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MORETON C CULLIMORE (GRAVELS) LIMITED

**LAND AT BOW FARM
RIPPLE
WORCESTERSHIRE**

**DETAILED RESTORATION AND AFTERCARE PROPOSALS AND
LANDSCAPE AND ECOLOGICAL MANAGEMENT PLAN**

**CONDITIONS 44, 54 AND 58
PLANNING PERMISSION 19/000048/CM**

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RTPI

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CONTENTS:

1. INTRODUCTION.....	5
Scope.....	5
Description of the Site and Surroundings	5
County Landscape Character (Worcestershire)	6
Compliance with Landscape Character Objectives	7
Compliance with Emerging Policy	7
County Landscape Character (Gloucestershire).....	8
2. AIMS AND OBJECTIVES.....	9
General.....	9
Overall Objectives	9
3. DETAILED RESTORATION PROPOSALS	11
General.....	11
Handling of Materials.....	11
Timing of Works	12
Arboriculture.....	12
4. AFTERCARE SCHEME	14
General.....	14
Commencement of Aftercare	14
Annual Monitoring	14
Weed Control	14
Replacement Planting	15
5. MANAGEMENT CATEGORIES AND MANAGEMENT FEATURES WITHIN THE SITE	16
General.....	16
6. AGRICULTURAL LAND.....	17
7. PROPOSED NATIVE HEDGEROW PLANTING.....	20
8. PROPOSED WET GRASSLAND AND SCRUB.....	22
9. PROPOSED DECIDUOUS WOODLAND.....	25
10. EXISTING HEDGEROWS	27
11. PROPOSED LAKE.....	28
12. FORMER SILT LAGOONS	29
13. RETAINED DRAINAGE BASIN	30
14. RETAINED INTERCEPTOR DITCH	31
15. EXISTING WATERCOURSES	32
16. ARABLE FIELD MARGINS	33
17. OPEN WATER AND SCRUB.....	35

18. WETLAND GRASS AND SCRAPES.....37

19. GRASS AND SCRUB.....38

20. OTHER FEATURES.....39

Figures:

2636-4-4-2-1-DR-0001-S4-P5 Proposed Management Categories

Appendices:

1. Planting Schedules

1. INTRODUCTION

- 1.1 This LEMP has been prepared to demonstrate how Moreton C Cullimore (Gravels) Limited will protect the retained habitats on site from damage and disturbance during operations and promote landscape and biodiversity net gains as a result of the approved quarry operations at Bow Farm, near Ripple, Worcestershire
- 1.2 The LEMP has been produced in response to conditions 44, 54 and 58 of planning permission 19/000048/CM, relating to land within Worcestershire and conditions 46 and 58 of appeal permission APP/T1600/W/23/3324695, relating to land within Gloucestershire. The principles established by this LEMP have largely been agreed through extensive consultation with County Ecologists from Worcestershire County Council (WCC) and Gloucestershire County Council (GCC). Minor revisions have however been made to address final comments made by WCC's County Ecologist, dated 21 February 2022.
- 1.3 A Landscape and Visual Impact Assessment for the proposed development was submitted by DJA in November 2019 as part of the Environmental Statement (application references 19/000048/CM and 19/0081/TWMAJM for Worcestershire and Gloucestershire MPAs respectively). Landscape and Visual analysis for the assessment was based on field work undertaken during December 2018 and February 2019.

Scope

- 1.4 This detailed restoration and aftercare scheme, incorporating a LEMP, will:
- i. Set out the overall objectives for the site restoration
 - ii. Identify how existing habitats and species will be protected during operations
 - iii. Describe how proposed restoration and aftercare will be achieved
 - iv. Identify and set out for each management category:
 - a. Specific restoration objectives;
 - b. The current land use and present conditions within each compartment;
 - c. A programme of restoration and aftercare operations required in order to achieve the restoration objectives; and
 - d. Identify, where appropriate, the intended extent structure and composition targets of habitats.

Description of the Site and Surroundings

- 1.5 The approved site straddles the administrative boundaries of Worcestershire and Gloucestershire and is located approximately 0.5km southwest of Ripple, approximately 1.7km west of Twyning and 3km north-west of Tewkesbury and is centered on National Grid Reference (NGR) SO 87955, 36163.
- 1.6 The site is irregularly shaped and comprises a combination of arable and pastoral land to the south of the M50 Motorway and to the west of Bow Lane. The River Severn lies to the west. The approved site boundary is defined by a combination of hedgerows and by narrow belts of deciduous woodland, except for the southern boundary of the proposed processing area and connecting haul road which have no physical definition.
- 1.7 The site comprises a total of ten complete fields defined by hedgerows and portions of a further three fields. Fields sizes vary, with the largest field occupying the northernmost portion of the site. Field sizes reduce towards the south and south-west where their boundaries are defined by heavily treed hedgerows frequently containing willow pollard. Locally, sections of hedgerow have become fragmented and occasionally depleted.

- 1.8 The site is low-lying and slopes east-west and ranges from ~12m AOD on its eastern boundary adjacent to the A38 to ~8m AOD on its western boundary adjacent to the River Severn.
- 1.9 An Ecological Impact Assessment (EclA) was undertaken by DJA in November 2019. The following principle habitat types were identified:
- Semi Natural Woodland;
 - Plantation Woodland;
 - Scattered scrub;
 - Semi-improved neutral grassland;
 - Marshy grassland;
 - Tall ruderal vegetation;
 - Swamp;
 - Marginal vegetation;
 - Standing water;
 - Running water; and
 - Arable farmland.
- 1.10 At a local level landscape features of potential interest to the casual observer identified as part of the field survey include pockets and belts of woodland on the rising land to the east of the site to the western edge of Puckrup Hall Hotel. The upper elements of the Bow Farm complex provide some interest in views towards the south. Some localised distant views reveal the eastern edge of the Cotswold escarpment; Bredon Hill, cloaked in deciduous woodland, forms a prominent landscape feature on the distant skyline towards the east.
- 1.11 The gently undulating landscape towards the west and south-west reveals few landscape features of note, except for the presence of areas of mixed and deciduous woodland and occasional nucleated farmsteads and agricultural buildings on the north-eastern and eastern facing slopes in the vicinity of Bredon School, Bushley, and Bushley Green.
- 1.12 Overhead power lines and associated telegraph poles which traverse the application site's northernmost field are notable detracting features in the landscape, together with the M50 motorway and associated infrastructure and signage which are exhibited in local and mid-range views from the site.
- 1.13 At a local level, the River Severn channel and associated marginal deciduous treelines provide contrasting linear features within the landscape.
- County Landscape Character (Worcestershire)**
- 1.14 The central portion of the site and most of the extraction area are located within the *Settled Farmlands on River Terraces* LCT, whilst the western portion is located within the *Riverside Meadows* LCT. The eastern portion of the site including the site access road is located within the *Principal Settled Farmlands* LCT.

- 1.15 The site falls within LDU 33.11 - *River Severn – Uckinghall* within the *Riverside Meadows* LCT. This LDU follows the course of and includes the River Severn channel and its floodplain from Ripple, crossing the county boundary into Gloucestershire towards the northern edge of Tewkesbury.
- 1.16 The western edge of the site falls within the *Principal Settled Farmlands* LCT which extends to the south-west from Baughton Hill to the northern edge of the Mythe Water Treatment Works to the north of Tewkesbury and includes the settlements of Hill End, Twyning, Church End and Shuthonger together with much of the south-eastern facing slopes and floodplain on the western edge of the River Avon.
- 1.17 The site forms part of LDU MW71.1 – *Twyning Principal Settled Farmlands (located in Gloucestershire)* which forms the southern portion of the *Principal Settled Farmlands* Landscape Type and extends to the south-west from the convergence of the M5 and M50 to the eastern edge of the River Severn to the north of Tewkesbury.

Compliance with Landscape Character Objectives

- 1.18 The restoration of the site is consistent with and contributes to the following landscape character objectives contained in the Worcestershire Landscape Character Assessment:

Settled Farmlands on River Terraces LCT

- *conserve and enhance patterns of hedgerows.*

Riverside Meadows LCT

- *conserve existing wetland habitats and seek opportunities for further wetland habitat creation;*
- *seek to retain the unity of the linear form of these landscapes;*
- *seek opportunities to encourage the conversion of arable land back to arable; and*
- *explore opportunities to return to patterns and processes of natural flooding cycles where feasible.*

Principal Settled Farmlands LCT

- *conserve and enhance the pattern of hedgerows; and*
- *conserve and enhance tree cover along watercourses.*

Compliance with Emerging Policy

- 1.19 The restoration scheme is partially consistent Policy MLP5: *Lower Severn Strategic Corridor* of the emerging Worcestershire Minerals Local Plan states:

“Planning permission will be granted for mineral development within the Lower Severn Strategic Corridor that contributes towards the quality, character and distinctiveness of the corridor through the delivery and enhancement of green infrastructure networks.

