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Stairfoot Quarry, Barnsley

Details Pursuant to Condition 3 (Planning Permission Ref.
B/93/0247/BA) and Condition 28 (Planning Permission Ref.
B/95/0832/BA) (Barnsley Metropolitan Borough Council)

Initial Restoration and Outline Aftercare Scheme

May 2011

SLR Ref: 403.00027.00307



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DRAWINGS

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1.0 INTRODUCTION

1.1 Introduction

SLR Consulting Ltd (SLR) has been commissioned by Hanson UK Ltd to prepare an initial draft restoration and outline aftercare scheme for Stairfoot Quarry.

The scheme has been produced pursuant to conditions of two separate planning permissions which relate to different parts of the site, as indicated on Drawing 1. Areas A, C and D all fall within planning permission ref. B/93/0247/BA, whilst Area B is covered by a separate Planning Permission ref. B/95/0832/BA.

The details of the aforementioned conditions are as follows:

3 *Unless otherwise agreed in writing by the Mineral Planning Authority, within 12 months of the date of this permission a restoration scheme for the unrestored areas of the site shall be submitted to and approved in writing by the Mineral Planning Authority. The scheme shall include, but not be limited to:*

- *Details of final restoration levels;*
- *The precise boundaries of the land uses including areas to be restored for agriculture, woodland, amenity/conservation and other uses;*
- *The pattern of field boundaries;*
- *Areas to be tree planted;*
- *Areas to be formed for conservation, amenity and ecological interest;*
- *Specification of seeding mixes;*
- *Details of all tree and shrub planting, including the size, species and planting pattern and the measures for the protection of planted areas;*
- *Details of hedgerow planting including location, species, size and measures for the protection of such planting;*
- *The provision of fencing, water supply, gates and stiles, including details of the location and types of fencing to be erected and protected treatment thereof;*
- *A programme of implementation providing for progressive seeding and planting on areas as they become available during the first available season following restoration to final contours;*
- *Details of steps to be taken for land drainage purposes following restoration to final contours;*
- *Details of footpaths to be reinstated;*
- *Phasing of restoration works.*

Once approved the scheme shall be fully completed in accordance with the approved details, including timescale.

28 *Prior to the commencement of extraction operations, a restoration scheme shall be submitted and shall have received the written approval of the Local Planning Authority. The site shall thereafter be restored in accordance with this scheme which shall include details of the following:*

1. *The detailed final levels of the land;*
2. *The precise boundaries of the land uses including areas to be restored for:*
 - a) *Agriculture;*
 - b) *Woodland;*

- c) Amenity/Conservation;*
- d) Other uses.*
- 3. The pattern of field boundaries;*
- 4. Areas to be tree planted;*
- 5. Areas to be formed for conservation, amenity and ecological interest;*
- 6. Specification of seeding mixtures;*
- 7. Details of all tree and shrub planting, including the size, species and planted pattern and the measures for the protection of planted areas;*
- 8. Details of hedgerow planting including location, species, size and measures for the protection of such planting;*
- 9. The provision of fencing, water supply, gates and stiles, including details of the location and types of fencing to be erected and protected treatment thereof;*
- 10. A programme of implementation providing for progressive seeding and planting on areas as they become available during the first available season following restoration to final contours;*
- 11. Details of steps to be taken for land drainage purposes following restoration to final contours;*
- 12. Details of footpaths to be reinstated;*
- 13. Phasing of Restoration Work.*

Hanson will be responsible for the implementation of all steps and treatments that are set out in this report, including all aspects of operational health and safety and any geotechnical considerations.

1.2 Methodology

This report has been prepared by carrying out correspondence with the client, completing a desk-based review of the permitted development and a visual inspection of the site and surrounding areas on January 2011, with a Hanson representative. No intrusive investigations have been carried out.

Although telephone consultation was initiated with Barnsley Metropolitan Borough Council prior to the preparation of this scheme, the relevant officer was unavailable at the time and it was considered expedient by Hanson that an initial draft scheme should be prepared for submission and to allow formal comments to be made.

SLR is a multidisciplinary environmental consultancy with over 350 staff and 20 offices in the UK. The landscape practice consists of over 30 experienced Landscape Architects, and is registered with the Landscape Institute. The existing landscape workload is wide ranging and covers mining and minerals, waste and energy business areas.

