



**New England Resource Recovery Centre
Nr. Lee Mill, Devon**

Technical Appendix 12-2 – Habitat Surveys

Viridor

**January 2010
SLR Ref: 402-0036-00350**



solutions for today's environment

CONTENTS

1.0	INTRODUCTION.....	1
1.1	Background	1
1.2	Study Aims and Objectives	1
2.0	SURVEY METHODOLOGY	2
2.1	Extended Phase 1 Habitat Survey.....	2
2.2	National Vegetation Classification Survey.....	2
2.3	Study Area	3
2.4	Survey Personnel	3
2.5	Limitations to Survey	3
3.0	EXTENDED PHASE 1 HABITAT SURVEY RESULTS	5
3.1	Site Overview	5
3.2	Habitats	5
3.3	Protected and Notable Species.....	8
4.0	WOODLAND NVC SURVEY RESULTS	11
4.1	Broad Habitat Description	11
4.2	Field Survey Results – Woodland Community Types.....	11
5.0	DISCUSSION.....	13
5.1	Woodland Habitats	13
5.2	Other Habitats.....	14
5.3	Potential Value to Fauna.....	15
6.0	SUMMARY AND CONCLUSIONS	17
7.0	CLOSURE.....	18

TABLES

Table 1 – Domin Score	2
Table 2 - Target Notes	7

DRAWINGS

Drawing 1 Phase One Habitat Plan

Drawing 2 – NVC Woodland Quadrat Plan

1.0 INTRODUCTION

1.1 Background

Viridor commissioned SLR Consulting Ltd (SLR) to undertake an Extended Phase 1 Habitat survey in support of a planning application for a Resource Recovery Centre at New England Quarry near Ivybridge in Devon.

Viridor also commissioned SLR to undertake a Phase II botanical survey of semi-natural woodland habitats at the site – namely Challonsleigh Plantation, Southwood Woods and Swainstone Hams.

1.2 Study Aims and Objectives

1.2.1 Extended Phase 1 Habitat Survey

The aims of the Extended Phase 1 Habitat survey were to:

- Classify and map all broad habitat types within the site and surrounding areas;
- Highlight and describe any features of nature conservation interest;
- Broadly assess the intrinsic ecological value of the habitat types present;
- Assess the potential of habitats present to support protected species;
- Make recommendations for any necessary further survey / licensing requirements as appropriate.

The objectives of this survey were to:

- Provide the local planning authority with relevant information to aid determination of the planning process in respect of ecology; and
- Inform the scope of any further ecological assessments at the site.

1.2.2 Woodland NVC Survey

The aim of the Phase II woodland survey was to determine with greater detail the woodland communities present within the study area. The survey aimed to establish the current condition and distribution of woodland communities and to compare the current baseline with that described in the County Wildlife Site citation for these areas of woodland.

This survey report does not provide details of mitigation proposals, which are described in Chapter 12 of the Environmental Statement.

2.0 SURVEY METHODOLOGY

2.1 Extended Phase 1 Habitat Survey

An 'Extended' Phase 1 Habitat survey was carried out in accordance with the methodology produced by JNCC¹ and the former IEA. Extended Phase I Habitat surveys follow the same general approach as conventional Phase I Habitat surveys; mapping all broad habitat types. However greater emphasis is placed on recording protected and notable species, as well as identifying features and habitats capable of supporting such species. Special attention was given to the potential use of the site by species protected under European or British legislation², local and national Biodiversity Action Plan species or other notable species. Species relative abundance is also inferred according to the DAFOR scale; Dominant, Abundant, Frequent, Occasional or Rare.

2.2 National Vegetation Classification Survey

The survey was carried out using the standard National Vegetation Classification (NVC) survey methodology³ on the 21st May 2009. The survey was conducted during dry and sunny weather conditions and during the optimal season for woodland botanical survey.