A level of technical assessment appropriate to the proposed development will be required to demonstrate how, throughout its lifetime, the development will optimise opportunities to deliver the following green infrastructure priorities for the Lower Severn Strategic Corridor:

a.) *create wetland features such as fen and marsh, wet grassland, reedbed and lowland meadows during both working phases and as part of restoration and after-use, including where the following characteristic agricultural land uses are incorporated:*

- *cropping and horticulture in the Settled Farmlands on River Terraces landscape type;*
- *pastoral land use in the Riverside Meadows and Wet Pasture Meadows landscape types;*

b.) *conserve, enhance and restore characteristic hedgerow patterns and tree cover along watercourses and streamlines;*

c.) *create accessible semi-natural green space, incorporating information or routes which increase the legibility and understanding of the geodiversity, heritage and character of the area..."*

County Landscape Character (Gloucestershire)

- 1.20 The site is predominantly located within the *Low Hills and Commons* LCT which occupies a relatively small area between the county boundary and the northern fringes of Tewkesbury. The *Twynning Hills* Landscape Character Area is the only landscape character area associated with the *Low Commons and Hills* LCT.
- 1.21 A very small portion of the southern boundary of the site falls within the *Riverside Meadows* LCT. This LCT comprises three separate character types which are located in the northern extremities of the county adjacent to the River Severn beyond Tewkesbury. The site is located within the *Mythe Meadows* Landscape Character Area (SV4B) within the *Riverside Meadows* Landscape Character Type.
- 1.22 The site is located within the *Mythe Meadows* Landscape Character Area (SV4B) within the *Riverside Meadows* Landscape Character Type.

2. AIMS AND OBJECTIVES

General

2.1 The over-arching aim of the restoration proposals is to protect and enhance habitats, and to maintain biodiversity and to introduce and enhance biodiversity and nature conservation. The following key principles developed by Natural England have provided the basis for scheme design and its long-term management:

- Maintain and enhance existing habitats types and the links between those habitats;
- Provide optimal conditions for key wildlife species found within the site and the local landscape, thereby boosting effective populations and likelihood of their expansion; and
- Increase the extent of key habitat by creation, restoration or management to reduce the likelihood of local species extinction.

2.2 The methodologies to establish and manage restored habitats will incorporate best practice guidance including from Nature After Minerals (www.afterminerals.com), which is led by the RSPB and supported by Natural England, the Mineral Products Association and the British Aggregates Association.

Overall Objectives

2.3 The overall objectives of the site restoration centre on the assimilation of the restored landform into the surrounding landscape and enhancing habitats appropriate to the context of its wider setting.

2.4 Specific objectives in relation to landscape and ecology are outlined below.

Landscape Objectives:

- Introduce structural planting that reflects the best and most characteristic elements of the local landscape;
- Return the site to its existing use at the earliest opportunity in order to reduce the visual presence of the extraction activities;
- Ensure that the nature conservation interest within the site is managed to maximise ecological benefits; and
- Ensure the restoration scheme and its on-going management respects the local landscape character.

Ecological Objectives:

2.5 The main ecological objective of habitat creation and management during the first 1-5 years after the restoration of each discrete quarry phase is to ensure the successful establishment of the different habitat types as set out in Section 1. Longer-term objectives deal mainly with maintaining a species- and structurally-diverse, robust and maturing habitat mosaic for the benefit of a wide range of wildlife. The key ecological aims of the restoration management scheme are therefore to:

2.6 Establish and to ensure the survival of newly created or restored habitats and plants:

- Encourage a more diverse and species-rich environment using appropriate management techniques; enhance and strengthen connectivity between existing and restored habitats and the wider landscape;
- Enhance biodiversity within the restored areas through the creation and management of an appropriate mix of habitats including hedgerows, scrub, wet and dry grassland, permanent and

ephemeral water features to enhance the site for a range of wildlife including invertebrates, amphibians, reptiles, birds (including waterfowl) and mammals (including bats); and

- Control threats to biodiversity by suppressing/eradicating more vigorous and less desirable (i.e. non-native or invasive species) plant species.

3. DETAILED RESTORATION PROPOSALS

General

- 3.1 The detailed restoration proposals for the site are shown on **Drawing 2636-4-4-2-1** provided in **Figure 1**. Please refer to the Soil Handling Strategy for further details on the existing soil resources and the proposed restoration profiles and inferred volumes.
- 3.2 Restoration of the site would take place progressively as mineral extraction advances through the application site. The proposed restoration scheme is characterised by two distinct strands: (1) return of the land to pre-extraction levels and retention of high-grade agricultural land; and (2) significant biodiversity and nature conservation gain.
- 3.3 In order to achieve a beneficial agricultural afteruse, it is necessary to return the land through Phases 1 - 9 back to pre-extraction levels. This will be achieved through a combination of site derived soils and overburden and the import of approximately 1.4 million tonnes of inert material throughout the life of the development.
- 3.4 As restoration progresses, restored areas of land will enter into aftercare to be reinstated to agriculture at the earliest opportunity. Soils will be handled in accordance with the site's Soil Handling Strategy to avoid degradation of the existing soil resource operation. It will not be necessary to import topsoil for restoration.
- 3.5 Compared to the current baseline, the proposed restoration would result in the replacement of over 29.7 hectares of agricultural land with significant biodiversity and nature conservation gain. This would largely be directed towards the flexible working areas A and B, adjacent to the River Severn.
- 3.6 The nature conservation area would comprise a mosaic of wetland grassland, scrapes and shallows, woodland and open water.
- 3.7 Following the completion of mineral extraction operations, the plant site and internal haul routes would be removed and largely returned to agriculture. The silt settlement and clean water lagoons would be retained as wetland features. This would comprise a combination of reedbed planting and natural regeneration. The site access would be retained to provide long-term agricultural access into the site.

Handling of Materials

- 3.8 All soil handling operations will be carried out in accordance with the guidance set out within the '*Good Practice Guide for Handling Soils*' produced by MAFF (now DEFRA). Refer to the Soil Handling Strategy provided as part of the application.

Secondary Treatments

- 3.9 The requirement for secondary treatments will be reviewed towards the end of the first year of aftercare.
- 3.10 During this period any area of the site affected by settlement hollows shall be regraded to resolve the problem by filling the depression to the permitted restoration contours with suitable soils, to a specification to be agreed at the annual aftercare meetings.
- 3.11 During this period any areas of poor drainage will be assessed by recording any areas of standing water during winter with possible remedies to be moling, subsoiling or installation of land drainage subject to severity. The requirement and specification for any land drainage will be subject to review and agreement at the annual aftercare meetings.

- 3.12 For the agricultural areas, land drainage will be installed if excessive soil wetness is affecting seed germination, root development and/or the range of agricultural crops that would typically be expected to be grown in the locality. It will also be installed if soil wetness is impacting the ability to traffic the land with farm machinery at appropriate times. A drainage plan would be designed by a qualified agricultural drainage expert.
- 3.13 Consultation with the Mineral Planning Authority will be undertaken in advance of any land drainage installation to agree the scheme design, timing of installation works within the aftercare programme and to agree any temporary drainage measures e.g. temporary drainage grips/ditches.

Timing of Works

Arboriculture

- 3.14 Tree and hedgerow protection measures are identified in the arboricultural report (ref T_MEA125-01, prepared by Mullholland Land Ecology and Arboriculture which accompanies the application. All trees and hedgerows unaffected by the proposed development will be protected in accordance with BS5837:2012 *Trees in Relation to Design, Demolition and Construction*.
- 3.15 Where tree surgery is planned as part of this management plan or in the event that remedial works for health and safety reasons are required, the potential for bats to be present must be assessed prior to the works being carried out. Except for in exceptional circumstances (e.g. after damage by high winds), tree works will be carried out between the months of November-February, outside of the bird nesting season. Identification of features such as rot holes, split limbs or loose bark could be undertaken by an arboriculturalist prior to any tree works in the first instance with subsequent assessment and survey works by a suitably qualified ecologist as appropriate.
- 3.16 If the timber to be felled exceeds 5m³ in any one year, a Felling License will be sought from the Forestry Commission in advance of any tree works.
- 3.17 The structural integrity of all trees will be monitored on an ongoing basis. Appropriate and timely action will be taken to manage risks. Ash trees will be identified and monitored to assess ash dieback and appropriate action taken. Inspections of trees will be carried out by a qualified and competent arboricultural professional with the relevant expertise and qualifications to assess trees and recommend the appropriate course of action. Tree inspections will take place during the winter to allow for the assessment of trees with the absence of foliage.

Breeding Birds

- 3.18 All bird nests, eggs and young are protected under the Wildlife & Countryside Act 1981 (as amended) which makes it illegal to intentionally take, damage or destroy the nest of any wild bird while it is in use or being built. Therefore, preferably no removal of trees, scrub, hedgerows, grassland should take place between 1st March and 31st August inclusive to prevent committing an offence under the Wildlife & Countryside Act 1981 (as amended).
- 3.19 If this option is not feasible and some or all of the site / vegetation clearance has to go ahead within the bird breeding season, as defined above, then the following action will be taken:
- A nesting bird inspection immediately prior to (maximum of 2 days in advance of) the commencement of work as described above will be undertaken. If nesting birds or birds constructing a nest are subsequently identified to be present work in that area must cease until the nest is clear.

- 3.20 Regardless of timing of work or results of previous surveys, if nesting birds are found within the site during any part of the demolition/construction phase then work should stop and a qualified ecologist consulted.
- 3.21 Any ground cultivation works (e.g. harrowing/ plugging) will ideally be done before March or after the end of July to avoid possible disturbance to ground-nesting birds. If ground cultivations are required during this period an inspection will be undertaken by a suitably qualified person to determine if any ground nesting birds are present. Operations will only commence if the area is clear of nests or appropriate mitigation/ safeguarding measures are in place as directed by a qualified ecologist.