1.3 Background

This scheme relates to four discrete areas (labelled as A-D on Drawing 1) which form part of the larger Stairfoot quarry and brickworks, located off Wombwell Lane (A633), approximately 3km east-south-east of Barnsley.

Area A is partially backfilled with indigenous material completed in 2009 consequently the existing surface is bare ground/ clay or mudstones. There are no available soils on site to restore this area. The nub to the north west of Area A is a haul road located on previously restored landfill. There is a seasonally wet 'sump' at the lowest part of the slope which drains away via culverts beneath the disused railway line/Trans Pennine Trail.

There is a designated geological SSSI within the southern part of Area A (known as "Stairfoot Brickworks"), which contains exposures of the Aegiranum Marine Band, of about 4m thick and consists of black and blue-grey shales and mudstones which overlie a thin coal and seat earth. The citation describes the site as being an internationally important horizon for the stratigraphical correlation of the Westphalian Series across much of north-west Europe.

Area C is the most recently operational quarry area, known as Yew Tree Quarry. The worked out void was backfilled with remnant brick clay stockpiles from Area D in 2009 and consequently the existing surface is bare ground/ clay or mudstones. There are no available soils on site to restore this area.

Area D is now a cleared out brick clay stocking ground and with remnant clay material across the surface and existing 3m high screening bunds along the eastern boundary. This area of land is currently being marketed for sale as part of the adjacent brickworks plant site area, which also benefits from the road frontage and existing services. This area is also separated from the other parts of the site by the Trans Pennine Trail and is therefore considered to be most suitable for an ongoing industrial afteruse.

Area B is a more recently permitted area, known as Marine Band Quarry, which was only partially worked (within the area to the south-west of the double blue fence line/public right of way) and soils were stripped and placed in heaps to the north.

The brickworks within the adjacent part of the site to the west are currently being demolished. There is an area of historic clay extraction to the north of the site which has been restored to low-level grassland and conservation around the margins and there are two areas of old landfill which have been backfilled to a more rolling landform (presumably similar to existing ground levels, rather than low-level) and are managed as agricultural grassland.

Ardsley, a residential settlement is located to the north of Areas C and there is also a further small number of properties to the south of Area A, associated with the edge of Wombwell.

There are a number of public rights of way which connect the settlements and also with the Trans Pennine Trail which cross through the site (and are identified on Drawing 1). Nevertheless, the site itself is not particularly conspicuous/highly visible, except for when immediately adjacent to the disturbed areas.

The site lies within National Character Area 38 – *Nottinghamshire, Derbyshire & Yorkshire* which is characterised by the following:

- *Widespread evidence of industrial activity including mine buildings, former spoil tips and iron and steel plants.*
- *Complex mix of built-up areas, industrial land, dereliction and farmed open country.*
- *Many areas affected by urban fringe pressures creating fragmented and downgraded landscapes.*
- *Substantial areas of intact agricultural land in both arable and pastoral use.*
- *Small, fragmented remnants of pre-industrial landscape and semi-natural vegetation, including many areas of woodland, river valley habitats, subsidence flashes and other relict habitats.*
- *Ever-present urban influences from major cities, smaller industrial towns and mining villages.*

- *Widespread influence of transport routes, including canal, road (M1, M62) and rail, with ribbon developments emphasising the urban influence in the landscape.*
- *Rolling landforms with hills, escarpments and broad valleys.*
- *Local variation in landscape character reflecting variations in underlying geology.*
- *Strong cultural identity arising from history of coal mining and other heavy industry.*

2.0 PROPOSED RESTORATION SCHEME

2.1 Introduction

Drawing 1 describes the precise boundaries of the land uses, pattern of field boundaries and areas to be tree planted.

It is proposed that with the exception of Area D, which would be returned to industrial use, the rest of the site would be restored primarily to a nature conservation afteruse based on a variety of habitats and potential contributions to the Barnsley Biodiversity Action Plan (BAP)¹.