An initial walkover of the woodland study area was undertaken, in order to map the broad woodland community types present. Quadrats were placed in broadly homogenous stands along the valley floor with the aim of characterising the main woodland community types present (see Plan 2).

The method used was based upon the standard methodology for NVC survey, i.e. the detailed mapping of vegetation communities to sub-community level using quadrats as the basis for recording⁴. Vegetation was sampled using standard-sized quadrats with a 50 x 50m quadrat used to assess the canopy and understory composition, 4x4m quadrats to assess the ground layer. In woodlands with limited ground flora, i.e. in *Fagus*-dominated areas, a 10x10m quadrat was used. Within each quadrat, the species present were identified and their frequency and cover recorded according to the Domin score as shown in Table 1.

Table 1 – Domin Score

% Cover	Domin Score
91 – 100	10
76 – 90	9
51 – 75	8
34 – 50	7

¹ JNCC (1990) *Handbook for Phase 1 Habitat Survey Manual*.

² protected under the Conservation (Natural Habitats &c.) Regulations 1994 (as amended), and Wildlife and Countryside Act, 1981 (as amended)

³ Rodwell, J.S. (2006). *National Vegetation Classification, Users' Handbook*. Joint Nature Conservation Council, Peterborough.

⁴ Rodwell, J.S. (editor) (1991) *British Plant Communities Volume 1- Woodlands and scrub (1991)* Cambridge University Press.

% Cover		Domin Score
26 – 33		6
11 – 25		5
4 – 10		4
< 4	With many individuals	3
	with several individuals	2
	with few individuals	1

The quadrat data from each vegetation stand was analysed using a version of Tablefit⁵ and cross-reference to the keys, constancy tables and community descriptions in NVC British Plant Communities, Volume 1, Woodlands and Scrub (Rodwell, 1991). Using a combination of these analyses and professional judgement, each woodland community identified has been described as a 'best fit' with those communities identified by the NVC.

2.3 Study Area

The Extended Phase 1 Habitat survey area was that delineated by the planning application boundary and the surrounding 30m annulus, where considered appropriate this area was extended further such as in the woodland components where the proposed development will impact on a small portion of the total area but has potential to cause fragmentation or affect species reliant on the habitat as a whole. The surrounding land was assessed either from the site, surrounding roads or through the use of aerial photography to inform the relevance of the habitats in the immediate context of the landscape.

The location of the NVC quadrates are shown on Plan 2.

2.4 Survey Personnel

The surveys were conducted by Jon Taylor CEnv and Niall Lusby, both employees of SLR, members of the Institute of Ecology and Environmental Management, and experienced botanical surveyors.

2.5 Limitations to Survey

Some areas of the Extended Phase 1 survey areas were not accessed due to safety concerns such as the benches of the quarry face or due to the dense nature of scrub belts. For those areas that were inaccessible, assessments on the habitats were made from accessible areas or through comparison to similar habitats adjacent that were safe to access. The survey was updated throughout the year with many repeat visits to the site undertaken relating to other ecological works ongoing on the site. As such it is considered that the habitats and species lists are comprehensive and sufficient to achieve the aims set out in Section 1.2 above.

To the west of the quarry void are two low lying fields designated as New England Fields County Wildlife Site for the presence of species-rich marshy grassland, however this area was not included in the Extended Phase 1 Habitat survey by SLR during the 2008-09 season due to its late inclusion into the design scheme. A survey undertaken by Acorn Ecology in 2005 is the basis for the description provided herein; this area is considered unlikely to have changed significantly in character or quality in the intervening period.

⁵ Computer programme Hill, M.O. (1996). *TABLEFIT version 1.0, for identification of vegetation types*. Huntingdon: Institute of Terrestrial Ecology.

It is considered that the results obtained during the woodland NVC survey are sufficient to identify the representative woodland community types which are present within the study area. However, the surveys undertaken did not aim to provide a comprehensive census of woodland plants within the areas studied and very early and late flowering species may have overlooked or under-recorded due to the timing of the survey.

