aspersa* (= *Cantareus aspersus*). Whilst this species is native in the Maltese Islands; the stock that will be used to start farm operations will be imported from Cyprus. The stock has been bred specifically to provide a consistent and favourable product. Besides this, *Helix aspersa* is represented in several forms

that are highly differentiated genetically[3].

21. The Scheme will result in the erection of eleven greenhouses to be used for snail breeding. The greenhouses will occupy an area of 4,180 m^2 and will be 3.6 m high. Access to the site will be through the current gate on Triq Tal-Balal. The farm aims to generate 100 tons of snails annually.

22. The greenhouses will be in the northern part of the field. **Figure 2** shows the proposed block plan. **Figures 4 -6** show drawings of the greenhouses.

23. The Applicant will adopt a curtain breeding method, see **Figure 7**. The breeding units will consist of wooden planks supported by steel bars within pans. Low-lying grass will be allowed to grow at the base of the pans to support humid conditions for the snails. This grass will be trimmed regularly, whilst the edges of the pan will have a low voltage electric fence to ensure that there are no escapes, see **Figure 8**. The curtains will be affixed to the bottom of the wooden plank.

24. This system considers the snails' behaviour. The curtains will be used by the snails to mate, live and grow. The snail is only active during the night when it moves to the top surface of the wooden plank to eat. Thus, most of the snail excreta will also be found on the wooden planks. On the other hand, during the day the snail moves to the underside of the planks or on the curtains to sleep. This behaviour facilitates a more efficient feeding of the snails and adequate cleaning of the breeding units.

25. The Scheme forms part of a wider project to develop heliculture in Malta. Another site close to the Scheme site and that will be operated by Malta Snails Ltd was granted a development permit in March 2021.

