

LOWER HARE INERT LANDFILL

Lower Hare Farm

CLOSURE & AFTERCARE MANAGEMENT PLAN

STATUS: FINAL MAY 2022

213189/CAP

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1.0 INTRODUCTION

Overview

- 1.1 This Closure & Aftercare Management Plan (CAP) describes the management and monitoring of the site once all waste deposit has been completed. The Plan has been developed in accordance with the standards of the Environment Agency (EA)¹. The Operator is GRS Stone Supplies Ltd.
- 1.2 The landfill operation includes:
- Import, of circa 700,000 tonnes of wastes for disposal or restoration; of this
 - Disposal in the land raise activities of circa 380,000 tonnes;
 - Construction Quality Assured geological separation layer of circa 150,000 tonnes; and
 - Placement of circa 170,000 tonnes of restoration soil.
- 1.3 The restoration soil profile is 1.25 m thick to ensure suitable agricultural depth and comprises the following:
- Subsoil of 950 mm thickness; overlain by;
 - Topsoil of 300 mm thickness (20 %).
- 1.4 The site will operate under a Bespoke Permit. The primary purpose of the site is to restore agricultural land using waste. The restoration may take up to 10 years.
- 1.5 The site operations will include the temporary storage and deposit of inert waste. The waste will be placed and compacted to allow restoration of the land to create an engineered feature for future agricultural land use in accordance with the Planning Permission. Construction of the geological liner, the restoration layer and parts of the final formation will utilise soils under a recovery activity.
- 1.6 The purpose of this plan is to outline the following:
- overview of the sensitivities at the site;
 - the closure and after care operations;
 - pollution control measures to be put in place on closure;
 - how the site will be managed and monitored during the subsequent aftercare phase;
 - a risk-based completion criteria which will show the site is in a satisfactory state for permit surrender.
- 1.7 This plan will be reviewed annually during the restoration works and at least every 4 years following cessation of all activities.

¹ Environmental Permitting Regulations: Landfill and deposit for recovery: aftercare and permit surrender (EA Guidance, March 2022)

2.0 RESTORATION PROFILE AND DRAINAGE

- 2.1 The site will be constructed in line with the approved permit drawings. The site will be progressively restored during the infilling. Once the waste has been placed to its final level it will be surveyed to ensure that it achieves the required stability. Following completion of the landfilling, the waste will be covered by a restoration soils layer as required in the restoration, to remove pathway into the waste, potential for erosion and to permit the seeding to occur as early as potential in the programme. The final seeding and planting is not detailed within this report.
- 2.2 The waste deposited at the site will be compacted to ensure that it is stable. The waste will be finished and compacted to 1.25 m below final restoration level. The site will be completed with 1.25 m of restoration soils comprising of subsoil (0.95 m thick) and top soil (0.3 m thickness each).
- 2.3 The restoration soils is a human health cap to prevent pathway to the underlying inert waste. The soil quality must be protective of the groundwater and human health. The combined environmental standards are presented in the Importation Protocol (213189/IP).
- 2.4 The restoration soils will be imported for direct placement. All restoration soils will be imported and placed directly or processed will be tested as per the Importation Protocol (213189/IP).
- 2.5 Following the placement of each material type, sub-soil and top soil will be lightly ripped to remove compaction. The operator will aim to minimise tracking over the soil surface. This is to reduce compaction. The topsoil will then be placed carefully over the restored materials.
- 2.6 Following the placement of each layer an inspection will be undertaken to ensure that all material complies with the specification and oversize and any observed detritus is removed.
- 2.7 The drainage design is presented in drawing 213189/PL/D/010.