Wild Mammals

- 3.22 All wild mammals are protected from unnecessary suffering, including suffocation in burrows. Where common mammals such as hedgehogs, rabbits, foxes, voles and mice are encountered during maintenance works, they should be allowed to safely escape the working area to avoid unnecessary cruelty. Should any burrows be located in the vicinity of intrusive earthworks, ecological advice should be sought to determine which species is present and what measures can be taken to avoid any unnecessary suffering to mammals.
- 3.23 The worked quarry areas will be appropriately profiled or created with an access route (i.e. haulage road or ramp) connecting the floor of the quarry to the existing ground level to allow animals to move freely in and out of the excavated area.
- 3.24 Any other excavations within or outside the worked quarry areas will be appropriately profiled, installed with an escape ramp, covered or back-filled at the end of the working day to avoid entrapment and/or accidental injury/mortality to badgers and other mammals foraging through the site.
- 3.25 In accordance with the methods set out in the EclA, a suitably qualified ecologist will provide an overseeing role (Ecological Clerk of Works) for the proposed quarry operation to ensure ecological mitigation and enhancement requirements are implemented appropriately, as well as providing ad hoc ecological advice for the duration of the quarry operation.

4. AFTERCARE SCHEME

General

- 4.1 The objectives of this aftercare plan are to ensure that all of the proposed planting, as well as the retained trees, hedgerows and agricultural land, are managed appropriately during the 10-year establishment period to ensure that these features achieve the objectives outlined in Section 3 above.
- 4.2 The existing perimeter woodland and hedgerows are also covered by the aftercare plan to ensure that the current level of visual screening to the proposed mineral extraction works is maintained throughout the duration of operations.
- 4.3 All materials, operations, workmanship and quality should be carried out in accordance with relevant industry regulations, British Standards, HSE standards or appropriate code of practice.

Commencement of Aftercare

- 4.4 Immediately following the placement of restoration soils with any management area, the company will inform the Mineral Planning Authority of the completion of the restoration landform in that specific area and give prior notice of the commencement of planting and seeding operations (where applicable). The programme of aftercare would operate for a period of 10 years following the completion of the planting and seeding works.

Annual Monitoring

- 4.5 Before 1st September every year during the aftercare period, a detailed annual aftercare review and programme shall be submitted in writing to the Mineral Planning Authority. This shall include:
- Proposals (for the forthcoming 12 months) for managing the land in accordance with the management objectives for the land;
 - A record of aftercare operations carried out on the land during the previous 12 months; and
 - Records of species and habitats on the site during the previous 12 months.
- 4.6 Aftercare Monitoring Reports will address:
- Vegetation and habitat establishment;
 - Extent of restoration surface erosion;
 - Effective management of vegetation;
 - Control of undesirable/invasive plant species;
 - Condition of retained trees;
 - Remedial actions undertaken or required to restore any defects; and
 - Overall adherence to the management plan
- 4.7 Standard NVC monitoring will be taken in each habitat type in years 1, 3, 5 and 10.
- 4.8 In accordance with the requirement of Condition 58, a Restoration Working Group (RWG) will be formed and will meet annually, preferably in March. The RWG will ideally comprise the following:

- Mineral Planning Authority Ecologist;
- Operator; and
- Contractor working on behalf of the Operator.

Weed Control

- 4.9 All undisturbed areas of the site and all temporary soil and overburden mounds used in the restoration of the site shall be kept free from noxious or invasive weeds. Cutting and removal will be undertaken in the first instance prior to seeding to control plant growth and to prevent the production of seed and the subsequent spread of weeds into adjoining agricultural land.
- 4.10 As a last resort, remaining weeds will be spot treated with a chemical spray approved by Natural England and the Environment Agency as suitable for use on weeds in or near waterbodies and as recommended by a BASIS qualified advisor. Application of chemical spray will be carried out by a suitably qualified operative, under appropriate weather conditions.

Replacement Planting

- 4.11 All trees, shrubs and hedgerows as shown on accompanying **Drawing 2636-4-4-2-1** provided in **Figure 1**, shall be maintained. Any plants which die at any time during the development or aftercare period, are removed or become seriously damaged or diseased shall be replaced in the next planting season with others of a similar size and species.
- 4.12 Prior to undertaking replacement planting, the likely cause of loss will be assessed to allow for an adjustment of species or specification. Replacement planting will be undertaken in the first available growing season unless otherwise stated by the Mineral Planning Authority and will match the species and specification lost.

Watering

- 4.13 Planting will be watered during the establishment period at the frequency necessary to ensure establishment and survival. Plant materials shall be watered immediately after planting.
- 4.14 During the establishment period, all trees are to be monitored for signs of die back and dehydration. During the establishment period additional watering may be required in periods of drought/dry weather to ensure plant survival. After 10 continuous days without rain during the growing season the trees shall be watered twice a week as above.

5. MANAGEMENT CATEGORIES AND MANAGEMENT FEATURES WITHIN THE SITE

General

- 5.1 Based on the detailed restoration proposals for the site shown on **Figure 1**, fifteen management categories have been identified within the Bow Farm site. These are listed below in Table 5.1.

Table 5.1 Bow Farm Management Categories and Management Features

MANAGEMENT CATEGORY	MANAGEMENT FEATURES (See Drawing 2636-4-4-3 S4 P1)
Reinstated Arable Farmland	A1 to A4
Proposed Native Hedgerow	H1 to H3
Proposed Wet Grassland and Scrub	WG1 to WG3
Proposed Deciduous Woodland	PW1 to PW3
Existing Hedgerow	H4 to H9
Proposed Lake	PL1
Former Silt Lagoons	FSL1-FSL4
Retained Drainage Basin	RDB1
Retained Interceptor Ditch	RID1
Existing watercourses	EW1 to EW2
Arable field margins	FM1 to FM2
Open Water and Scrub	OWS1
Wet Grassland and Scrapes	WGSc1
Wet Grassland and Scrub	WGS1
Proposed Waterbodies	WB 1-2

- 5.2 The fifteen management categories have been subcategorised, where appropriate, into 'individual management features' (e.g. the Proposed Native Hedgerow management category has been subdivided into H1, H2 and H3 to represent the four lengths of proposed new hedgerow planting within the site).
- 5.3 The individual management feature references are shown on plan **2636-4-4-3 S4 P1** and are designed to assist with the management and monitoring of the site during the aftercare period.
- 5.4 Sections six to nineteen below cover the aftercare operations for the ten management categories identified for the site.
- 5.5 For each management category there is a clear description of the desired state for each habitat which reflects the overall restoration objectives for the site identified in Section 2. The individual management categories include a set of aftercare 'targets' to assist in determining whether or not the objectives of the plan are being met and also allow progress to be monitored.

6. AGRICULTURAL LAND

Intended Purpose/Function of Aftercare Operations

6.1 Agricultural Improvement

Current Condition

6.2 Area A1 to A4 currently comprise fields under able cultivation.

Restoration Objective and Aftercare Targets

6.3 The restoration objective for areas A1 to A4 focuses on returning the former areas of extraction to high grade agricultural land over the management period. Specific aftercare targets relating to the extent and condition of the reinstated farmland are outlined below.

Extent: Establish the proposed extent of 30.0ha of conventional arable farmland within area A1-A4.

Condition: Restored soils achieve loosening equivalent to a single pass at a tine spacing of 500mm or closer; the restored arable land is in a condition in which it does not need to be treated differently from nearby undisturbed land in the same use; and achieve a viable crop from year 4 onwards.

Establishment of Seedbed

6.4 If seeding works are carried out soon after completion of soil replacement operations, secondary ground preparation works will not be necessary as a tilth suitable for seeding will already have been formed.

6.5 In order to reduce the weed seed bank within the replaced soils, if timings allow, a 'stale seedbed' will be established. This will allow a flush of weed seed germination from within the existing soil resource which can then be cleared to produce a cleaned 'stale' seedbed with a reduced weed seed burden on the establishment of the reinstated areas of farmland.

6.6 Following removal of remnant vegetation, the land would be cultivated by a disc or power harrowing to produce a suitable seedbed about 100mm in depth. Stones greater than 100mm will have already been removed as part of the soil replacement operation described within section 3 above.

6.7 Soil analysis will be carried out in years 1 and 4, or more frequently if the soil nutrient index is very low. Soil samples will be taken and analysed for major plant nutrients P, K and Mg, and the pH determined. Fertiliser may be incorporated in the seed bed during cultivations, depending on seasonal conditions and results of the soil analysis.

Programme of Agricultural Aftercare

6.8 The programme of aftercare would operate for a period of five years following the sowing of the first aftercare crop.

6.9 For the initial crop and each subsequent change of crop, the site operator would supply details as set out below. If required by either party, a site meeting would be held between the site operator and the Mineral Planning Authority and their advisors to review progress and to reach agreement on future cropping provisions.

- 6.10 The information to be supplied to the Mineral Planning Authority by the company for the initial crop and for each subsequent crop shall be approved prior to the commencement of operations and shall include:
- The proposed crop, variety (or mixture) and seed rate.
 - The results of soil analyses carried out on representative samples in order to determine the pH, P, K and Mg content of the soil.
 - Fertiliser recommendations for the proposed crop based on soil analyses.
 - The cultivational operations necessary to prepare the restored land for cropping.
- 6.11 The company or their agents would undertake:
- Such operations as are necessary to prepare a seed bed, to apply fertilisers as appropriate and sow the proposed crop according to the specifications supplied.
 - All other operations as may be necessary (e.g. application of herbicides, fungicides and growth regulators).
 - At the end of each year's cropping the company would supply the following information:
 - The procedure whereby the seed bed was prepared (except if the crop was a continuation of a grass ley).
 - Amounts and kinds of fertiliser and top dressing applied
 - Amounts and kinds of herbicides used.
 - Details of any other treatments used (e.g. growth regulators)
 - Yields achieved.