Due to the relatively small size of the woodland stands identified, only single quadrats were surveyed. Due to the small sample size, confidence in the Tablefit analysis is low and a greater emphasis has been placed upon the qualitative assessment methods described.

3.0 EXTENDED PHASE 1 HABITAT SURVEY RESULTS

3.1 Site Overview

The main body of the site is a dolerite quarry set into the side of a valley, the River Yealm runs along the eastern boundary of the site with ancient woodland in the bottom and sides of the valley. The wider landscape is dominated by pasture with well managed hedgerow field boundaries. The main body of the site is comprised of the workings of the quarry with a large flooded void dominating, associated cliffs with benches, spoil heaps and abandoned buildings. The habitats are becoming naturalised with species-rich grassland developing in places on the quarry benches and scrub developing elsewhere. The margins of the site are dominated by gorse and willow scrub and in places mature woodland.

The proposed access road also extends from the north eastern corner of the main site across the River Yealm, through mature broadleaved woodland and north through grassland and scrub habitats to the A38. No existing track is present along the route.

3.2 Habitats

3.2.1 Broadleaved Woodland

Much of the east of the site is comprised of broadleaved woodland, however the stand types differ significantly over this area. Within the main site much of the woodland is secondary and has established over old spoil heaps on the margins of the site over the past 50-60 years. Between the main void and the old site buildings there is a spur of land that is listed as ancient woodland, with semi-mature ash (*Fraxinus excelsior*) dominating the canopy with occasional sycamore (*Acer pseudoplatanus*) and English elm (*Ulmus procera*), hazel (*Corylus avellana*) dominates the understory with occasional English elm and hawthorn (*Crataegus monogyna*) while the understory is relatively diverse with hart's tongue fern (*Asplenium scolopendrium*), scaly male fern (*Dryopteris affinis*), broad buckler fern (*Dryopteris dilatata*), dog's mercury (*Mercurialis perennis*) and sanicle (*Sanicula europaea*). The northern and eastern edges of the working areas are dominated by goat willow and European gorse, with semi-mature ash, beech, English oak and sycamore becoming more frequent on the established spoil heaps, the groundflora is sparse in these areas mostly being comprised of bramble, moss species and harts-tongue fern.

The woodland to the north of the worked area (Southwood Woods) is dominated by mature oak (*Quercus robur*) with ash, alder and crack willow, with an understory of hazel, hawthorn and blackthorn, and a damp ground flora becoming wetter close to the stream which flows through it from west to east. This area appears relatively semi-natural in nature with the exception of localised plantings of Douglas fir (*Pseudotsuga menziesii*) and golden poplar (*Populus x Canadensis Serotina Aurea*). To the east of the worked area (west of the River Yealm) the woodland becomes more typical open wet woodland dominated by alder (*Alnus glutinosa*) with ash and a wet groundflora of tall herbs including yellow iris (*Iris pseudacorus*), alternative-leaved golden saxifrage (*Chrysosplenium alternifolium*), hemlock water drop-wort (*Oenanthe crocata*) and meadowsweet (*Filipendula ulmaria*). In places reed canary-grass (*Phalaris arundinacea*) is prevalent and occasional clumps of sedge (*Carex* spp.) species are apparent, reflecting the saturated nature of the ground conditions.

The woodland to the east of the River Yealm (Strashleigh Hams) is also variable in structure and composition, with mature beech (*Fagus sylvatica*) plantation dominating the southern half; this area is relatively dry with an open structure due to a closed canopy of dominant beech with occasional ash and sycamore which creates heavily shaded areas. The understory is limited in these areas comprising occasional holly (*Ilex aquifolium*) and hazel,