3.0 STABILITY

- 3.1 The waste will be well compacted during placement and the land raise activities. No significant settlement is anticipated. Prior to the placement of the restoration soils the Construction Quality Assurance engineer will review the placed waste and associated testing results to ensure the design parameters are attained the risk of rotational slippage is minimised.
- 3.2 Following the completion of the restoration, a site inspection and topographical levels will be recorded at pre-determined locations, to ensure there are no signs of instability and that the waste mass is stable and not moving. The survey will be undertaken yearly for at least 2 years after definite closure. until the site is surrendered.
- 3.3 If the change in level is not statistically significant (the variance in the data is less than 5%), the Operator will present this to the Environment Agency for consideration and approval. The EA will normally agree that you do not need to carry out further topographic surveys if no significant change.

4.0 POLLUTION CONTROL INFRASTRUCTURE

Groundwater and leachate monitoring

- 4.1 During the landfilling, restoration and closure phases, monitoring of the groundwater will be undertaken at boundary on a routine basis. The frequency of each phase and the parameters are set out in Table 4.1.
- 4.2 The waste will be fully characterised through the importation process. No leachate monitoring at the site will occur following restoration.

Table 4.1 Groundwater monitoring		
Determinant	During landfilling	Post completion
Dissolved Organic Carbon	Quarterly	Quarterly for 2 years then TBC with the EA
Total Dissolved Solids		
Arsenic (total)		
Barium (total)		
Cadmium (total)		
Chromium (total)		
Copper (total)		
Mercury (inorganic)		
Nickel (total)		
Lead (total)		
Molybdenum (total)		
Antimony (total)		
Selenium (total)		
Zinc (total)		
Chloride (total)		
Fluoride (total)		
Sulphate (as SO ₄)		
Phenols (total)		
BTEX (TPH C5-C10)		
TPH Speciated (Aliphatic / Aromatic)		
PCB		
PAH Speciated 16		

- 4.3 The results will be assessed against the baseline values and appropriate agreed standards. In the unlikely event of a sustained deteriorating trend in the boreholes the Environment Agency will be notified and additional monitoring and remedial controls assessed.

Ground Gas monitoring

- 4.4 The existing site is currently an agricultural field. As such, no landfill gas monitoring has been undertaken prior to infilling. Perimeter gas monitoring has been undertaken and is presented in the Landfill Gas Risk Assessment. The potential for landfill gas to be generated in significant quantities, to pose a risk to nearby properties is considered very low.
- 4.5 During the construction of the site, in-waste monitoring will be installed into the waste deposit. The post restoration monitoring points will be installed at a frequency of circa 2 boreholes per hectare.
- 4.6 Ground gas monitoring will be in accordance with the Landfill Gas Risk Assessment.
- 4.7 Following 2 years of monitoring, the requirement for, and frequency of, ground gas monitoring will be agreed with the Environment Agency.

Surface water

- 4.8 Surface water monitoring will be undertaken on a quarterly basis at SW1, SW2, SW3 and SW4 (also noted as the only discharge point 'DISCHARGE 1'). The locations are shown in drawing 213189/D/008. The surface drainage and maintenance will be in accordance with the Detailed Drainage & Maintenance Strategy (submitted within the Operational Plan).