The local BAP sets out priorities for conservation action and includes a number of Habitat Action Plans, which could be achieved on the site including:

- *HAP5 Ancient and Species-Rich Hedgerows;*
- *HAP8 Lowland Meadows; and*
- *HAP18 Post-Industrial Derelict and Degraded Land.*

Habitat Action Plan 18 *Post-Industrial Derelict and Degraded Land* is perhaps of most relevance as this recognises that:

- *This habitat normally involves derelict former industrial land such as former colliery sites, disused railways, mineral and clay extractions and other industrial practices;*
- *It usually has a bare and sometimes lunar landscape in the early stages but, over time, progresses through a period of sparse vegetation and finally woodland, in some cases;*
- *It is this transition which makes this habitat unique and often attracts a number of various species of flora and fauna that cannot survive in adjacent more intensified habitats; and*
- *Post-industrial land, such as spoil heaps, is nutrient and mineral deficient. Colonising vegetation is therefore often sparse and sometimes unusual. Spectacular assemblages of plants occur on some sites.*

As discussed above, the areas at Stairfoot Quarry are not particularly conspicuous/highly visible, except for when immediately adjacent to the disturbed areas and also Areas A and C are lacking in any on-site soils. Whilst soil or other organic matter could be brought to site to "improve" the ground conditions for an agricultural afteruse, this may represent a missed opportunity for biodiversity. The local BAP acknowledges that:

- *Although post-industrial areas cannot be left as landscape eyesores, it is very important now to preserve 'mini habitats' within these areas to conserve species such as Little Ringed Plover and other important species. Due to agricultural intensification, these colonised sites offer the last remaining pocket for many important species of flora and fauna.*

¹ The Barnsley Biodiversity Action Plan (March 2002), produced by the Barnsley Biodiversity Partnership with assistance from Eric Bennett, Geoff Carr and Louise Hill

Consequently pursuing a nature conservation afteruse within Area A and C would not result in a "landscape eyesore" and would thus appear to be a good location for "*Post-Industrial Derelict and Degraded Land*" habitat creation.

Area B is more visible to the general public due to the proximity of the right of way which traverses the area and also benefits from the availability of the soil stockpile. It is consequently proposed that this would be restored to "*lowland grassland*", with "*species rich hedgerows*" habitats, which are described in the Barnsley BAP as follows:

- *Lowland Meadows are taken to include most forms of unimproved neutral grassland in lowland areas. The plan is not restricted to grasslands cut for hay, but also takes into account unimproved neutral pastures where livestock grazing is the main land use. On many farms in different parts of the UK, use of particular fields for grazing pasture and hay cropping changes over time, but the characteristic plant community may persist with subtle changes in floristic composition. In non-agricultural settings, such grasslands are less frequent but additional examples may be found in recreational sites, churchyards, roadside verges and a variety of other localities; and*
- *Species-Rich Hedgerows in northern England contain four or more native woody species on average in a 30 m length. Hedges which contain a rich basal flora of herbaceous plants are also included. The thin straight Hawthorn hedges of the later Parliamentary Enclosures, and hedges of Beech, Privet, Yew or non-native trees, are excluded. Recently planted Species-Rich Hedges are included.*

2.2 Details of Final Restoration Levels

Drawing 1 describes the proposed final restoration levels for all areas.

Area A, which consists of the partially backfilled area and haul road, would not receive any additional earthworks and consequently existing levels would be retained. These vary between 56m AOD at its northern point by the access to the haul road and 45m AOD at its lowest point within the seasonally wet sump adjacent to the old railway. Currently all surface water either infiltrates through the base of the sump or drains via local infrastructure and it is anticipated that this would continue. Gradients vary between 1:6 and 1:20.

Area B, which consists of the partially worked area would receive the on-site soils and would subsequently vary between 63m AOD at its northern point and 47m AOD at its lowest point within the ephemeral water areas adjacent to the old railway. Gradients vary between 1:6, north of the public right of way and 1:180 south of the public right of way. Currently all surface water infiltrates through the base of the sump and it is anticipated that this would continue.

Area C, which is the recent void, would not receive any additional earthworks and consequently existing levels would be retained. The void has been partially backfilled with up to 15m high faces and varies between 65m and 62m AOD around the rim and between 56m and 49m AOD within the base (sloping to the south-east). Gradients within the base vary between 1:22 and 1:100, whereas the steeper side slopes are consistently 1:1.5. Currently all surface water infiltrates through the base of the void and it is anticipated that this would continue.

Area D, which is the cleared stocking ground, would not receive any additional earthworks and consequently existing levels would be retained. These vary between 53m AOD at its northern point and 49m AOD at its lowest point to the east. Gradients vary between 1:20 and 1:65. A 3m high screening mound, with 1:1.3 side slopes is located along the eastern

and northern boundary. It is anticipated that a scheme of surface water management would be submitted as part of any proposal for industrial development.