Year 1

- 6.12 A grass crop (not a root crop) will be established as the first aftercare crop. Grass seeding will be carried out at an appropriate seed rate. Seeding will be carried out either during March-April or August – September.
- 6.13 The grass crop will be utilised as forage, probably hay, and, if practical, light grazing may follow, depending on the levels of seasonal re-growth. If a wet spell is anticipated post hay time, 50kg/ha of nitrogen fertilizer may be applied to boost re-growth. Light grazing will only take place at suitable low stocking densities, with appropriate livestock, when ground conditions are dry, to avoid damage to soil structure by poaching.
- 6.14 If growth and development of the crop is found to be suffering adverse effects from compaction of soils, suitable remedial measures will be taken.
- 6.15 Any grassland weeds causing a significant problem will be controlled by suitable mechanical means (or chemical methods as a last resort as described above) during the aftercare period.
- 6.16 A decision on the second year's aftercare cropping will be taken following the harvesting of the grass crop.

Year 2

- 6.17 In the case of a grass crop, spring work would include grass harrowing and flat rolling followed by an application of suitable fertiliser compound; e.g. 25:5:5, at an appropriate spreading rate. These operations would only take place when soils are suitably dry to allow vehicles to traffic them without damage to the soil structure.
- 6.18 Where a silage or hay conservation cut is planned, fertiliser may be applied at a higher rate, with a further application following the conservation cut. It also may be applied following any subsequent cut in the case of silage, using compounds with appropriate plant food ratios for the crops concerned.
- 6.19 Conservation cuts would occur in May in the case of silage and June for hay. The grass crop will then be ploughed or destroyed by spraying and a winter crop established. Any spraying-off of vegetation or cultivation works will be done after the end of July to avoid possible disturbance to ground-nesting birds. If cultivations are required prior to the end of July an inspection will be undertaken by a suitably qualified person to determine if any ground nesting birds are present. Operations will only commence if the area is clear of nests or if an appropriate mitigation safeguarding strategy is in place as advised by the Site's ECoW.
- 6.20 Cultivations will be carried out to establish a seed bed suitable for winter cereal. Fertiliser and spray applications will be tailored to suit the chosen arable crop and carried out at appropriate times during the growing season.

Years 3 - 5

- 6.21 Fertiliser and spray applications will be tailored to suit the chosen arable crop and carried out at appropriate times during the growing season.
- 6.22 Any problem weeds in the crops on the restored land will be controlled in the first instance by mechanical means with the application of the appropriate chemical weedkillers as a last resort to control serious infestations of perennial weeds, as advised by a BASIS qualified advisor. Application will be undertaken by a suitably qualified operator using approved equipment under appropriate weather conditions, according to the manufacturer's recommendations for use.

7. PROPOSED NATIVE HEDGEROW PLANTING

Intended Purpose/Function of Aftercare Operations

7.1 Landscape and biodiversity enhancement, ecological connectivity.

Current Condition

7.2 The internal hedgerow network to delineate the restored arable farmland is yet to be established within the site.

Restoration Objectives and Aftercare Targets

7.3 The restoration objective is to create secure continuous field boundaries to provide ecological and visual connectivity between the restored quarry and existing vegetation surrounding the site. The aftercare targets relating to extent and condition of the hedgerow are identified below.

Extent: Establish 830m length of reinstated and new hedgerow, with no gaps greater than 1m.

Condition: A 95% establishment rate at year 5; with no species listed in Schedule 9 part II of the WCA to be present within any part of H1, H2 and H3.

Establishment of New Hedgerows

7.4 Prior to planting the hedge lines will be marked out on site. If the proposed hedgerow is to be established within existing grassland or within areas of perennial weeds, the area will preferably be cleared by mechanical means in the first instance and then, if persistent weeds prove to be a problem, sprayed with a chemical spray approved by Natural England and the Environment Agency as suitable for use on weeds in or near waterbodies and as recommended by a BASIS qualified advisor. This will be undertaken a minimum of 10 days prior to proposed planting and between April and September to achieve the best results. Applications to be carried out in accordance with manufacturer's instructions.

7.5 Once any existing vegetation has been cleared or allowed to die back the hedge line will be cultivated using an approved mechanical means. The hedging trench will be c.600mm wide and a minimum of 450mm deep. The bottom of the trench will be broken up to improve drainage. A slow release NPK fertiliser (N:3 P:17 K:10) will be applied to the backfill at a rate of 60 grams per square metre and incorporated to the full depth of the cultivated trench.

7.6 Bare root hedge stock will be planted between November to March. Planting will be undertaken when the weather conditions allow and will not be undertaken during prolonged periods of frost.

Proposed Native Hedgerow Planting Management Operations

7.7 The aftercare operations for the new lengths of hedgerow are outlined overleaf in Table 7.1.

Table 7.1 Proposed Native Hedgerow Planting Aftercare Operations

Item	Purpose	Operation	Timing
1.	Prevent suppression of new planting.	A 500mm wide strip either side will be kept in a weed free condition throughout the growing season. Any grass or vegetation within the tree and shrub shelters would be removed.	Year 1 - 10 <i>(between May and August)</i>
2.	Monitoring of Establishment and protection measures	All guards and stakes to be inspected, corrected and replaced.	Year 1 - 10 <i>Annually (October/ November)</i>
3	Achieve 95% establishment rate at year 5	Prior to undertaking replacement planting, the likely cause of loss will be assessed to allow for an adjustment of species or specification. Replacement planting will be undertaken in the first available growing season unless otherwise agreed with the Mineral Planning Authority and will match the species and specification lost.	As necessary <i>(October to November)</i>
4.	Encourage Branching	Leading shoots will be cut back to approximately half their length to encourage branching. Vigorous side branches will be trimmed if required.	Year 3 <i>(January/ February)</i>
5.	Encourage dense twiggy growth	Hedgerows to be shaped. Prior to shaping any young hedgerow trees will be clearly tagged to avoid damage from cutters during operations. Following the establishment period cutting of new hedgerows to be undertaken on a rotation with no hedge cut more than once every two years .	Year 4 <i>(January/ February)</i>
6.	Encourage development of hedgerow trees	Remove guards before they start to restrict growth. Stakes will be removed following a test on sample plants. To test whether plants are root-firm, sample plants within a group (e.g. 10%) shall be untied in spring and monitored over the next growing season. When firmness is proven, remove all remaining stakes and ties. Where stakes and ties are still necessary, further inspections will be required to adjust and maintain them in good order, ensuring that stems are not being damaged.	As Necessary <i>(February – March)</i>

8. PROPOSED WET GRASSLAND AND SCRUB

Intended Purpose/Function of Aftercare Operations

8.1 Landscape and biodiversity enhancement.

Current Condition

8.2 Area WG1 to WG4 currently comprise fields under able cultivation and will comprise the former plant site.

Restoration Objective and Aftercare Targets

8.3 The restoration objective for areas WG1 to WG4 focuses on establishing a combination of species-rich grassland and scrub surrounding the former silt lagoons over the management period. The area will be sown with Emorsgate (or similar) Meadow Mixture for Wetlands. Specific aftercare targets relating to the extent and condition of the areas WG1 to WG4 are outlined below.

Extent: Establish the proposed extent of 0.35ha of wet grassland within area WG1 to WG4.

Condition: A 95% establishment rate at year 5; with no species listed in Schedule 9 part II of the WCA to be present within any part of WG1 to WG4.

Establishment of Scrub Planting

8.4 Prior to planting, areas of scrub will be marked out on site. Any perennial weeds which have established in the area to be planted will if possible be removed by mechanical means.

Establishment of Seedbed

8.5 If seeding works are carried out soon after completion of soil replacement operations, secondary ground preparation works will not be necessary as a tilth suitable for seeding will already have been formed.

8.6 In order to reduce the weed seed bank within the replaced soils, if timings allow, a 'stale seedbed' will be established. This will allow a flush of weed seed germination from within the existing soil resource which can then be cleared to produce a cleaned 'stale' seedbed with a reduced weed seed burden on the establishment of the reinstated areas of farmland.

8.7 Following removal of remnant vegetation, the land would be cultivated by a disc or power harrowing to produce a suitable seedbed about 100mm in depth. Stones greater than 100mm will have already been removed as part of the soil replacement operation described within Section 3 above.