[3] www.cabi.org

Figure 5: Greenhouses, isometric view

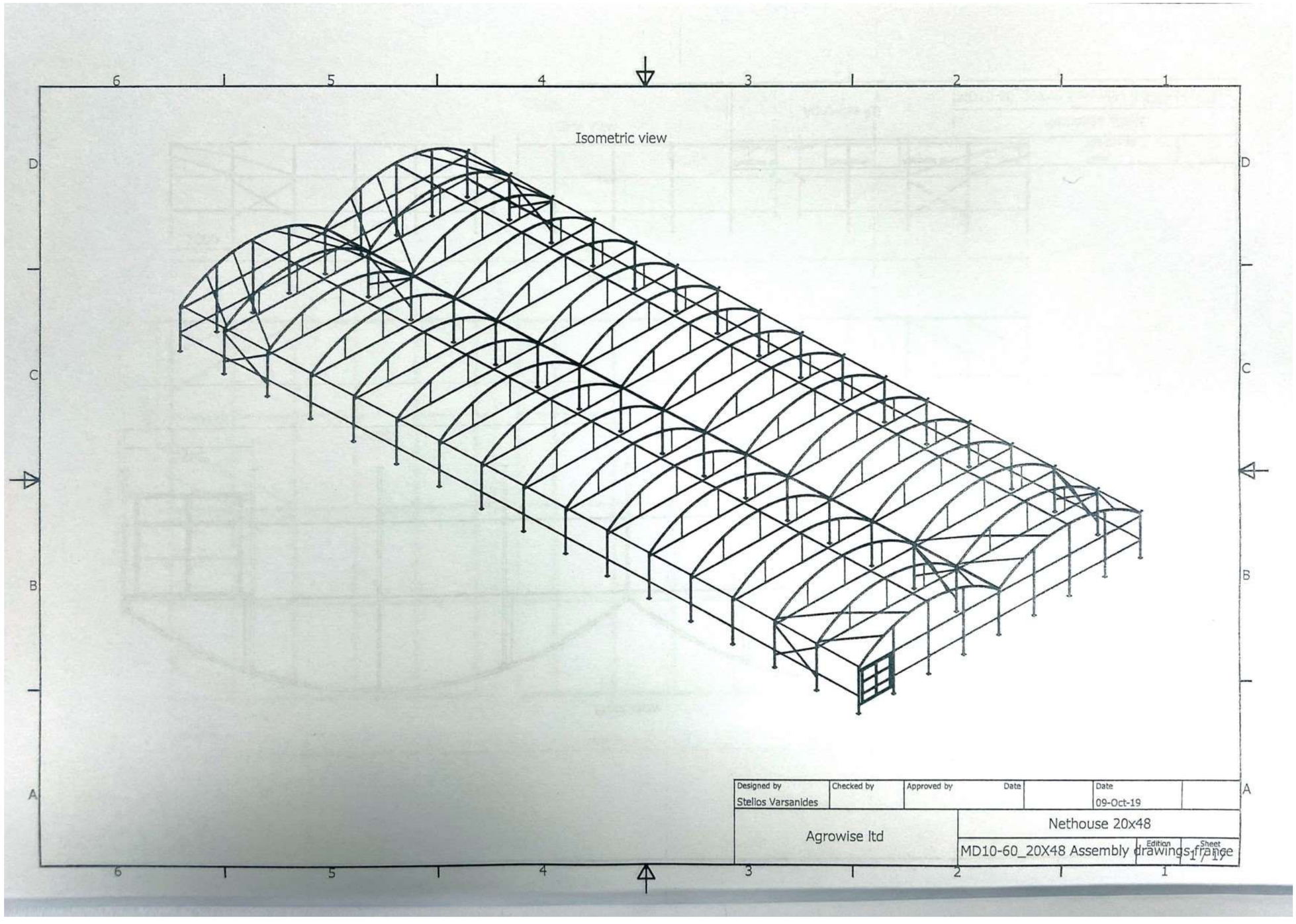


Figure 6: Greenhouses, front view

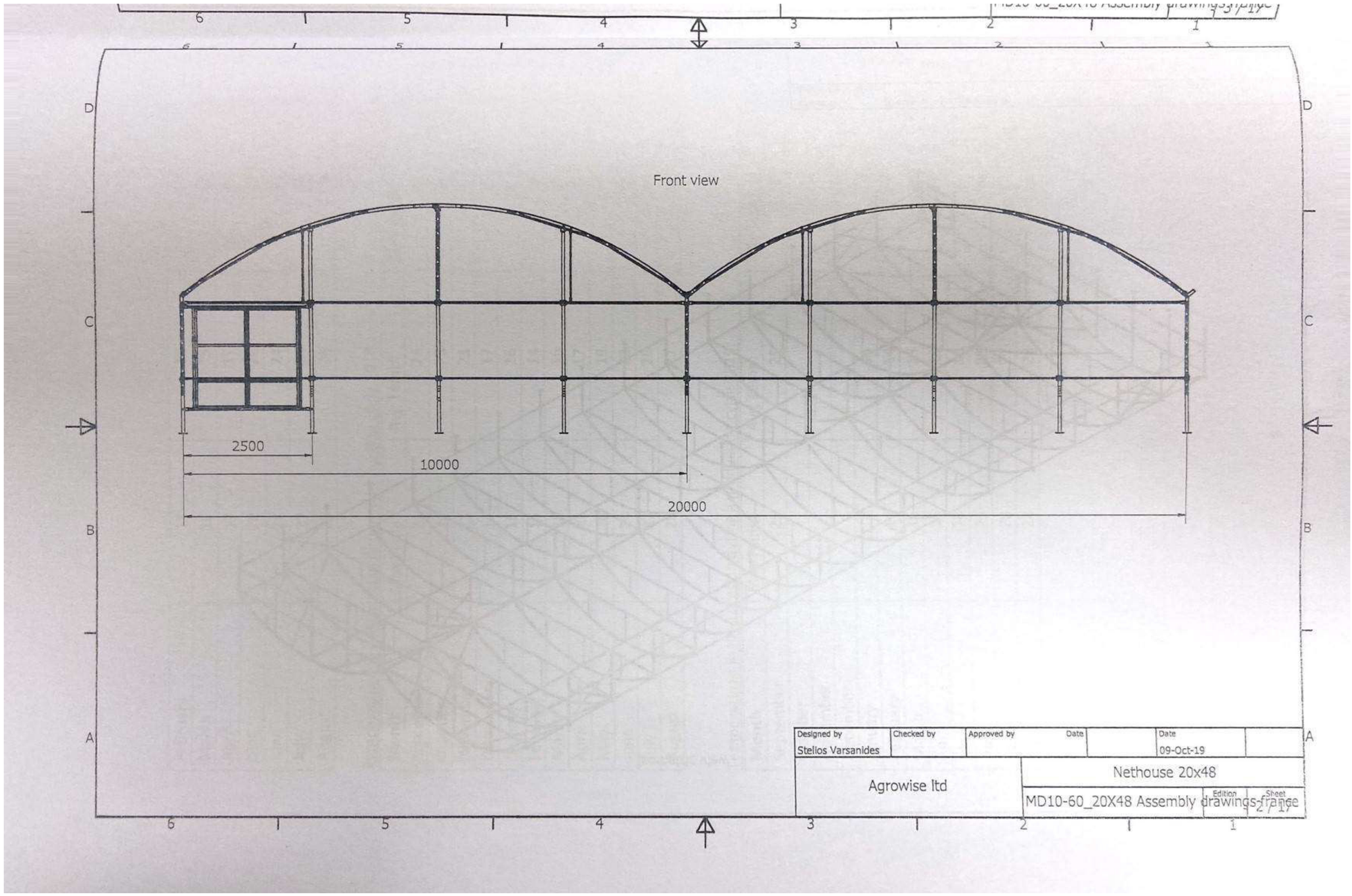


Figure 7: Greenhouses, foundations

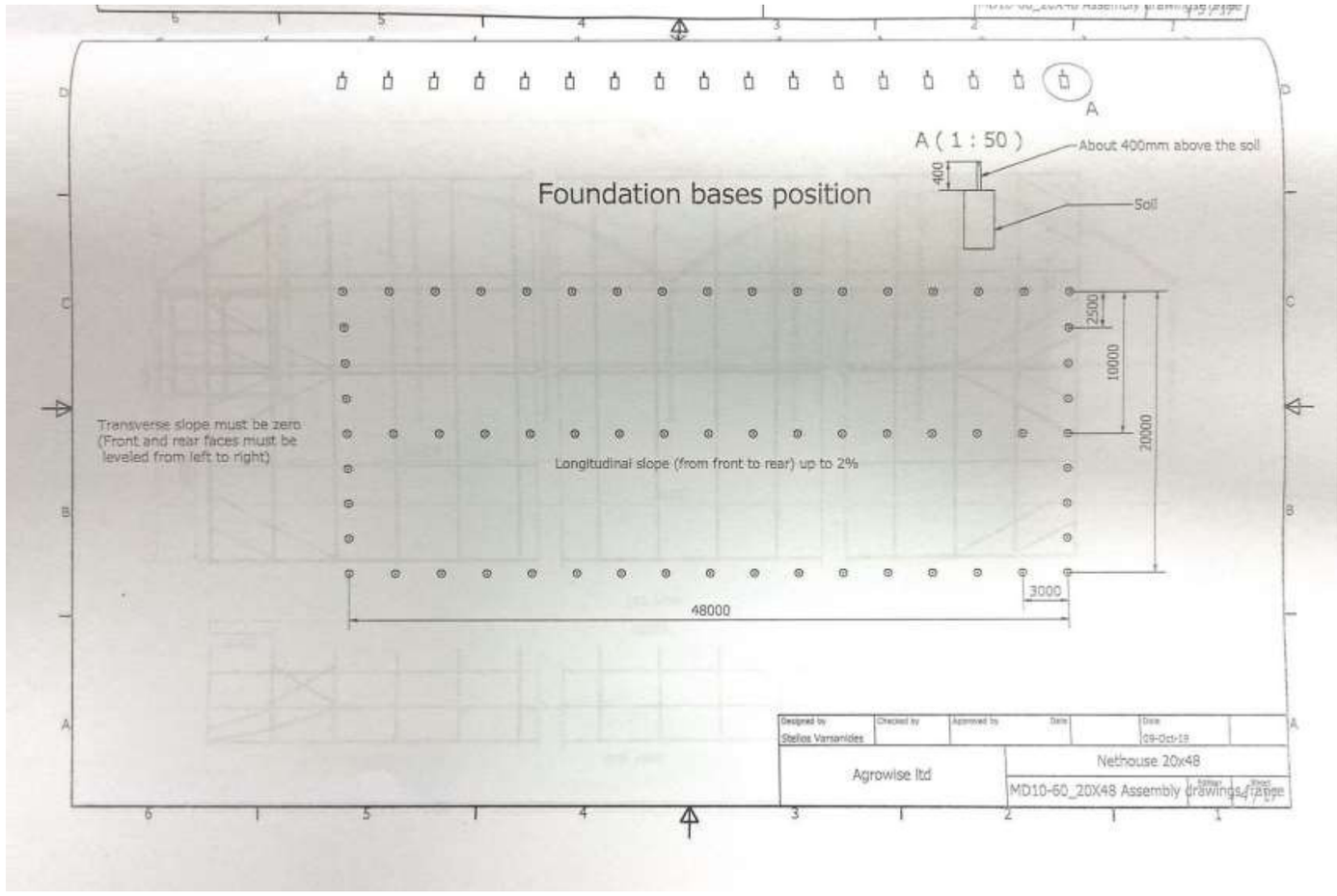
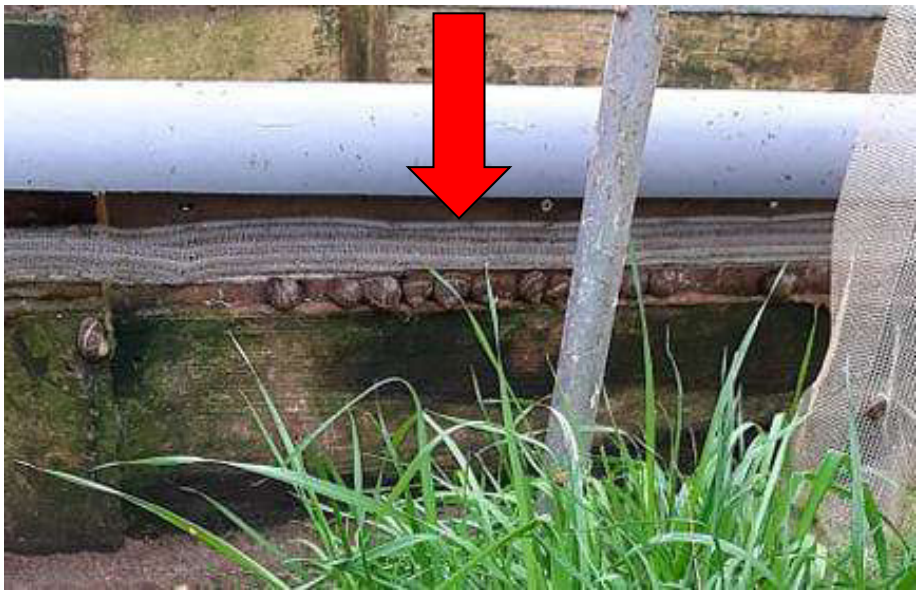


Figure 8: Curtain method

Source: Touchstone Snails

Figure 9: Electrical fence (tape)



Source: Touchstone Snails

26. **Table 4** summarises potential sources of impact and the respective pathway to the relevant receptor. The table also describes the mitigation measures that will be adopted to mitigate such risks, distinguishing between fixed structural elements incorporated by the Scheme and procedural mitigation measures. It is to be noted that all the mitigation measures in the table will be implemented as part of the Scheme.

27. **Table 5** identifies source-pathway-receptor linkages for major accident scenarios of fire, flooding, and earthquakes.