The restoration profile conforms to Condition 16 of planning permission B/93/0247/BA.

2.3 Soil Handling and Profiles

As discussed above, soil handling is limited to the Area B and the recovery and replacement of approximately 1,500m³ soil from the existing storage bunds to the north of the area. The restoration area is approximately 3,000m² and thus the profile will be approximately 0.5m in thickness.

The exact nature of the soils in storage was unknown at the time of producing this report although it is assumed to be clay and the main limitations to the restoration conditions are therefore assumed to be poor drainage and compaction.

All soil handling operations will follow the guidelines set out in MAFF Good Practice Guide for Handling Soils² to make the best use of the available soil resource and minimise compaction as follows:

- All soil units will be separately recovered and replaced;
- All soil units will be handled when dry and friable; and
- Where possible, no heavy wheeled earthmoving vehicles or machines will run over *in-situ*/un-disturbed or replaced soils.

Soil will be restored sequentially to avoid trafficking of *in-situ* or newly placed soil layers, according to the following methods:

- All plant and equipment will only operate on the top of formation level and shall under no circumstances run on *in-situ* or replaced soil layers. Soil replacement will start at the farthest point from the storage area or where there is direct access to a haul route without traversing soils;
- Soils will be handled by hydraulic backhoe/tracked excavators with toothless buckets standing on the adjacent area and spreading to full thickness; and
- Spread soil will only comprise of blocks of soil less than 300mm diameter in any direction. Any oversize blocks will be broken down using the excavator bucket before the next load is spread.

2.4 Specification of Seeding Mixes

There would be no seeding carried out within the natural regeneration areas of Area A and C. This would ensure that the valuable transitional habitats mentioned in the Barnsley BAP would have the potential to develop over time (i.e. from bare ground in the early stages, progressing through a period of sparse vegetation and finally woodland, in some cases).

There would be no seeding carried out within the ongoing industrial afteruse or natural regeneration on the bunds in Area D.

² Humphries Rowell Associates (2000), MAFF Good Practice Guide for Handling Soils, FRCA, Cambridge

The areas of lowland meadow in Area B would aim to reflect the natural distribution of grassland habitats and be based on the assumed substrate conditions, to be inspected and assessed prior to seeding. The excavated or restored surface would be cultivated to a fine tilth prior to drilling or broadcasting of a selected grass seed.

Highly competitive species such as ryegrass would be omitted and no fertiliser would be applied to retain an impoverished substrate and reduce the potential for weed establishment. The aim would be to provide an open nurse sward which, whilst stabilising the ground, would allow for colonisation by locally native grass and wildflower species.

As discussed, for the assumed clayey substrate areas, these would be encouraged to dry, neutral grassland, NVC MG5 (Crested Dog's Tail *Cynosurus cristatus* and Common Knapweed *Centaurea nigra*). The mix would be sown at a rate of up to 20g/m².

Preparing a seed bed on clay can be difficult, being prone to compaction and poor drainage. Well timed preparation and sowings are therefore important to successful establishment. The seed must be surface sown and can be applied by machine or broadcast by hand, followed by rolling or treading to produce a firm surface.

2.5 Details of Tree and Shrub Planting

Drawing 1 describes areas to be planted with trees and shrubs.

All areas of tree and shrub planting will be assessed for compaction prior to planting and if necessary or practical, de-compaction will be carried out to a depth of 300mm, with soils loosened, aerated and broken up, when ground conditions are reasonably dry.

A Lowland Mixed Broadleaved Woodland with dog's mercury in accordance with NVC Woodland W8 (refer to Table 1 below) has been selected for the proposed woodland planting across the site to reflect the assumed nature of the local substrate, which will be inspected and assessed prior to planting, and also to reflect the character of the local landscape.

The range of species will help to reduce the chances of plant failures either from poor stock, late planting, preferential animal attack, frost sensitivity or soil chemical/physical conditions.

New tree and shrub planting will ensure planting density of 2m centres (2,500/ha). All species will be randomly mixed to give an even distribution of species throughout the compartment.