8.8 The scrub planting and wet grassland management operations are shown below in Tables 8.1 and 8.2 respectively.

Table 8.1 Scrub Management Operations

Item	Purpose	Operation	Timing
1.	To allow establishment of scrub	Any existing areas of hardstanding or compacted soil relating to the former plant site should be cultivated to a depth of 50cm	<i>Upon commencement of restoration</i>
2.	Prevent suppression of new planting.	A 500mm wide strip either side will be kept in a weed free condition throughout the growing season. Any grass or vegetation within the tree and shrub shelters would be removed.	Year 1 – 10 <i>(between May and August)</i>
3.	Monitoring of Establishment and protection measures	All guards and stakes to be inspected, corrected and replaced.	Year 1 - 10 <i>Annually (October/ November)</i>
4.	Achieve 95% establishment rate at year 5	Prior to undertaking replacement planting, the likely cause of loss will be assessed to allow for an adjustment of species or specification. Replacement planting will be undertaken in the first available growing season unless otherwise agreed with the Mineral Planning Authority and will match the species and specification lost.	As necessary <i>(October to November)</i>
5.	Encourage Branching	Leading shoots will be cut back to approximately half their length to encourage branching. Vigorous lateral branches will be trimmed if required.	Year 3 <i>(January/ February)</i>
6.	Encourage development of scrub	Remove guards before they start to restrict growth. Stakes will be removed following a test on sample plants. To test whether plants are root-firm, sample plants within a group (e.g. 10%) shall be untied in spring and monitored over the next growing season. When firmness is proven, remove all remaining stakes and ties. Where stakes and ties are still necessary, further inspections will be required to adjust and maintain them in good order, ensuring that stems are not being damaged.	As Necessary <i>(February – March)</i>

Table 8.2 Wet Grassland Management Operations

Item	Purpose	Operation	Timing
1.	To promote successful establishment of wet grassland	Sow with Emorsgate (or similar) at the recommended rate. If the grassland species falls below 75% in terms of the species present or below 60% for the wildflowers, remedial action will be taken.	<i>Standard NCV monitoring in Years 1, 3 5 and 10</i>
2.	To promote successful establishment of grassland and eradicate dominant invasive species	Monitor the development grassland to ensure that invasive or non-native species are removed and disposed of off-site.	<i>August - September</i>

Item	Purpose	Operation	Timing
3.	Ensure the desired compositions are established and to and eradicate dominant invasive species	Control encroachment of invasive weeds and non-native species by cutting/ removal where possible and spot treating with selective herbicides as a last resort.	<i>Annually between May to August</i>
4.	To sustain effective management regime and to promote growth	Undertake first, second and third cuts and remove clippings. All cutting operations prior to August will be preceded by a walkover survey to identify the extents of any ground nesting birds and ensure suitable safeguarding measures are in place as advised by the ECoW.	<i>Year 1 (when the sward exceeds 15cm)</i>
5.	To prevent suppression of sward from scrub	Control scrub ingress	<i>As required Years 2 and 3 (November to February)</i>
6.	To sustain effective management regime and to promote growth	Ongoing topping. All arisings to be collected and removed from site.	<i>Year 2 to 10 (late July to late September)</i>

9. PROPOSED DECIDUOUS WOODLAND

Intended Purpose/Function of Aftercare Operations

9.1 Landscape and biodiversity enhancement, ecological connectivity

Current Condition

9.2 Area PW1 currently comprise fields under arable cultivation located to the south western extremities of extraction phases 1 - 3. Area PW2 currently comprises arable farmland located to the south western edge of extraction phase 9. Area PW3 is located to the northern edge of the proposed plant site.

Restoration Objective and Aftercare Targets

9.3 The restoration objective for areas PW1 to PW3 focuses on the establishment of native deciduous woodland over the management period. Specific aftercare targets relating to the extent and condition of the areas PW1 to PW3 are outlined below.

Extent: Establish the proposed extent of 1.63ha of deciduous woodland within area PW1 to PW3.

Condition: A 95% establishment rate at year 5; with no species listed in Schedule 9 part II of the WCA to be present within any part of PW1 to PW3.

Establishment of Deciduous Woodland

9.4 Prior to planting, areas of woodland will be marked out on site. Any perennial weeds which have established in the area to be planted will preferably be removed by mechanical means. The deciduous woodland management operations are shown in Table 9.1 below.

Table 9.1 Deciduous Woodland Management Operations

Item	Purpose	Operation	Timing
1.	Prevent suppression of new planting.	A 500mm wide strip either side will be kept in a weed free condition throughout the growing season. Any grass or vegetation within the tree and shrub shelters would be removed.	Year 1 - 10 (between May and August)
2.	Monitoring of Establishment and protection measures	All guards and stakes to be inspected, corrected and replaced.	Year 1 - 10 Annually (October/November)
3.	Achieve 95% establishment rate at year 5	Prior to undertaking replacement planting, the likely cause of loss will be assessed to allow for an adjustment of species or specification. Replacement planting will be undertaken in the first available growing season unless otherwise agreed with the Mineral Planning Authority and will match the species and specification lost.	As necessary (October to November)

Item	Purpose	Operation	Timing
4.	Encourage Branching	Leading shoots will be cut back to approximately half their length to encourage branching. Vigorous side branches will be trimmed if required.	Year 3 <i>(November)</i>
5.	Encourage development of trees	Remove guards before they start to restrict growth. Stakes will be removed following a test on sample plants. To test whether plants are root-firm, sample plants within a group (e.g. 10%) shall be untied in spring and monitored over the next growing season. When firmness is proven, remove all remaining stakes and ties. Where stakes and ties are still necessary, further inspections will be required to adjust and maintain them in good order, ensuring that stems are not being damaged.	As Necessary <i>(February – March)</i>

10. EXISTING HEDGEROWS

Intended Purpose/Function of Aftercare Operations

- 10.1 Maintain, enhance and maximise existing screening function from Bow Lane. Landscape and biodiversity enhancement, ecological connectivity.

Current Condition

- 10.2 H5 defines the north eastern edge of Flexible Working Area B, H6 is located to the southern/south eastern edge of extraction Phase 9; H7 and H8 bound Bow Lane on the north eastern boundaries of the principle extraction area. H9 defines the northern boundary of the principle extraction area.

Restoration Objective and Aftercare Targets

- 10.3 Limited intervention. The restoration objective for hedgerows H5-H9 focuses on maintaining and enhancing their screening and ecological function during the management period. The enhancement of these boundary hedgerows would be prioritised and take place at the commencement of works. Existing hedgerow enhancement will be enacted prior to the commencement of Phase 1 restoration.
- 10.4 Specific aftercare targets relating to the extent and condition of hedgerows H5-H8 are outlined below.

Extent: Maintain and enhance the extent of 814 m of existing native hedgerows H5-H9

Condition: To maintain a continuous, dense hedgerow; with no species listed in Schedule 9 part II of the WCA to be present within any part of H5-H9.

The existing hedgerow management operations are shown in Table 10.1 below.

Table 10.1 Existing Hedgerow Management Operations

Item	Purpose	Operation	Timing
1.	To maintain continuous screening and ecological function	Infill planting if necessary, comprising triple staggered rows set 500mm apart and plants at 300mm centres in each row using species provided at Appendix 1.	<i>Hedgerow enhancement works enacted prior to commencement of Phase 1 restoration (During December – January)</i> <i>Subsequent ‘gapping up’ as required (December-January)</i>
2.	To maintain continuous screening and ecological connectivity	Hedgerows will be maintained at a minimum height of 2m	Year 1 - 10 <i>Annually (January/February)</i>
3.	To encourage fastigate growth and to visually enhance the hedgerows as a landscape element	Hedges to be cut in an ‘A’ shape on a rotation with no hedge cut more than once every two years.	Year 1 - 10 <i>Annually (January/February)</i>

11. PROPOSED LAKE

Intended Purpose/Function of Aftercare Operations

- 11.1 Nature conservation/ biodiversity enhancement, ecological connectivity with Ripple Lake and the River Severn.

Current Condition

- 11.2 Ephemeral arable farmland located within Flexible Working Area B.

Restoration Objective and Aftercare Targets

- 11.3 To establish a shallow waterbody from natural infill of the extraction void with gently sloping margins of varied depths and profiles to provide ecological connectivity with Ripple Lake and the River Severn.

Extent: Establish the extent of a single large waterbody of 0.85ha comprising PL1.

Condition: Open water lake hosting aquatic assemblages/habitats with established riparian vegetation.

- 11.4 The proposed lake management operations are shown in Table 11.1 below.

Table 11.1 Proposed Lake Management Operations

Item	Purpose	Operation	Timing
1.	To ensure ≥ 80% of the riparian assemblages are becoming established	Monitor initial establishment for non-native plants	<i>Year 1 (between June and July)</i>
2.	To ensure desired aquatic assemblages are becoming established	Monitor for non-native invasive plants (visual inspection)	<i>Annually Years 2-10 (April-September to allow easy identification of non-native herbaceous species)</i>
3.	To maintain open aspect and water quality	Remove any significant vegetation or scrub fallen from peripheral scrub	<i>Year 2-10 Annually (January/February)</i>
4.	Maintain ecological function	Check lake after inundation events for debris and damage to marginal areas	<i>As required</i>

12. FORMER SILT LAGOONS

Intended Purpose/Function of Aftercare Operations

12.1 Nature conservation/ biodiversity enhancement, ecological connectivity with adjacent woodland.

Current Condition

12.2 FSL1-4 currently comprises fields under arable cultivation and FSL1-2 will comprise the former silt lagoons within the plant site.

Restoration Objective and Aftercare Targets

12.3 To establish deep waterbodies for the benefit of birds, amphibians, aquatic invertebrates and for foraging animals including bats.

Extent: Establish the extent of a series of large waterbodies c.1.51ha comprising FSL1-4

Condition: Open waterbodies hosting aquatic assemblages/habitats with established riparian vegetation.