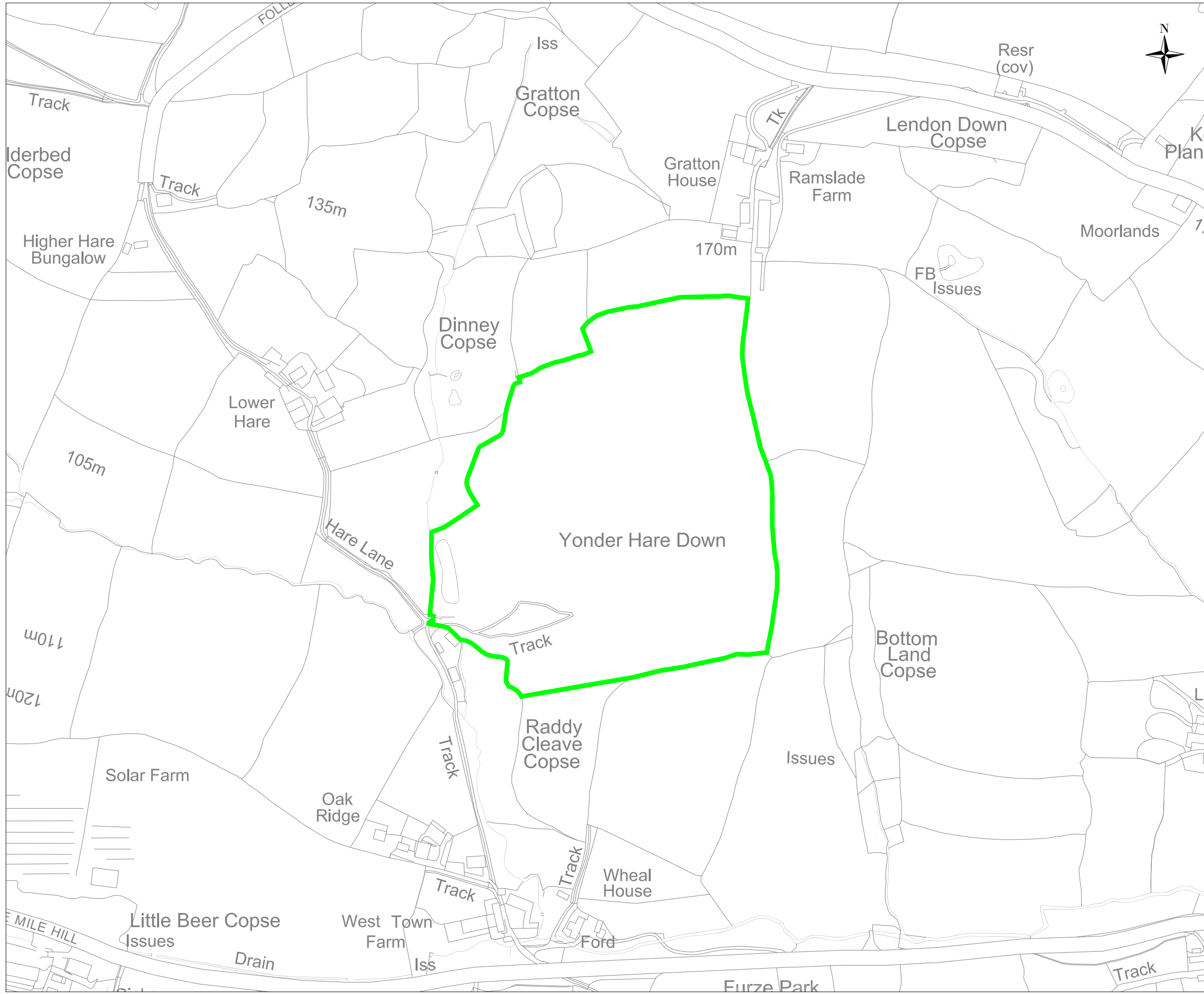
5.0 RISK ASSESSMENT

- 5.1 The post-restoration site has been assessed in the context of the baseline setting. The resulting matrix and associated mitigation is presented in Appendix A.