All other plants will be well-grown nursery stock as seed-raised transplants, 1+1, 1/1 (2 year old transplant, one year in seedbed, transplanted and grown for one year) or 1+2, 1/2 (one year in seedbed, transplanted and grown for 2 years) up to 80cm in height (for shrubs), depending on species and form. Plants will be sourced as locally as possible and all effort will be made to source stock of native genetic origin. Trees and shrubs will be sourced from native provenance areas 402 and 403 as shown in the Forestry Commission publication '*Using Stock for Planting native trees and shrubs*'. All plant handling and planting operations will comply with relevant clauses of CPSE '*Handling and Establishing of Landscape Plants*' (obtainable from the Horticultural Trades Association).

Table 1: Lowland Mixed Woodland Broadleaved Woodland Planting Mix

Latin Name	Common Name	% Mix
<i>Fraxinus excelsior</i>	Ash	20
<i>Quercus robur</i>	Pedunculate Oak	20
<i>Acer campestre</i>	Field maple	20
<i>Betula pendula</i>	Silver Birch	10
<i>Sorbus aucuparia</i>	Rowan	10
<i>Corylus avellana</i>	Hazel	5
<i>Crataegus monogyna</i>	Hawthorn	10
<i>Prunus spinosa</i>	Blackthorn	5
		100

The health and well being of all planting stock will be ensured before commencing work, including root system condition.

All transplants will be bare-root and supplied to site in bags containing the whole root system and pit planted as necessary to accommodate the root system. All pits will be excavated on the same day of planting. Transplant stock will be planted with a pit size to be a nominal 300mm diameter by 300mm depth or as necessary to accommodate their root systems. Backfill will consist of previously excavated material and 3L of sanitized and stabilised, friable compost to PAS 100.

When planted, the top of the root collar must be level with the surrounding soil surface and the ground around the plant will be firmed in by treading, taking care to avoid scuffing or damage. The completed planting pit will be either at ground level or slightly domed to prevent waterlogging. On no account shall any roots be left exposed or bent.

All proposed tree and shrub planting will be individually protected either by 0.6m height translucent plastic spiral guards supported by a single stout cane. If required, the soil around all plants will then be suitably firmed and watered.

2.6 Details of Hedgerow Planting

Drawing 1 describes areas to be planted with hedgerows.

The hedgerows would reflect the aim of creating a Lowland Mixed Broadleaved Woodland with dog's mercury in accordance with NVC Woodland W8 (refer to Table 2 below) has been selected for the proposed planting across the site to reflect the assumed nature of the local substrate, which will be inspected and assessed prior to planting, and also to reflect the character of the local landscape.

All plants would be transplants and planted according to the woodland planting above, but at 7 plants per linear m, with the exception of the Ash and Oak which would be feathered tree (175-250cm in height).

The feathered trees will be pit planted with a slightly raised bottom to the pits and scarified sides, with a pit of approximately 1000mm x 1000mm x 750mm depth or as necessary to accommodate their root systems. Backfill will consist of previously excavated material and 9L of sanitized and stabilised, friable compost to PAS 100 per Standard. Stakes will be driven vertically at least 300mm into the bottom of the pit on either side of the tree position before planting. 100mm diameter stakes will be cut off just below the lowest branch of the tree and expanding ties used to firmly but not rigidly secure the tree to the cross bar.

Table 2: Lowland Mixed Woodland Broadleaved Hedgerow Planting Mix

Latin Name	Common Name	% Mix
<i>Fraxinus excelsior</i>	Ash	5
<i>Quercus robur</i>	Pedunculate Oak	5
<i>Acer campestre</i>	Field maple	5
<i>Betula pendula</i>	Silver Birch	5
<i>Sorbus aucuparia</i>	Rowan	5
<i>Corylus avellana</i>	Hazel	10
<i>Crataegus monogyna</i>	Hawthorn	40
<i>Prunus spinosa</i>	Blackthorn	25
		100

2.7 Fencing, Gates and Stiles

The existing network of gates and access points will be maintained.

1.2m high post and barbed wire fencing will be erected around the woodland and hedgerow planting compartments to prevent unwanted access and protect the planting as it establishes. Stiles will be created into each of the planting compartments to permit maintenance access. The post and wire fencing will be constructed to BS 1722: Part 3 and in accordance with the following specification:

- Height: 1250mm;
- Barbed wire: 2 lines double strand barbed wire, 12.5 gauge (galvanised) to be attached at 75mm intervals from post tops;
- Line wires: mild steel, 10 gauge (galvanised), attached to posts at 75mm and 800mm from ground level. Wires to be evenly strained using an approved system;
- Fixings: all wires to be fixed to posts with galvanised wire staples; and
- Treatment: All posts bark peeled and pressure treated.