12.4 The proposed lagoon management objectives are shown in Table 12.1 below.

Table 12.1 Proposed Lagoon Management Objectives

Item	Purpose	Operation	Timing
1.	To ensure \geq 80% of the aquatic assemblages are becoming established	Monitor initial establishment for non-native plants	Year 1 (between June and July)
2.	To ensure desired aquatic assemblages are becoming established	Monitor for non-native invasive plants (visual inspection)	Annually Years 2-10 (April-September to allow easy identification of non-native herbaceous species)
3.	To maintain water quality	Remove any significant vegetation or scrub fallen from lake edge	Year 2 - 10 Annually (January/February)
4.	Maintain ecological function	Check lake after inundation events for debris and damage to marginal areas	As required

13. RETAINED DRAINAGE BASIN

Intended Purpose/Function of Aftercare Operations

13.1 Surface water management/ biodiversity and nature conservation enhancement.

Current Condition

13.2 RDB1 comprises the drainage basin which will be retained as a water management feature located to the south eastern edge of extraction phases 1 - 9.

Restoration Objective and Aftercare Targets

13.3 Maintain in a condition which allows for its drainage/water management function. Establish a grassland mix within the basin capable of tolerating occasional inundation and of value to biodiversity.

Extent: Manage the 2.27ha of drainage basin comprising RDB1.

Condition: Functional drainage basin clear of obstruction and with no species listed in Schedule 9 part II of the WCA to be present. Established grass and wildflower mix of value to biodiversity and nature conservation.

Establishment of Vegetation

13.4 The drainage basin will be left to naturally colonise with bankside and emergent plants.

13.5 The retained drainage basin management operations objectives are shown in Table 13.1 below.

Table 13.1 Retained Drainage Basin Management Operations

Item	Purpose	Operation	Timing
1.	To maintain drainage basin water management function	Inspect to review vegetation growth and build-up of debris which may impede water flow.	Annually (between October and November)
2.	Create ≥ 80% structural variation and to minimise disturbance to wildlife	Rotationally hand-cut bankside vegetation. Cut vegetation should be stored to the edge of the basin for 2-3 days to allow water and any aquatic invertebrates or other animals to drain and to migrate back to the ditch. The arisings should then be removed to stockpiles off site.	Years 3, 5, 7 and 9 (late August)
3.	To sustain effective management regime and to promote growth	Implement weed control by hand pulling (particularly for woody species) and the targeted use of herbicides for invasive or undesirable species as a last resort.	As required (between May and September)
4.	To maintain waterflow	Removal of in-channel silt or debris working from one side of the basin.	Rotationally and staggered over 3-10 years (between September and November)

14. RETAINED INTERCEPTOR DITCH

Intended Purpose/Function of Aftercare Operations

14.1 Surface water management/ biodiversity and nature conservation enhancement.

Current Condition

14.2 RID1 comprises the interceptor ditch which will be retained for water management located to the north western edge of extraction phases 1-9.

Restoration Objective and Aftercare Targets

14.3 Maintain in a condition which allows for its drainage/water management function. Establish a grassland mix within the basin capable of tolerating occasional inundation and of value to biodiversity.

Extent: Manage the 2.91ha of interceptor ditch comprising RID1.

Condition: Functional drainage basin clear of obstruction and with no species listed in Schedule 9 part II of the WCA to be present. Established grass and wildflower mix of value to biodiversity and nature conservation.

14.4 The drainage basin will be left to naturally colonise with bankside and emergent plants.

14.5 The retained drainage basin management operations objectives are shown in Table 14.1 below.

Table 14.1 Retained Drainage Basin Management Operations

Item	Purpose	Operation	Timing
1.	To maintain interceptor ditch water management function	Inspect to review vegetation growth and build-up of debris which may impede water flow	Annually (between October and November)
2.	Create ≥ 80% structural variation and to minimise disturbance to wildlife	Rotationally hand-cut bankside vegetation. Cut vegetation should be stored to the edge of the basin for 2-3 days to allow water and any aquatic invertebrates or other animals to drain and to migrate back to the ditch. The arisings should then be removed to stockpiles off site.	Years 3, 5, 7 and 9 (late August)
3.	To sustain effective management regime and to promote growth	Implement weed control by hand pulling (particularly for woody species) and the targeted use of herbicides for invasive or undesirable species as a last resort.	As required (between May and September)
4.	To maintain waterflow	Removal of in-channel silt or debris working from one side of the basin.	Rotationally and staggered over 3-10 years (between September and November)

15. EXISTING WATERCOURSES

Intended Purpose/Function of Aftercare Operations

15.1 Maintain biodiversity interest.

Current Condition

15.2 EW1 comprises the existing watercourse to the north eastern edge of Flexible Working Area A connecting Mythe Brook with the ephemeral land in the vicinity of Ripple Lake. EW2 comprises the existing watercourse within the hedgerow bisecting Flexible Working Areas A and B.

Restoration Objective and Aftercare Targets

15.3 Retain, protect and where possible enhance existing trees, scrub and vegetation along the stream corridor. Retain dead-wood habitat as hibernacula where safety allows.

Extent: Manage the combined 0.7ha of watercourse comprising EW1 and EW2.

Condition: Maintain a good overall diversity of canopy, shrub and ground layer with enhanced areas of deadwood habitat.

15.4 The existing watercourse management operations are shown in Table 15.1 below.

Table 15.1 Existing Watercourse Management Operations

Item	Purpose	Operation	Timing
1.	To eliminate the spread of non-native species and invasive and notifiable weeds	Identify, kill and remove non-native species as well as invasive and notifiable weeds to limit spread and allow scrub and trees to continue to develop.	<i>Annually between May to August in dry conditions</i>
2.	Maintain structure of scrub and trees	Fell or thin as appropriate to maintain variation in the age structure of scrub and trees. Kill stumps. Use brash, logs and grass cuttings from habitat management of the area to create vegetation piles in the immediate locality of felled trees. Felling will be carried out by qualified arboricultural contractor under the supervision of a qualified ecologist if required.	<i>Annually between May to August</i>
3.	Maintain function of watercourse	Remove any significant vegetation, scrub and branches which may impede water flow	<i>As required</i>

16. ARABLE FIELD MARGINS

Intended Purpose/Function of Aftercare Operations

16.1 Biodiversity interest.

Current Condition

16.2 AFM1 and AFM2 are located between the retained drainage basin and the site boundary on the south western edge of extraction phases 1-9.

Restoration Objective and Aftercare Targets

16.3 To establish a floristically rich, tussocky grassland using an appropriate seed mix such as *Emorsgate EM10 (Tussock Mixture)* or similar.

Extent: Manage the combined 0.97ha of arable field margins comprising AFM1 and AFM2.

Condition: Maintain a good overall diversity of floristically rich, tussocky grassland.

Establishment of Seedbed

16.4 Seedbed would be established as described in section 6.4 above.

16.5 Following removal of remnant vegetation, the land would be cultivated by a disc or power harrowing to produce a suitable seedbed about 100mm in depth. Stones greater than 100mm will have already been removed as part of the soil replacement operation described within Section 3 above.

16.6 The arable field margins management operations are shown in Table 16.1 below.

Table 16.1 Arable Field Margins Management Operations

Item	Purpose	Operation	Timing
1.	To promote successful establishment of field margins	Sow Emorsgate EM 10 (or similar)	<i>Standard NCV monitoring to be undertaken at Years 1, 3, 5 and 10</i>
2.	To promote successful establishment of grassland and eradicate dominant invasive species	Monitor the development grassland to ensure that invasive or non-native species are removed and disposed of off-site.	<i>August - September</i>
3.	To ensure $\geq 80\%$ of compositions are established and to and eradicate dominant invasive species	Control encroachment of invasive weeds and non-native species by cutting and removal where possible and spot treating with selective herbicides as a last resort.	<i>Annually between May to August</i>
4.	To sustain effective management regime and to promote growth	Undertake first, second and third cuts and remove clippings. Arisings to be collected and removed from site. All cutting operations prior to August will be preceded by a walkover survey to identify the extents of any ground nesting birds and ensure suitable	<i>Once every 2 years (years 2-5) on a 50% rotation</i>

Item	Purpose	Operation	Timing
		safeguarding measures are in place as advised by the ECoW.	
Item	Purpose	Operation	Timing
5.	To prevent suppression of sward from scrub.	Control scrub ingress.	<i>As required Years 2 and 3 (November to February)</i>
6.	To sustain effective management regime and to promote growth.	Cut and collect to 50% in alternate years.	<i>Alternate years (late July to late September)</i>

17. OPEN WATER AND SCRUB

Intended Purpose/Function of Aftercare Operations

17.1 Biodiversity interest.

Current Condition

17.2 Arable fields forming part of Flexible Working Area A, bounded to the northeast by an existing watercourse.

Restoration Objective and Aftercare Targets

17.3 To establish two large deep waterbodies (WB1 and WB2) to encourage wildfowl. Establish wet grassland to the peripheral areas.

Extent: Establish the marginal areas of WB1 and WB2 covering 1.06 ha.

Condition: Establish a species rich grassland.

Establishment of Seedbed

17.4 Seedbed would be established as described in section 8.5 above.

17.5 Following removal of remnant vegetation, the land would be cultivated by a disc or power harrowing to produce a suitable seedbed about 100mm in depth. Stones greater than 100mm will have already been removed as part of the soil replacement operation described within Section 3 above.