6.0 RECORDS

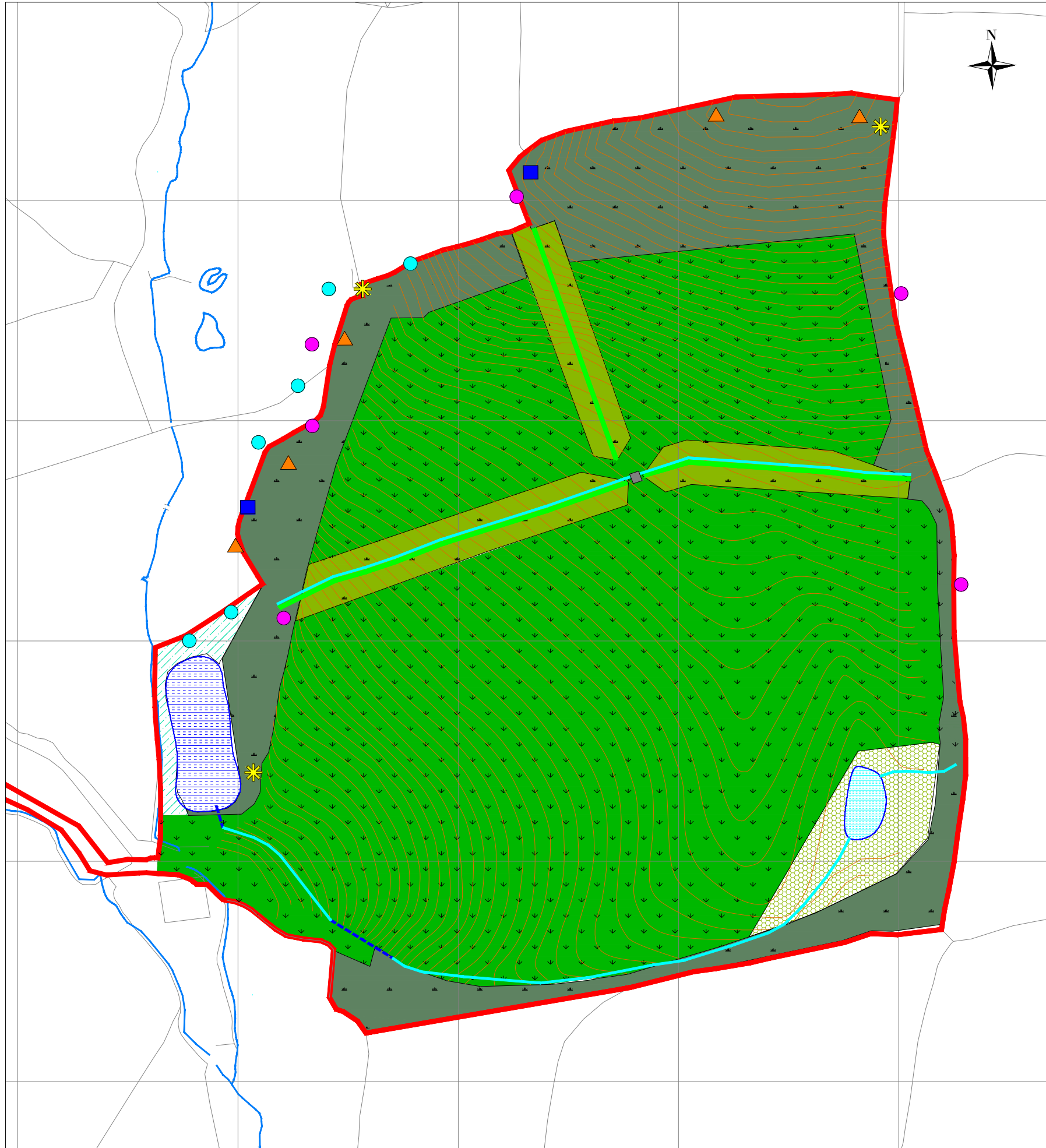
- 6.1 All records required by the Permit will be held by the Operator. The operator will keep all records relating to the site at the main office.
- 6.2 Following the completion of the restoration, all survey plans will be maintained and kept accessible.
- 6.3 A copy of the Permit, all management plans and the supporting documents, will be kept available on site for reference when required by all site staff carrying out work under the requirements of the Permit.
- 6.4 The CAP will be reviewed at least every four years. Other triggers for the review of the plan would include any proposed changes to the phasing of the landfill.