Table 4: Pollution Pathway Identification and Mitigation Measures

Source	Pathway	Receptor	Mitigation Measures	
			Structural Mitigation Measures	Procedural Mitigation Measures
Escape of snails from snail farm	Fields/land adjacent to farm	Surrounding agricultural land	• The snails will be kept in pans. The walls of these pans will be buried into the ground to ensure there are no escapes from beneath its wall. Additionally, the pans' walls will be surrounded by a low voltage electric fence. • Grass within the pans will be kept low to avoid escapes this way. • The pans will be located within the greenhouses, that will be secured by a mesh stopping an intrusion by predators and concurrently keeping the snails in. The mesh will have a small enough size to stop intrusions or escapes from the greenhouses. Additionally metal sheeting will be buried 60 cm in the ground and another 60 cm above ground all around the greenhouse perimeter. • The opening of the greenhouse will be kept always closed. • The greenhouse structures are anchored by concrete blocks and have been certified to withstand strong winds.	• Regular visual sweeps and inspections checking for any snails that may have escaped from the pan area (still in the greenhouse). • Regular maintenance of electrical fence and operational checks. • Fence control panel checks. • Dynamo system and battery charge level checks. • Training of personnel in correct operation and record keeping.

Table 5: Pollution Pathway Identification and Mitigation Measures for Major Accident Scenarios

Scenario	Source	Pathway	Receptor	Mitigation Measures	
				Structural Mitigation Measures	Procedural Mitigation Measures
Flooding	Greenhouses	Agricultural land	Surrounding fields Natural land	• N/A	• Regular inspection of net integrity and immediate repairs in case of damage.
Earthquake	Greenhouses	Agricultural land	Surrounding fields	• Anchoring of greenhouses.	• Regular inspection of integrity of structures.

Identification of potential escapes

28. The snails could escape in the case of a failure of the electrical fence or the structure. However, in this eventuality, another level of containment is provided by the greenhouses themselves. It is only if this secondary level containment fails through structural damage of the greenhouses themselves would the snails be able to escape to the surrounding area.

Identification of Migration Pathways

Without Mitigation

29. It is likely that without the mitigation measures in place, part of the stock will escape in the surrounding areas. Whilst some of the stock would remain due to the presence of favourable conditions within the Scheme site, mainly through the provision of food, the rest of the stock might still escape. The surrounding area includes agricultural land which can provide for the needs of the snails. The same pathway would be followed in the event of flooding or an earthquake.

With Mitigation

30. A number of mitigation measures will be in place on site to prevent the migration of the snails towards receptors, as described above, and in **Table 4** and **Table 5**.

31. The electrical fence / tape will be placed around the top part of the pans' walls. This fence / tape is made up of multiple wires that will be placed in a particular way to prevent snails from going out of the pans as shown in **Figure 9**. This technology has been tried and tested and is used specifically in heliculture. The tape is covered in semi-circular plastic which protects it from any damage during operations. **Figure 10** shows the setup of the low voltage batteries. A control panel in the room indicates when each fence has electrical power running through it (see **Figure 11**). The batteries are powered by electricity from the mains or solar panels, which could be used as a backup source.

32. The staff will ensure that the grass is kept at a lower height than the pan walls to ensure that it is not used by the snails as a potential escape route.

33. As explained above, the greenhouse itself will serve as a second tier of containment against snail escapes. The greenhouse will be equipped with a mesh which is small enough to stop escapes. Additionally, metal sheeting will be included 60 cm below the ground and another 60 cm above the ground. The metal sheeting will be affixed to the nylon mesh and will stop predators, like rodents, from entering the greenhouses and snails from escaping (see **Figure 12**).