17.6 The open water and scrub management operations are shown in Table 17.1 and 17.2 below.

Table 17.1 Open Water Management Operations

Item	Purpose	Operation	Timing
1.	To promote successful establishment of grassland	If the grassland species drops below 75% in terms of the species present or wildflowers below 60%, remedial action will be taken	<i>Standard NCV monitoring to be undertaken in years 1, 5 and 10</i>
2.	To promote successful establishment of grassland and eradicate dominant invasive species	Monitor the development grassland to ensure that invasive or non-native species are removed and disposed of off-site.	<i>August -September</i>
3.	To ensure $\geq 80\%$ of compositions are established and to and eradicate dominant invasive species	Control encroachment of invasive weeds and non-native species by physical removal in the first instance and spot treating with selective herbicides as a last resort.	<i>Annually between May to August</i>
4.	To sustain effective management regime and to promote growth	Undertake first, second and third cuts and remove clippings All cutting operations prior to August will be preceded by a walkover survey to identify the extents of any ground nesting birds and ensure suitable safeguarding measures are in place as advised by the ECoW.	<i>Year 1 (when the sward exceeds 15cm)</i>
5.	To prevent suppression of sward from scrub	Control scrub ingress	<i>As required Years 2 and 3</i>

Item	Purpose	Operation	Timing
			<i>(November to February)</i>
6.	To sustain effective management regime and to promote growth	Ongoing topping	<i>Year 2 to 10 (late July to late September)</i>

Table 17.2 Scrub Management Operations

Item	Purpose	Operation	Timing
1.	Prevent suppression of new planting.	A 500mm wide strip either side will be kept in a weed free condition throughout the growing season. Any grass or vegetation within the tree and shrub shelters would be removed.	Year 1 – 10 (between May and August)
2.	Monitoring of Establishment and protection measures	All guards and stakes to be inspected, corrected and replaced.	Year 1 – 10 Annually (October/ November)
3.	Achieve 95% establishment rate at year 5	Prior to undertaking replacement planting, the likely cause of loss will be assessed to allow for an adjustment of species or specification. Replacement planting will be undertaken in the first available growing season unless otherwise agreed with the Mineral Planning Authority and will match the species and specification lost.	As necessary (October to November)
4.	Encourage Branching	Leading shoots will be cut back to approximately half their length to encourage branching. Vigorous side branches will be trimmed if required.	Year 3 (January / February)
5.	Encourage development of trees	Remove guards before they start to restrict growth. Stakes will be removed following a test on sample plants. To test whether plants are root-firm, sample plants within a group (e.g. 10%) shall be untied in spring and monitored over the next growing season. When firmness is proven, remove all remaining stakes and ties. Where stakes and ties are still necessary, further inspections will be required to adjust and maintain them in good order, ensuring that stems are not being damaged.	As Necessary (February – March)

18. WETLAND GRASS AND SCRAPES

Intended Purpose/Function of Aftercare Operations

18.1 Biodiversity interest.

Current Condition

18.2 Arable fields forming part of Flexible Working Area A.

Restoration Objective and Aftercare Targets

18.3 To establish an area of open wetland grassland with scrapes of varying sizes and depths, which will be physically and visually linked to Ripple Gravel Pit and the retained area of marshy grassland (MG1) to encourage waterfowl and wading birds.

Extent: Establish the 10.17 ha of wetland and scrapes associated with the peripheral areas of WB1 and WB2 and low lying land of flexible working area A.

Condition: Establish a mosaic of habitats ranging from species rich grassland through to open water, with small area of low scrub in the southern part.

18.4 The wet grassland and scrapes management operations are shown in Table 18.1 below.

Table 18.1 Wet Grassland and Scrapes Management Operations

Item	Purpose	Operation	Timing
1.	To promote successful establishment of grassland and eradicate dominant invasive species	Monitor the development grassland to ensure that invasive or non-native species are removed and disposed of off-site.	August - September
2.	To ensure ≥ 80% of compositions are established and to and eradicate dominant invasive species	Control encroachment of invasive weeds and non-native species by physical removal in the first instance.	Annually between May to August
3.	To sustain effective management regime and to promote growth	Undertake first, second and third cuts and remove clippings. Arisings to be collected and removed from site. All cutting operations prior to August will be preceded by a walkover survey to identify the extents of any ground nesting birds and ensure suitable safeguarding measures are in place as advised by the ECoW.	Year 1 (when the sward exceeds 15cm)
4.	To prevent suppression of sward from scrub	Control scrub ingress	As required Years 2 and 3 (November to February)
5.	To sustain effective management regime and to promote growth	Ongoing topping	Year 2 to 10 (late July to late September)

19. GRASS AND SCRUB

Intended Purpose/Function of Aftercare Operations

19.1 Biodiversity interest.

Current Condition

19.2 Arable fields forming part of Flexible Working Area A.

Restoration Objective and Aftercare Targets

19.3 To establish an area of wetland grassland and scrub to encourage waterfowl and wading birds.

Extent: Peripheral areas of PL1 covering 4.41 ha.

Condition: Establish a species rich grassland.

19.4 The wet grassland and scrub management operations are shown in Table 19.1 below.

Table 19.1 Wet Grassland and Scrub Management Operations

Item	Purpose	Operation	Timing
1.	To promote successful establishment of grassland and eradicate dominant invasive species	Monitor the development grassland to ensure that invasive or non-native species are removed and disposed of off-site.	<i>August - September</i>
2.	To ensure $\geq 80\%$ of desired seed compositions are established and to and eradicate dominant invasive species	Control encroachment of invasive weeds and non-native species by cutting/ removal where possible and spot treating with selective herbicides as a last resort.	<i>Annually between May to August</i>
3.	To sustain effective management regime and to promote growth	Undertake first, second and third cuts and remove clippings. All cutting operations prior to August will be preceded by a walkover survey to identify the extents of any ground nesting birds and ensure suitable safeguarding measures are in place as advised by the ECoW.	<i>Year 1 (when the sward exceeds 15cm)</i>
4.	To prevent suppression of sward from scrub	Control scrub ingress	<i>As required Years 2 and 3 (November to February)</i>
5.	To sustain effective management regime and to promote growth	Cut and collect to 50% in alternate years.	<i>Alternate years (late July to late September)</i>

20. OTHER FEATURES

Artificial Habitats

- 20.1 New wildlife features will be built using materials that are a by-product of the mature trees felled to enable the extraction of mineral resource. The new features outlined below are designed to enhance the deadwood habitat resource within the Site and provide sheltering and hibernating opportunities for invertebrates and amphibians and small terrestrial mammals.
- 20.2 A diversity of habitat piles (referred to as 'hibernacula') will be provided at the four locations shown on **Drawing 2636-4-4-2-1**, a copy of which is provided at Appendix 1. The habitat piles will vary in size and aspect to create a diversity of habitat across the Site.

Down wood habitat

- 20.3 The wood from the mature trees that are to be felled shall be retained on Site. The largest diameter and lower trunk sections of timber from the felled trees will be relocated to the areas marked on **Drawing 2636-4-4-2-1** and retained to replicate one or more 'windthrown trees'.
- 20.4 Thereafter the wood will be left undisturbed in its location and allowed to decay and develop into a 'fallen deadwood' habitat to support a range of invertebrates and fungi.

Dead wood habitat piles

- 20.5 Smaller branches and twigs recovered from the felled trees will be retained in habitat piles to support species including mites not found in larger materials. In addition these habitat piles or dead wood hibernacula will also offer shelter and hibernating opportunities to other species.
- 20.6 Each proposed hibernaculum will be at least five square metres and have an exposed (not shaded) southern aspect so as to provide potential basking opportunities for reptiles as well as a warm sheltered feature for small mammals.
- 20.7 Prior to the placement of felled materials a shallow excavation c.500mm will be formed into which the larger sections of felled timber are to be placed in perpendicular (crisscross) layers. This facilitates the formation of tunnels at the base and interior of the pile. Finer materials in the form of smaller logs/ branches, brash and vegetation cuttings can be added in layers to achieve a height of approximately 1m above ground level. Once formed the habitat pile can be covered with the excavated soil/ turf to maintain humidity within.
- 20.8 If required, during the aftercare period as advised by the ECoW the habitat piles may be supplemented and be suitable repositories for brash and deadwood from tree and hedgerow trimmings.
- 20.9 In order to avoid entrapping animals potentially hibernating within them the hibernacula should only be replenished between May and September.