Drawings




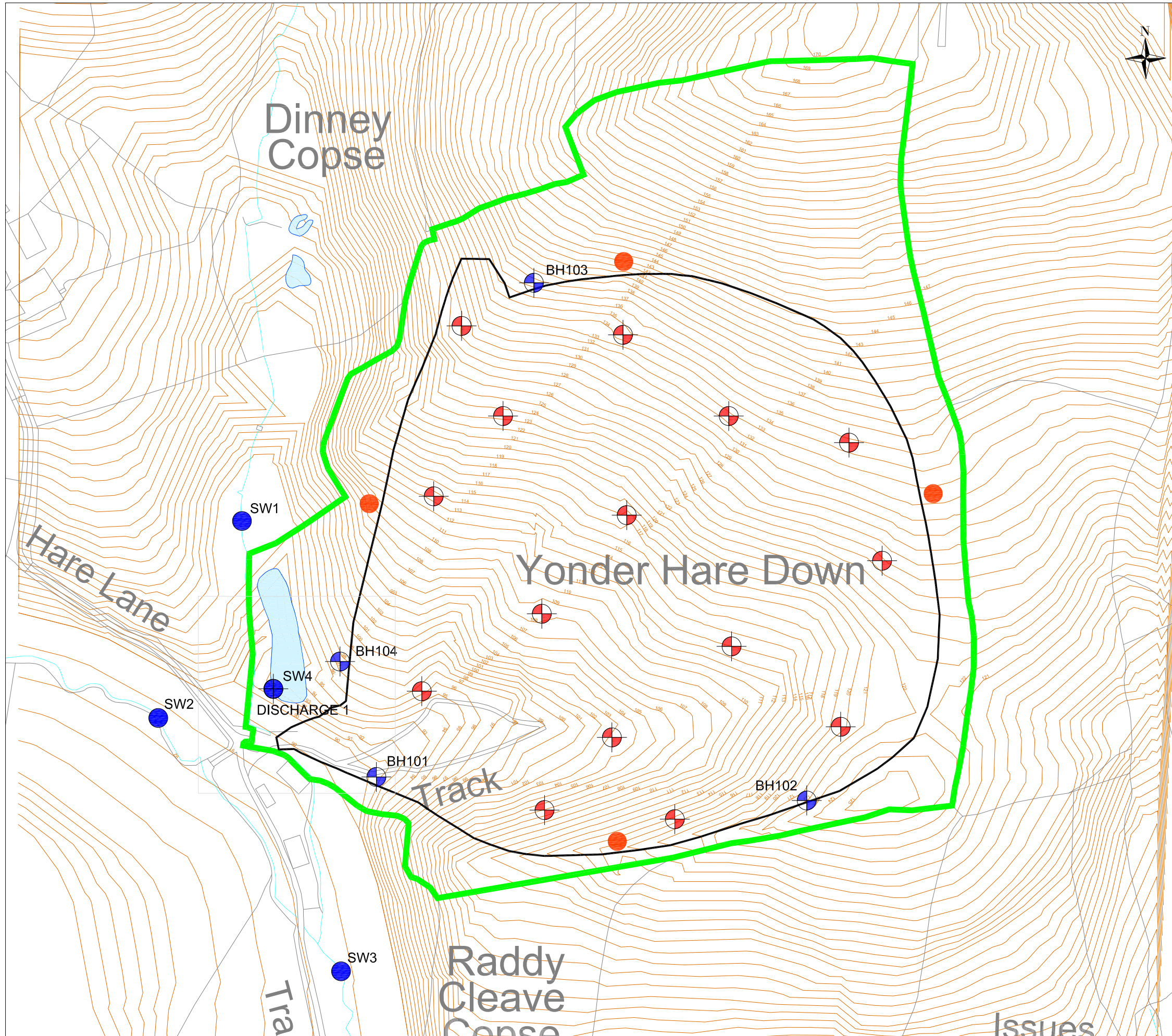
Key:
 Permit Site Boundary

Rev.	Details	Drawn	Date
		Chkd.	
Project 213189 Lower Hare Farm			
Title Permit Boundary Plan			
		AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T:(01235) 536042 F:(01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk	
Scale 1:4,000@A3	Date Nov'21	Drg. No. 213189/D/001	Rev.
Drawn KE	Chkd. EB		