and a ground flora of ivy (*Hedera helix*), great wood-rush (*Luzula sylvatica*), wild garlic (*Allium ursinum*) and bluebell (*Hyacinthoides non-scripta*). North of this area the woodland is dominated by an ash / sycamore canopy with occasional mature oaks, and limited hazel / holly understorey with a ground flora dominated by dog's mercury and bluebell, with occasional yellow archangel (*Lamiastrum galeobdolon*), wood speedwell (*Veronica montana*), bramble and sanicle. An area at the northern end of the woodland is less mature in structure as a result of having been felled in the 1980's, although the species composition is similar to that of the adjacent ash / sycamore woodland. Small areas of wet woodland are also present within Strashleigh Hams, occurring in low lying hollows and alongside small water courses. These are dominated by alder with occasional ash, sycamore and grey willow (*Salix cinerea*), and a wet ground flora of hemlock water-dropwort (*Oenanthe crocata*), wild angelica (*Smyrindrum olusatrum*), yellow iris and reed canary-grass

3.2.2 Unimproved Neutral Grassland

The upper benches of the quarry void have established as species-rich, short rabbit grazed sward of unimproved neutral grassland which is dominated by herbaceous species including birds-foot trefoil (*Lotus corniculatus*), common centaury (*Centaurea erythraea*), rough hawkbit (*Leontodon hispidus*), selfheal, common mouse-ear (*Cerastium fontanum*), red clover, common cat's-ear (*Hypochaeris radicata*), common sorrel (*Rumex acetosa*), mouse eared hawkweed (*Pilosella officinarum*) and fine grasses of red fescue (*Festuca rubra*), bent (*Agrostis* spp.), crested dog's-tail (*Cynosurus cristatus*), meadow foxtail (*Alopecurus pratensis*) and silver hair-grass (*Aira caryophyllea*).

3.2.3 Ephemeral / Short Perennial

The lower benches, open spoil heaps and former processing areas are the most recent to become colonised and are vegetated with a sparse but species rich assemblage of annuals including black medick (*Medicago lupulina*), wild strawberry (*Fragaria vesca*), bird's-foot trefoil, mouse-eared hawkweed, fairy flax (*Linum catharticum*), common centaury, eyebright (*Euphrasia* spp.) and common spotted orchid (*Dactylorhiza fuchsii*), with occasional grasses colonising including rough meadow-grass (*Poa trivialis*), Yorkshire fog (*Holcus lanatus*), sterile brome (*Bromus sterilis*), fern grass (*Catapodium rigidum*) and false brome (*Brachypodium sylvaticum*).

Several shallow ephemeral waterbodies also present in the former processing area, where marsh bedstraw (*Galium palustre*), creeping yellow-cress (*Rorippa sylvestris*) and coltsfoot (*Tussilago farfara*) also occur, while more permanent wet areas include common spike-rush (*Eleocharis palustris*), pendulous sedge (*Carex pendulosa*), lesser bulrush (*Typha angustifolia*), curled dock (*Rumex crispus*) and marsh valerian (*Valeriana dioica*). Scrub is colonising and encroaching in places, predominately comprising specimens of buddleia (*Buddleja davidii*), grey willow, goat willow (*Salix caprea*), alder, dog rose (*Rosa canina*), European gorse (*Ulex europaeus*) and bramble.

3.2.4 Scrub

The margins of the northern half of the worked area are dominated by scrub which has colonised over spoil heaps and is dominated by dense grey willow, goat willow, European gorse, downy birch (*Betula pubescens*), and buddleja.

Scrub is also beginning to colonise the upper benches in the southern half of the site and encroach on area of species-rich grassland; this includes scattered specimens of European gorse, goat willow and buddleia.

The proposed access road also passes through areas of buddleia and willow scrub to the west of Strashleigh Tip.

3.2.5 Standing Water

Two areas of standing water are present in the base of the quarry void. The largest is a deep cutting down into the rock which is broadly circular in shape and measures approximately 150m in diameter; the water is very clear, and devoid of marginal and aquatic vegetation. A shallow depression in the quarry floor is also present to the south of this; this feature is broadly crescent shaped, measuring approximately 20-30m wide and 150m long, with a depth of less than 1m, this water body is also devoid of vegetation.