The straining and intermediate post specification will be as follows:

- Straining posts: 125mm diameter softwood timber rounds (2100mm in length) with one pointed end. 100m in straight runs and at all ends, corners, changes of direction and acute variations in level. Driven to a maximum 800mm into ground, set vertically;
- Struts: 75mm diameter softwood timber rounds (1750mm in length). Notched and nailed into straining posts and anchors;
- Anchors: 125mm diameter softwood timber rounds (700mm in length) with one pointed end. Driven into ground at 90 degrees to struts;
- Single strut/anchor attached to straining posts at ends of fence runs. 2 struts/anchors attached to intermediate straining posts. All struts to be placed in line with fence run direction; and
- Intermediate posts: 75mm diameter softwood timber rounds (1900mm in length) with one pointed end. At 3m maximum intervals between straining posts, or to follow ground levels where appropriate, driven a maximum 600mm into ground, set vertically.

Installation of the post and wire fence will be in straight lines or smoothly flowing curves, with tops of posts following the profile of the ground. All posts will be set rigid, plumb and to specified depth to ensure adequate support. Where new fencing ties into existing fencing at any joins, this will be carried out to achieve an effective barrier.

All stiles will be constructed to BS 5709:1979 and the following specification where appropriate:

- Materials: Gripping/Stile Posts – softwood timber rounds. Rails, Steps and Step Posts – softwood planks. All timbers to be sound and free from cracks, splits, shakes and deformation;
- Finishes: All post tops to be bevelled to shed water. All square edge timber to be chamfered;
- Treatment: All posts bark peeled and pressure treated;
- Posts: Gripping Posts will be 100mm x 2700mm, Post 100mm x 1400mm, both driven maximum 800mm into ground. Rails to be 125mm x 75mm x 1300mm. Steps to be 200mm x 50mm x 1000mm. Step Posts to be 200mm x 50mm x 1200mm (top step) and 200mm x 50mm x 900mm (lower step), both driven maximum 800mm into ground;

- **Fixing/Joints:** Rails to be fixed to Stile Posts with mortice joints (bolts and coach screws to be used to connect members). Steps to be fixed to Step Posts with countersunk head galvanised screws;
- Post will be set rigid, plumb and to specified depth, with correct fastenings and all components securely fixed; and
- All posts and stile tie into existing fencing, to achieve an effective stock proof barrier.

2.8 Water Supply

The requirements and location for a water supply is to be determined locally.

2.9 Programme of Implementation/Phasing

It is proposed to restore the site on a progressive basis:

- Firstly the soil would be recovered from storage and replaced over the identified areas;
- Cultivation and seeding would then be undertaken at the next suitable season, either in the Autumn or Spring; and
- Woodland and hedgerow planting would be carried out in the winter months (December to March).

The details of the restoration programme would be reviewed with the planning authority prior to the commencement of works. An initial draft programme of implementation is provided in Table 3 below.

Table 3: Programme of Implementation

Timings (construction programme and weather dependant)	Operations, to be carried out as required
July/August 2011	• Commencement of earthworks / soil replacement after end of bird nesting season
August/September 2011	• Sowing of grassland areas subject to weather conditions
November 2011-March 2012	• Completion of woodland and hedgerow planting • Erection of gate and fencing around compartments

2.10 Land Drainage

Provision of an artificial land drainage scheme is not considered necessary given the proposed nature conservation afteruse for the site and where some wetness variation may be beneficial in promoting biodiversity.

2.11 Footpaths

The existing network of footpaths will be unaffected by the proposed restoration and outline aftercare scheme.

3.0 OUTLINE AFTERCARE SCHEME

3.1 Introduction

The restored site would be closely monitored throughout a 5 year aftercare period so that the most suitable management regime can be defined on an area-by-area basis. As discussed above, the overall aftercare objective would be nature conservation and the enhancement of biodiversity.