- Key:**
- Site Boundary
 - Ground Level Contours
 - Headland (Lowland Meadow Habitat) Buffer Zone
 - Headland (Neutral Grassland Habitat) Buffer Zone
 - Restored Agricultural Fields
 - Lowland Meadow Habitat Buffer Zone (available from end of Phase 3)
 - Retained existing trees
 - Devon Hedgebank
 - Permanent Drainage Swale
 - Piped drainage section
 - Ecological Pond
 - Attenuation Pond
 - Culvert
 - Indicative Bat Box Location
 - Indicative Bird Box Location
 - ✱ Indicative Hibernacula Location
 - ▲ Indicative Log Piles Location
 - Indicative Insect Hotel Location

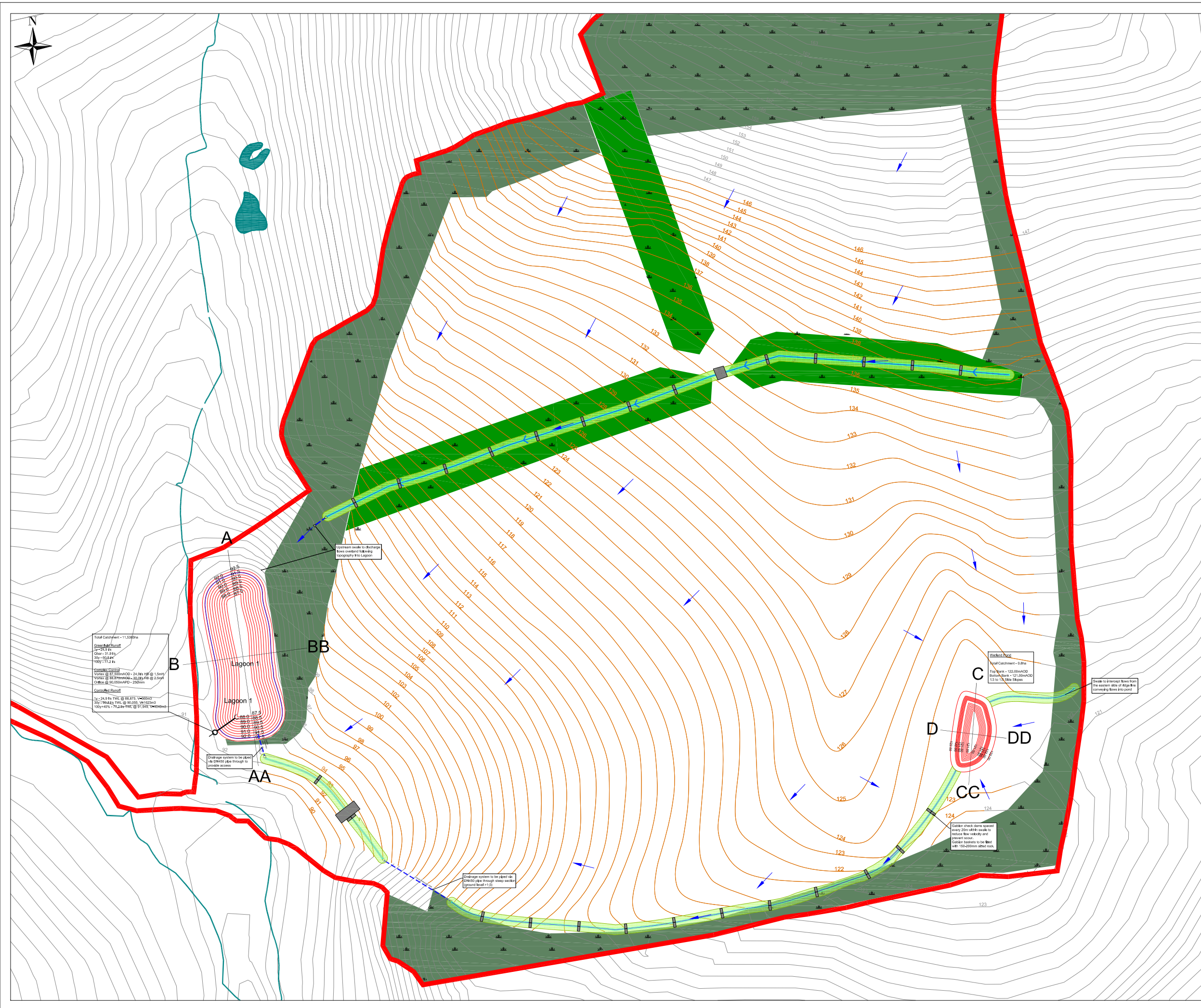
Rev.	Details	Drawn Chkd.	Date
Project 213189 Lower Hare Farm			
Title Restoration Plan			
		AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T: (01235) 536042 F: (01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk	
Scale 1:2,000@A3	Date Apr'22	Drawn KW	Chkd. ML
Drg. No. 213189/PL/D/007		Rev.	