3.2.6 River Yealm

The River Yealm lies to the east of the former quarry site and flows in a north – south direction. This section is a shallow fast flowing river in a 5-10m channel of cobbles and riffles, with occasional deep pools and sand banks. It is flanked by mature and very-mature overhanging trees with exposed root systems, with woodland to the east (Channonsleigh Plantation) dominated by an open high canopy of mature beech, while woodland to the west (Southwood Wood) is wet dominated by alder and ash.

3.2.7 Marshy Grassland

The eastern field is of level topography with springs issuing giving way to wet grassland with the species typical of this habitat present including yellow iris, soft rush (*Juncus effusus*), bird's-foot trefoil, lesser spearwort (*Ranunculus flammula*), compact rush (*Juncus conglomeratus*), water mint (*Mentha aquatica*), meadowsweet, jointed rush (*Juncus articulatus*) and marsh thistle (*Cirsium palustre*). The western field has a raised southern end with improved grassland while the northern extent is also wet grassland with similar species composition to the eastern field, with the addition brooklime (*Veronica beccabunga*), wild angelica, purple loosestrife (*Lythrum salicaria*) and perforate St John's-wort (*Hypericum perforatum*).

Table 2 - Target Notes

Target Note	Description
1	River Yealm – A 4 – 8m wide river with a gentle gradient and natural channel topography with riffles and pools, gentle meanders with river cliffs and point bars. The channel is largely free from vegetation with occasional hemlock water dropwort and Himalayan balsam (<i>Impatiens glandulifera</i>) on shingle banks in the centre of the river and moss covered boulders.
2	Ash-sycamore woodland. This woodland is well structured with a high canopy and diverse age range in the stand. The groundflora is tall and dominated by dog's mercury, wild garlic and bluebell. Frequent yellow arch angel, honeysuckle, ivy, wood speedwell and bramble is also present with occasional greater stitchwort, moschatel and sanicle.
3	Beech plantation – very mature beech dominates the canopy with a subsequently reduced shrub layer giving a very open woodland. Outside of these areas the woodland is dominated by sycamore, English oak, holly and occasional hazel. The groundflora in this area is dominated by great woodrush with occasional daffodil and isolated patches of bluebell.
4	Alder dominated wet woodland with frequent sycamore and grey willow, occasional English oak is also present with a groundflora that reflects the saturated nature of the soil, with hemlock water-dropwort dominating with frequent reed canary-grass, yellow iris, alternate-leaved golden-saxifrage, yellow pimpernel, and marsh valerian.
5	Dense scrub – this habitat abounds within the abandoned quarry site. Typically dominated by European gorse and grey willow with frequent bramble and ruderals

Target Note	Description
	on the margins. This area lacks a well developed field layer due to the dense litter level created by the gorse. Occasional harts fern is present in the scrub areas where they have developed on old spoil heaps.
6	Old quarry buildings – a series of scattered single storey buildings in various states of disrepair and construction styles. Some are formed of concrete rendered brick, with flat roofs, others with simple corrugated steel sheet construction and an old prefabricated office building with a bitumen flat roof. Some of these buildings support roosting bats.
7	Tunnels - A five metre tall stone construction built into the bank, facing the southern boundary road. This structure is covered with ivy and has mature sycamores growing through the masonry in places. A series of chutes appear to pass through this structure vertically and into three tunnels that open from the road frontage horizontally and extend 5m into the banks and are concrete lined with steel plates on the roof where the vertical chutes enter the tunnels. Bats have been observed roosting within these tunnels.
8	Quarry void – a single large flooded void with no apparent aquatic vegetation. No fish were observed in the void but reports of smooth newt and frogs have been received. Close to the water level of the main void is a another shallow pool which has formed on a flooded bench; this area has no established aquatic vegetation and appears to dry out in hot summers.
9	Species-rich unimproved neutral grassland. The benches of the quarry have developed a herb rich sward, with the shallow soil that has formed precluding the dominance of aggressive grass species. With common cats-ear (<i>Hypochaeris radicata</i>) ribwort plantain (<i>Plantago lanceolata</i>), perforate St john's-wort (<i>Hypericum perforatum</i>), common ragwort (<i>Senecio jacobaea</i>), selfheal (<i>Prunella vulgaris</i>), wild strawberry, wood sage (<i>Teucrium scorodonia</i>) and thyme-leaved speedwell (<i>Veronica serpyllifolia</i>).
10	Hedgerows – in the surrounding landscape and adjacent fields, traditional Devon style steeped hedge banks are present, typically dense and regularly flailed they are dense and in good condition. With hazel, hawthorn, blackthorn, oak, holly and beech.
11	Large badger sett along hedge bank. With over twenty openings many with signs of recent use and extending approximately 70m along the bank.