Figure 10: Diagram showing battery set up

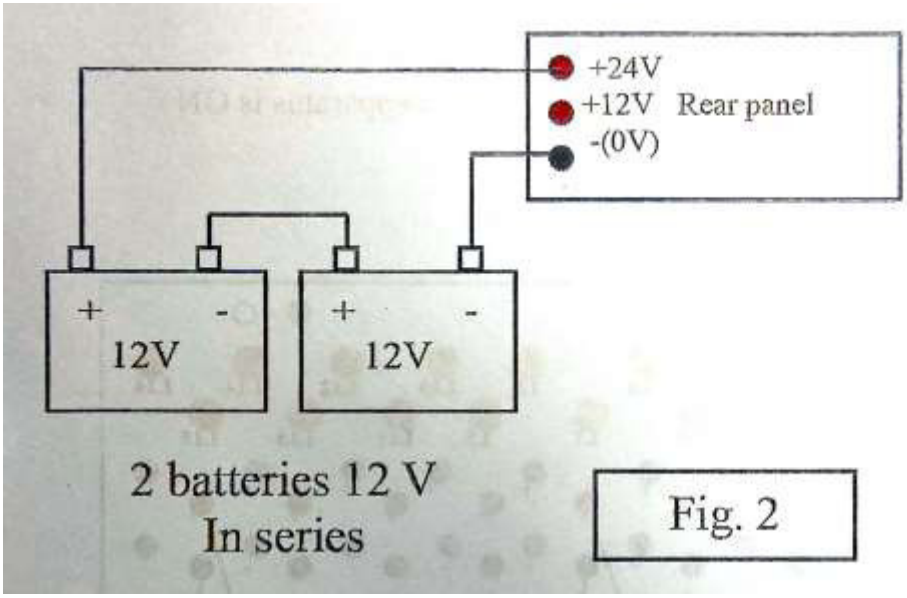


Figure 11: Control panel

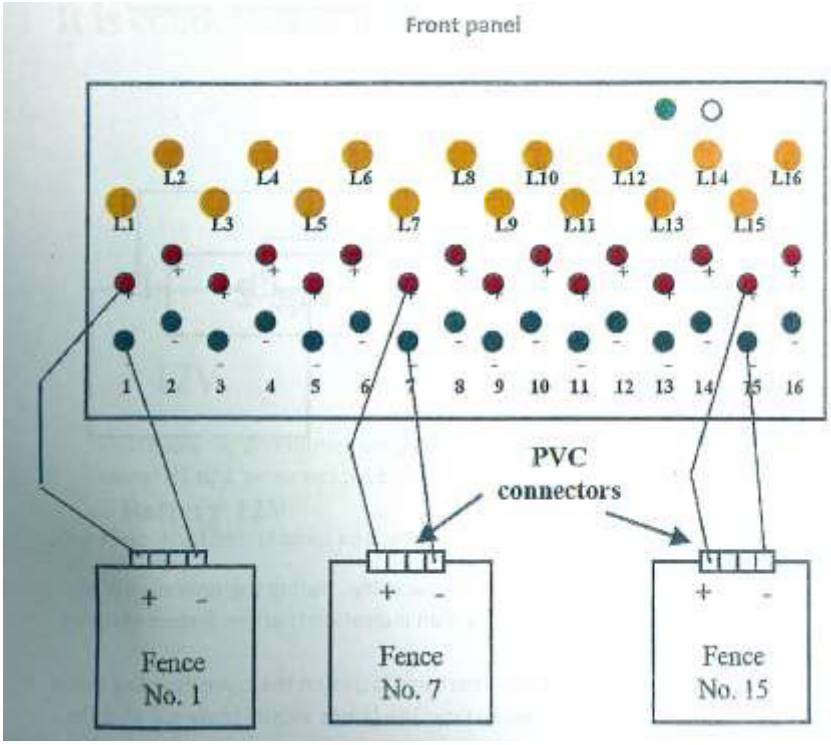


Figure 12: Greenhouse metal sheet covering

34. The greenhouse is designed to withstand gale force wind. However, in case of extreme events, such as an earthquake, damage to the structures is likely and escape of snails in this scenario is possible.

35. The Applicant's technology provider is Touchstone Snails Limited acting in Malta through Malta Snails Ltd. Touchstone Snails is based in Larnaka, Cyprus and operates an international franchise. The company has 15 years' experience in the breeding of *Helix aspersa* (Muller, 1774) snails. The company also offers consultancy services for start-ups in the heliculture industry to ensure sustainable and profitable operations. The company follows international standards and is certified under EN ISO 9001:2015: Consulting Services for the Construction and the Management of Snail Breeding Units and the Trading of Snails (Certificate Registration No.: 0217386063090) and EN ISO 22000:2005: Snail Farming, Processing, Packaging and Distribution (Certificate Registration No.: 021775063090). The Maltese site will also be subject to audits in order to ensure that it is in line with the standards to which Touchstone Snails Ltd comply.