An aftercare management plan would be formulated in accordance with the recommendations of MPG7. This outline scheme provides the overall objectives for the management of the site and the main management operations. It is anticipated that detailed schemes would be submitted to the planning authority in the autumn of each aftercare year. It is also proposed that an aftercare meeting would be held on an annual basis to discuss the condition of the site and to agree the aftercare requirements for the following growing season.

The aftercare scheme would include provision for the safe use of the site including:

- Regular inspections, repairs and records, as well as continuing liaison with local community;
- Clearly visible signage and notices to provide warnings and safety information, such as areas and dangers of steep faces, contact details for emergency services and keyholders;
- Where appropriate, fencing to prevent access; and
- Access to and around site clearly marked to assist arrival of emergency vehicles.

3.2 Monitoring and Personnel

All areas will be closely monitored throughout the 5 year aftercare period by a suitably competent professional so that the most appropriate management regime can be defined on an area-by-area basis. This is likely to consist of a visual inspection on a twice yearly basis to check for good strong foliage and growth and the success of habitats.

3.3 Annual Management Operations

Table 4 presents a summary of main annual management operations and timings and it is proposed that a checklist and detailed record of management operations are maintained by the site operator.

Table 4: Timings of Main Annual Management Operations

Timings	Standard Operations, to be carried out as required
Winter	• Complete record of previous year's operations • Thinning/felling operations • Hedgerow siding up on rotation
Spring	• Visual inspection of vegetation and habitats • Replacement seeding • Weed control • Readjustments and firming of planting areas • Assessment of fertiliser requirements in planted areas
Summer	• Herbicide and grass cut through woodland and hedgerow compartments • Weed control • Grass cut of grassland in late summer (no earlier than mid August); • Assess irrigation / watering
Autumn	• Visual inspection of vegetation and habitats • Weed control • Grass cut of grassland, as deemed necessary. • Review of thinning requirements • Replacement planting

3.4 Vegetation Management

All vegetation will be managed, with the aims of improving wildlife habitat value, amenity and appearance.

The requirements for secondary treatments will be reviewed on an annual basis, in order to identify and remedy any localised problems including:

- Stone-picking - Assessed by visual inspection and any stones lying on the surface that are larger than 100 mm diameter (i.e. they will not pass through a wire screen mesh of 100mm spacing), together with other objects likely to obstruct future cultivation, will be removed from the site;
- Compaction - Assessed by excavating inspection pits or recording areas of standing water in winter, with possible remedy to be subsoiling or other mechanical means;
- Vegetation Failure - Assessed by visual inspection, with possible remedy to be cultivation and re-seeding/planting; and
- Pruning may take place at certain times, as required, to remove dead or dying and diseased wood to promote healthy growth and natural shape. All pruning should be carried out in accordance with good horticultural practices. All tree works are to be carried out by an approved member of the Arboricultural Association.

3.5 Grassland cutting

All grassland and natural regeneration areas will be managed throughout the aftercare period to promote floristic diversity and associated wildlife.

In general, grasses and wildflowers will be allowed to grow tall, flower and seed from May through to July/August. The meadows should then be cut back annually in late summer to approximately 75-100mm, leaving uncut margins each year on alternate rotation. Autumn mowing could then be undertaken as deemed appropriate and all arisings removed to a compost heap.

Growth and establishment of grasslands may be slow initially. Weed growth is easily controlled by topping or mowing in the first growing season but some thistle growth is to be actively managed as a good food source for birds.

3.6 Hedgerow Management

All hedges will be cut to a height of 2.5 - 3m, in a tall "A-shape" on rotation. All cutting will take place outside of bird nesting season (bird nesting season is the beginning of March to end of August inclusive). Checks will be undertaken to ensure there are no breeding birds present before work is undertaken.

3.7 Weed Control

It is acknowledged that under the provisions of the Weeds Act 1959, it is the responsibility of all occupiers of land - whether used for agriculture or not, to control injurious weeds, so that they do not spread. Weeds will be controlled by the appropriate application of herbicides by a certified competent person, according to manufacturer's instructions and in accordance with the Environment Agency Guidelines with regard to potential applications adjacent to the watercourses/bodies or, in areas of grass, by cutting.

Furthermore, as part of the habitat management, where an individual plant species dominates an area, it may be beneficial to remove a proportion to allow other species to colonise or be introduced and increase species diversity.