Grass Margins around Hibernacula

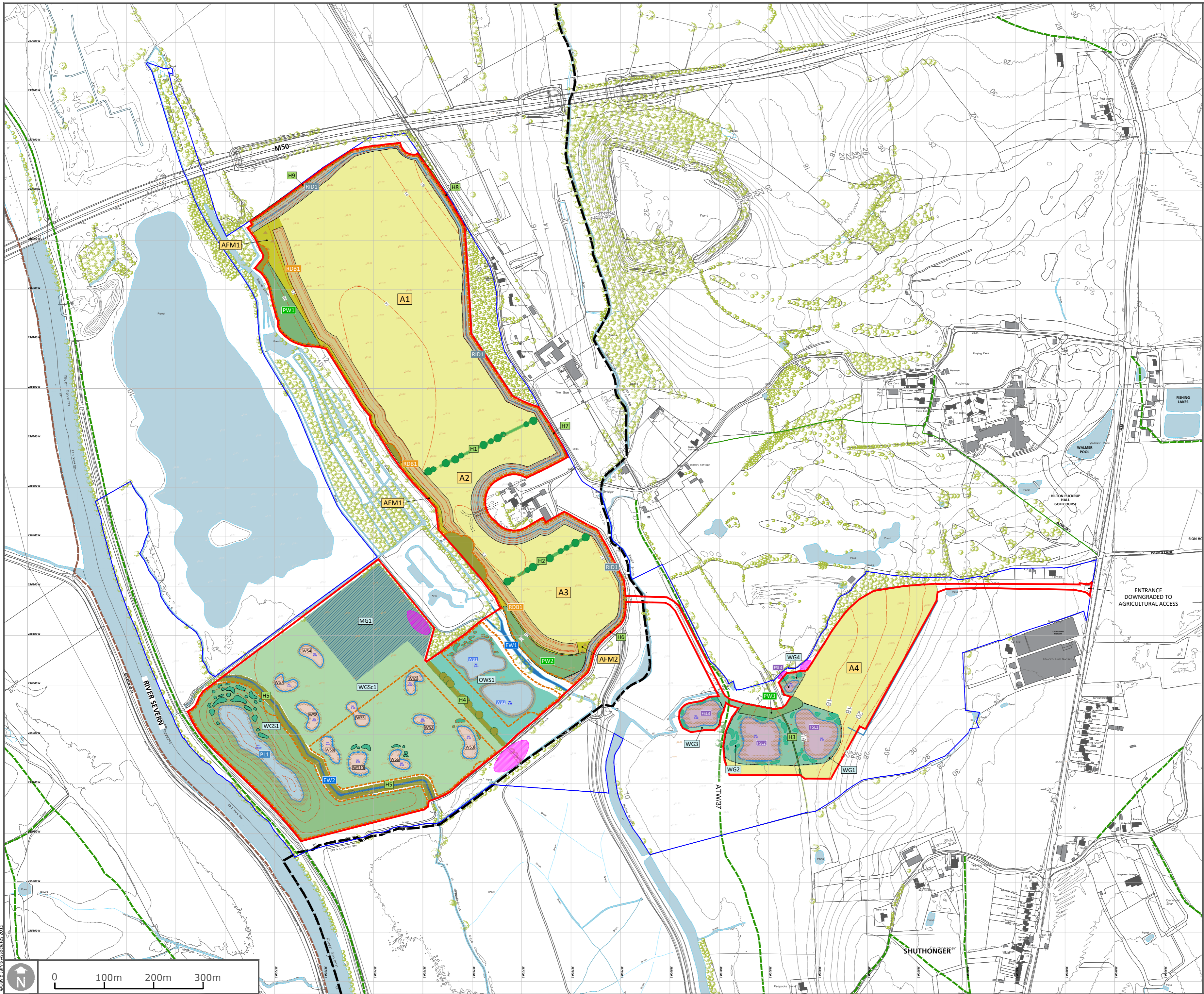
- 20.10 The grass margins bordering the above features (i.e. within 2 to 5m of these features) will be managed on a three year rotation, to and control scrub encroachment and create micro- ecotones around these features.

Table 20.1 Other Features Management Operations

Item		Purpose	Operation	Timing
1.	Artificial Habitats	To encourage diversity of habitat across the Site	Monitor to ensure that hibernacula are in optimal condition to encourage species to populate	To be inspected annually Years 1-10
2.	Down Wood Habitat	To encourage diversity of habitat across the Site	To be replenished as advised by the ECoW	To be inspected annually between May and September
3.	Dead Wood Habitat Piles	To encourage diversity of habitat across the Site	To be replenished as advised by the ECoW	To be inspected annually between May and September
4.	Grass margins (within 3-5m of hibernacula).	Retained to promote biodiversity afford protection to the hibernacula.	Control of scrub encroachment	On a 3 year rotation October/November

Figure 1

Proposed Management Areas



KEY

- BOUNDARY: APPLICATION SITE
- BOUNDARY: OWNERSHIP
- EXISTING VEGETATION
- ATW/37
- EXISTING CONTOURS AT 2.0M INTERVALS
- REINSTATED ARABLE FARMLAND (A1 - A4)
- ARABLE FIELD MARGINS (AFM1 - 2) & HIBERNACULA TIMBER PILES
- PROPOSED WET GRASSLAND & SCRAPES (WGSc1 & WS1 - 10)
- PROPOSED OPEN WATER & SCRUB (OWS1) & WATERBODIES (WB1 - 2)
- PROPOSED WET GRASSLAND & SCRUB (WG1)
- PROPOSED WET GRASSLAND & SCRUB (WG1)
- RETAINED MARSHY GRASSLAND (MG1)
- PROPOSED DECIDUOUS WOODLAND (PW1 - PW3)
- EXISTING HEDGEROW (H4 - H9)
- REINSTATED NATIVE HEDGEROW (H1 - H3)
- FORMER SILT LAGOONS (FSL1 - FSL4)
- PROPOSED LAKE (P1)
- EXISTING WATERCOURSE (EW1 - EW2)
- RETAINED DRAINAGE BASIN (RDB1)
- RETAINED INTERCEPTOR DITCH (RID1)
- HIBERNACULA FELLED TIMBER

Notes
 Issue: Drawn by David Jarvis Associates Limited (CROWN COPYRIGHT. ALL RIGHTS RESERVED 2019 LICENCE NUMBER 0100031). This drawing is for Planning purposes only - Do not use this drawing for Construction. The information contained in the drawing should be used as a guide to the final forms and finishes of the landscape scheme. Any revisions to be approved by the Client and Local Authority

Scaling: Do not scale this drawing. Use given dimensions only.

Drawing Revision

Rev.	Date	Description	Drawn	Checked
P2	03/08/20	Various amendments	MP	MG
P3	03/08/20	Marshy grassland, RPA	MP	MG
P4	17/08/21	Crack willow inclusion	MP	KA
P5	08/12/21	Extraction boundary & island removal	MP	AC

Status
FINAL ISSUE

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Project
BOW FARM

Drawing Title
PROPOSED MANAGEMENT CATEGORIES

Scale 1:5,000	Sheet Size A2	Date DEC 2021
Client Ref. -	Drawing Ref. 2636-4-4-2-1	Drawing No. DR-0001
		Status S4-P5

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Appendix 1

Planting Schedules

General

Each plant to receive a 1.2m 'Tubex' tree guard or similar tree shelter secured with wooden stakes except for *Corylus avellana* and *Ilex aquifolium* which will receive a 'Tubex' shrub guard to prevent browsing damage. Guards should be regularly checked to ensure they are functional and removed after a period of 3 - 5 years, or once they begin to split as they may compromise tree growth.

PW1-3: Proposed Woodland located to the south east of former extraction phases 1-9 and to the north of the plant site.

Trees should be planted in random groups of between 3 and 5 of the same species. Density – 1.5 metre centres for edge mix; 2.5m centre for understory and main mix.

Trees				
Species	Common Name	Size(mm)	Age/Pot Size	%
<i>Quercus robur</i>	oak	450-600	1+1	30
<i>Fagus sylvatica</i>	beech	450-600	1+1	25
<i>Acer campestre</i>	field maple	450-600	1+1	15
<i>Sorbus aucuparia</i>	rowan	450-600	1+1	15
<i>Prunus avium</i>	wild cherry	450-600	1+1	10
<i>Malus sylvestris</i>	crab apple	450-600	1+1	5

H1-H4: Reinstated hedgerows within former extraction areas 7 and 8 and bisecting Flexible Working Area A and former silt lagoons

Hedgerow trees to be planted at 10-20m intervals within hedgerow

Trees				
Species	Common Name	Size(mm)	Age/Pot Size	%
<i>Quercus robur</i>	oak	450-600	1+1	35
<i>Fagus sylvatica</i>	beech	450-600	1+1	35
<i>Sorbus aucuparia</i>	rowan	450-600	1+1	15
<i>Prunus avium</i>	wild cherry	450-600	1+1	10
<i>Malus sylvestris</i>	crab apple	450-600	1+1	5
Hedgerow planting				
<i>Crataegus monogyna</i>	hawthorn	60-90	1+1	25
<i>Prunus spinosa</i>	blackthorn	60-90	1+1	25
<i>Corylus avellana</i>	hazel	60-90	1+1	20
<i>Sambucus nigra</i>	elder	60-90	1+1	15
<i>Viburnum opulus</i>	guelder rose	60-90	1+1	10
<i>Ilex aquifolium</i>	holly	60-90	container	5

Hedgerows to be planted in two staggered rows at 300mm centres with 500mm between rows. Species to be planted in random groups of 3-5 of the same species.

Former Plant Site and Haul Road

WG1-WG4: Proposed waterbodies at the site of the former clean water and silt ponds

Species to be planted in random groups of 3-5

Trees				
Species	Common Name	Size(mm)	Age/Pot Size	%
<i>Alnus glutinosa</i>	common alder	450-600	1+1	40
<i>Populus nigra</i>	black poplar	450-600	1+1	40
<i>Salix caprea</i>	goat willow	450-600	1+1	20

Former Flexible Working Areas A and B

OWS1, WGSc and WGS1: To the northern edge of lake (PL1), to the northern edges of shallow scrapes WS6, WS9 and WS13 and to the northern edge of WB1.

Species to be planted in random groups of 3-5

Trees				
Species	Common Name	Size(mm)	Age/Pot Size	%
<i>Populus nigra</i>	black poplar	450-600	1+1	35
<i>Alnus glutinosa</i>	common alder	450-600	1+1	35
<i>Betula pubescens</i>	Downy birch	450-600	1+1	20
<i>Salix caprea</i>	goat willow	450-600	1+1	10