36. The staff will perform daily operational checks as described in **Table 4**. These checks consider the slow pace of snails and will ensure that through these checks any potential escapees are contained. These checks include:

- Grass trimming in pans;
- Cleaning the electrical fence and confirming that the electrical fences are in operation;
- Checking the perimeter of the pans for the presence of snails. Any identified will

be placed back in the pans;

- Checking the fence control panels for any alarms;
- Checking the dynamo system and battery charge levels; and
- Checking the condition of the greenhouse including the netting.

Identification of Potential Receptors

37. In the scenario without mitigation, in the event of escapes, the first receptor is the Scheme site itself since the southern half of the Scheme site will not include greenhouses. Additionally, one of the predominant land uses in the Scheme's surroundings, as described in the PDS, is agricultural. Whilst *H. aspera* is native, the species feeds on plant material. In the unmitigated scenario the snails could reach the adjacent agricultural land and the potential large number means that this would result in deleterious effects on crops in adjacent fields.

38. As identified above, *H. aspera* populations can have genetic variations and therefore if the farmed snails (originating from outside of Malta) breed with the local population, this may result in a genetic hybridisation and dilution of the local gene pool.

Risk Evaluation

39. The main identified risks on the environment have been assessed using the evaluation criteria described above (**Table 1** to **Table 3**). The risks associated with both the unmitigated and mitigated scenarios are evaluated. However, it should be noted that the Scheme envisages including all the mitigation measures described.

Without Mitigation

40. **Table 6** presents risk levels for each source without the implementation of any mitigation measures.

Table 6: Risk Levels Without Mitigation

Source	Environmental Consequences	Likelihood of Consequence	Resultant Risk Level
Escaped farm snails	Major	Unlikely	High
Escape as a result of flooding (assuming snails survive)	Major	Unlikely	High
Escape resulting from an earthquake (assuming snails survive)	Major	Unlikely	High

41. Without implementation of the mitigation measures described above, the impact to the surrounding environment from the escape of snails, namely agricultural land and associated crops as well as areas that support natural vegetation in the area and the genetic integrity of the local population of *H. aspera*, has been identified as high.

42. The probability of a flood causing escape has been classified as unlikely following a

review of Malta's Preliminary Flood Risk Assessment[4], which does not identify Naxxar as an area that is susceptible to flash flooding. The risk is therefore considered to be minor and also assuming that the snails would survive such an event.

43. A severe earthquake is also considered unlikely, and the risk has again been classified as moderate.

With Mitigation

44. **Table 7** presents risk levels for each source with the implementation of the proposed mitigation measures.

Table 7: Risk Levels with Mitigation

Source	Environmental Consequences	Likelihood of Consequence	Resultant Risk Level
Escaped farm snails	Minor	Unlikely	Low
Escape as a result of flooding (assuming snails survive)	Minor	Unlikely	Low
Escape resulting from an earthquake (assuming snails survive)	Moderate	Unlikely	Moderate

45. The proposed mitigation measures to prevent escape are as utilised by the company that will be providing the technology, Touchstone Snails. This technology is used in their operations in Cyprus and across several other countries. Experience shows that the low voltage electric fence ensures that the snails remain within the pans. Should the battery supply fail, a back up supply will kick in. Should the snails still escape from the pans, they will be contained within the greenhouse which is sealed off as described above. It is thus concluded that it is unlikely that the snails will in fact escape from the site with the containment measures in place. Operators will also be on site daily for over 12 hours carrying out inspections and maintenance as required to ensure that the containment measures remain efficient and effective.

46. The metal sheeting around the perimeter of the greenhouses further contains the interior and its contents, thus reducing the probability of escape.

47. The mitigation measures are considered unlikely to successfully contain the snails in the event of a severe earthquake although the likelihood of this event occurring remains unlikely.

48. In conclusion, as a result of the mitigation measures envisaged to be implemented, environmental risks from the Scheme are considered to have been reduced to low except in the unlikely event of a severe earthquake.

[4] Malta Resources Authority (2013) *Preliminary Flood Risk Assessment* http://mra.org.mt/wp-content/uploads/2013/06/Preliminary-Flood-Risk-Assessment.pdf.