Section 14 of the Wildlife and Countryside Act 1981 prohibits the establishment of particular non-native invasive species listed in Schedule 9 Part 2 of the Wildlife and Countryside Act 1981 (variation 6th April 2010). Particularly invasive non-native plants which if found to be present would need to be eradicated include (for complete list refer to Schedule 9 Part 2 of the Wildlife and Countryside Act 1981):

- Giant Hogweed (*Heracleum mantegazzianum*) - poses a public health hazard because its sap will cause a skin rash in the presence of sunlight;
- Japanese Knotweed (*Fallopia japonica var japonica*) - forms dense thickets displacing native plants;
- Himalayan Balsam (*Impatiens glandulifera*) - spreads by seeds explosively propelled from ripened pods;
- Australian Swamp Stonecrop (*Crassula helmsii*) - quickly out-competes all native vegetation and maintains dominance through very rapid growth and uptake of almost all available nutrients;
- Parrot's Feather (*Myriophyllum aquaticum*) - propagates by growth from small fragments that are easily spread when the brittle stems break; and

- Floating Pennywort (*Hydrocotyle ranunculoides*) – forms dense interwoven mats that quickly cover water surfaces.

All areas of the site will be monitored for the aforementioned plant species on at least a twice yearly basis, during the growing season. Where these plants are identified and where possible, appropriate measures, specific to the plant species will be taken to eradicate them, such as described by the Environment Agency leaflet '*Guidance for the control of invasive plants in or near fresh water*'. The Environment Agency identifies the following basic methods of controlling invasive plants:

- Mechanical – cultivation, hoeing, pulling, cutting, raking, dredging or other machinery to uproot or cut plants;
- Chemical – herbicides to kill plants;
- Natural – specific pests and diseases to weaken the target plant; and
- Environmental – alteration of the environment to make it less suitable for plant growth.

Where weeds are to be controlled by the application of herbicides this will be carried out by a certified competent person, according to manufacturer's instructions (For example, NPTC Certificate of Competence for use of Pesticides). Herbicides will not be used within 10m of ponds, ditches or streams. It is also acknowledged that:

- The Food and Environment Protection Act 1985 requires approval from the Environment Agency before using herbicides in or near water (refer also to Environment Agency Guidance Notes AqHerb01: Agreement to use herbicides in or near water);
- A waste license is required to remove Japanese Knotweed to a waste disposal facility; and
- All waste materials, including weeds, are subject to the Duty of Care and must only be transferred to, and carried by, registered waste carriers.

3.7.1 Weed control within planting areas

All woodland and hedgerow planting areas will be maintained free of vegetative competition (i.e. weeds) by the application of herbicide to a 1m diameter around the base of each plant, using a controlled droplet applicator, or similar, to minimise spray drift, for the first three years after planting.

All tree and shrub guards will be kept free from weeds, by careful checking and folding out of any growth for spraying.

Some bramble growth will be allowed to provide valuable scrub cover for wildlife but any substantial increase in bramble cover will be checked.

3.8 Fertiliser

Fertiliser requirements will be assessed on an annual basis according to the vegetation type and condition.

Areas of grassland will not receive fertiliser as the residual nutrient pool within the restored ground will be sufficient to allow the development of the grass sward as floristically diverse grassland and discourage the dominance of competitive species.

Tree and shrub planting may receive slow-release fertiliser, applied to the base of each plant, according to manufacturer's instructions, at the end of the second growing season, following planting, if deemed necessary.

3.9 Replacements

All planting failures (including where removed, dies or becomes seriously damaged or diseased) will be replaced on an annual basis, to ensure 95% maintenance of the densities/land cover.

All replacements will use plants of the same species or other such species as may be agreed with the Local Planning Authority. If abnormal plant failures persist then investigations and proposals for the remedying of site conditions will be prepared and agreed with the Local Planning Authority.

3.10 Tree and shrub accessories

All guards and canes which have become loose, over-tight or broken will be re-adjusted and any plants that become loose will also be re-firmed and adjusted, during early spring, on an annual basis.

At approximately year 5 all stakes and tubes will be removed from trees and shrubs and disposed of at a suitable facility.

3.11 Irrigation/watering

Requirements for irrigation/watering will be assessed on an annual basis, in particular any new areas of planting and during the drier, summer months.

4.0 CLOSURE

This report has been prepared by SLR Consulting Limited with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

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