- Key:
- Permit Site Boundary
 - Existing Ground Level (m AOD)
 - Extent of Earthworks
 - Groundwater Monitoring Boreholes
 - Surface Water Monitoring Location
 - Visual Dust Monitoring Location
 - Surface Water Pond
 - Surface Water Course
 - ⊙ Post in-waste gas monitoring locations

Surface Water Monitoring Point Coordinates		
ID	X	Y
SW1	285558	93422
SW2	285516	93313
SW3	285609	93184
SW4 (Discharge Point)	285574	93328

Rev.	Details	Drawn Chkd.	Date
Project 213189 Lower Hare Farm			
Title Monitoring Plan			
		AA Environmental Ltd Units 4-8 Cholswell Court Shippon Abingdon Oxon OX13 6HX T:(01235) 536042 F:(01235) 523849 info@aae-ltd.co.uk www.aae-ltd.co.uk	
Scale	Date	Drg. No.	Rev.
1:2,000@A3	May'22 Drawn KE Chkd. EB	213189/D/008	



- Key:**
- Site Boundary
 - Surface Water Features
 - Existing Topographical Level Contours (including contour changes for drainage lagoons) (m AOD)
 - Proposed Contours (mAOD)
 - Drainage Swale
 - Lagoon Topographical Level Contours (m AOD)
 - Lagoon Water Level Contours (m AOD)
 - Headwall to Manhole Drainage Outlets
 - Headland (Lowland Meadow Habitat) Buffer Zone
 - Headland (Neutral Grassland Habitat) Buffer Zone
 - Culvert
 - Drainage Flow

Lagoon Details		
ID	Water Level (mAOD)	Water Volume (m ³)
Lagoon 1	90.68	69
Wetland Pond	~121.5	~55

Total Catchment - 11,539sqm
 Slope of Swale
 S₁ = 2.5%
 S₂ = 2.5%
 S₃ = 2.5%
 S₄ = 2.5%
 S₅ = 2.5%
 S₆ = 2.5%
 S₇ = 2.5%
 S₈ = 2.5%
 S₉ = 2.5%
 S₁₀ = 2.5%

Lagoon 1
 Lagoon 1
 Lagoon 1

Wetland Pond
 Wetland Pond

Drainage system to be piped via 150mm dia pipe through steep section (ground level = 1.2)

Swale to intercept flow from the eastern side of slope and convey flow into pond

Checkers check stone spacing every 20m with 100mm gaps to reduce flow velocity and prevent scour. Checkers to be set with 150-200mm above soil.

Rev.	Details	Drawn	Date
		Chkd.	

Project
 213189
 Lower Hare Farm

Title
 Permanent Drainage Solution



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Scale	Date	Apr'22	Drg. No.	Rev.
1:1,500@A3	Drawn	KW	213189/PL/D/010	
	Chkd.	ML		

Appendix B
Risk Assessment

Hazard	Receptors	Harm	Pathway	Probability of Exposure	Consequence	Magnitude	Justification	Risk Management	Residual Risk
Odour	Residential within 210 m to the south and west. Priority habitat and public right of way within 50 m of the site.	Nuisance and loss of amenity value.	Atmospheric (fugitive). Air transport then inhalation.	Low	Medium	Medium	Waste types placed will predominantly be from construction sites and will not include odour generating wastes (putrescible waste).	Controls on the type of waste streams accepted. Waste will be capped by a 1.25 m thick restoration soils.	Very Low
Ground gas	Residential within 210 m to the south and west. Priority habitat and public right of way within 50 m of the site. The surrounding land is predominantly agricultural land.	Nuisance and loss of amenity value.	Atmospheric (fugitive). Air transport then inhalation.	Low	Medium	Medium	Waste types placed will predominantly be from construction and demolition activities and will not include odour generating wastes (putrescible waste).	Controls on the type of waste streams accepted. Waste will be capped by 1.25 m thick restoration soils. Monitoring will be undertaken in accordance with the CAP.	Low
Noise	Residential within 210 m to the south and west. Priority habitat and public right of way within 50 m of the site. The surrounding land is predominantly agricultural land.	Levels of noise that cause loss of amenity and nuisance to users and residents in the locale.	Airborne.	Low	Medium	Medium	Once finished levels have been achieved, all plant machinery will demobilise from the site.	No requirement for plant machinery once closed. Area restored to farmland / public open space.	Very Low
Dust	Residential within 210 m to the south and west.	Harm to human health, respiratory	Airborne then inhalation and/or deposition.	Low	Medium	Low	Once finished levels have been achieved, all plant machinery will	Seeding and vegetation will be undertaken to ensure no	Very Low

Hazard	Receptors	Harm	Pathway	Probability of Exposure	Consequence	Magnitude	Justification	Risk Management	Residual Risk
	Priority habitat and public right of way within 50 m of the site.	irritation and illness. Nuisance – deposition on cars.					demobilise from the site.	windblown mobilisation of fugitive dusts.	
Surface water run off	Ordinary watercourse to Alphin Brook. Underlying groundwater in bedrock geology.	Passive leaching to ground or existing land drains, from contamination or spillages on hardstanding surface and directly entering drainage system.	Land then surface water drainage systems.	Low	High	Medium	Proposed drainage will be in accordance with 213189/PL/D/010 Controls on the types of restored soils accepted.	Series of swales and an attenuation pond will be constructed to minimise overland flow and potential mobilisation of silts. All catchments will be vegetated to minimise erosion.	Low
Infiltration of surface water runoff to soakaway.	Potentially isolated and localised groundwater underlying site.	Pollution to aquifer.	Land infiltration through free draining sub soil and topsoil.	Medium	High	Low	Proposed drainage will be in accordance with 213189/PL/D/010. Controls on the types of restored soils accepted. Controls on the types of wastes accepted – not anticipated to generate leachate.	Series of swales and an attenuation pond will be constructed to minimise overland flow and potential mobilisation of silts. All catchments will be vegetated to minimise erosion. Monitoring to be in accordance with the CAP.	Low
Direct physical contact / exposure to waste deposit	Human health, fauna, and flora.	Bodily harm.	Direct contact.	Low	High	High	Inert waste will be capped by 1.25 m restoration soils. Breaking pathway between inert	Waste deposit will be human health capped by 1.25 m of restoration soils.	Low

Hazard	Receptors	Harm	Pathway	Probability of Exposure	Consequence	Magnitude	Justification	Risk Management	Residual Risk
							waste and agricultural practices.	Restoration soils will comply to Appendix A of the CAP and Restoration Plan.	
Loss of stability	Humans and livestock.	Bodily harm to humans or livestock. Loss or damage of geological strata.	Slippage of waste and restoration soils mass.	Low	High	High	All waste and restored soils will be compacted upon placement to minimise void space.	Once placed and compacted, the areas will be seeded / vegetated as soon as practically possible. A topographical survey will be undertaken every year (subject to EA review) before surrender to monitor mass movement.	Low