3.3 Protected and Notable Species

The data search received from DBRC and a web based search using the NBN Gateway³ contained records for the following species;

Badger

Seven records were returned for badger (*Meles meles*) from DBRC the closest of which pertained to road casualties on the A38, 1km north of the site. A large badger sett was also noted on the eastern edge of Southwood wood approximately 100m from the site boundary.

Otter

A single record was returned for otter (*Lutra lutra*) within the search area; this relates to the A38 to the north of the site. The River Yealm which runs adjacent to the main quarry site provides good potential to support this species with naturalised banks and woodland cover.

Bats

Four records of bats were returned in the data search (DBRC and Devon Bat Group); three related to buildings within the site itself, two of which were unidentified, while the third corresponds to a common pipistrelle (*Pipistrellus pipistrellus*) in the weighbridge / canteen building. A record for nathusius pipistrelle (*Pipistrellus nathusi*) was also returned from Sparkwell approximately 3.5km north of the site.

Records held on the NBN data base show records of six species of bat within a 3km radius of the site including greater horseshoe (*Rhinolophus ferrumequinum*), lesser horseshoe (*R. hipposideros*), brown long-eared (*Plecotus auritus*), natterers (*Myotis nattereri*), pipistrelle and Daubenton's (*Myotis daubentonii*). Serotine (*Eptesicus serotinus*), whiskered / Brandt's spp. and barbastelle (*Barbastella barbastellus*) have been recorded within a 10km radius of the site. County Wildlife Site designations of the application site surrounds and biodiversity audits undertaken of the site have recorded horseshoes and pipistrelle roosting in site structures.

Reptiles

A single record of grass snake (*Natrix natrix*) was returned 800m north of the site, close to the proposed access road. Records from the NBN gateway website³ show that adder (*Viper berus*), common lizard (*Zootica vivipara*) and slow worm (*Anguis fragilis*) are all present within the wider landscape of the application site but no records were from within 2km of the site.

Dormouse

No records of dormouse were returned from DBRC however 15 records were listed on the NBN database with the closest being approximately 6km south-east of the application site. A survey undertaken by Michel Hughs Associates previously at the site recorded the presence of dormouse in the wooded ridge to the south of the quarry void in 2006, the woodland and scrub habitats on the margins of the site also have potential to support this species.

Hedgehog

Records of hedgehog (*Erinaceus europaeus*) have been returned from both the NBN and DBRC both within 1.5km to the north of the site. Habitats within the site are suitable to support this species.

Fish

Atlantic salmon (*Salmo salar*), bullhead (*Cottus gobi*) and lamprey (*Lampetra* spp.) have all been recorded in the River Yealm adjacent to the site, with records held by the NBN gateway corresponding to Environment Agency samples taken at Popples bridge and within Southwood Wood.

Other Species

Other species shown to be within the same 10km quadrant of the site on the NBN website were brown hare (*Lepus europaeus*), harvest mouse (*Micromys minutus*), water shrew (*Neomys fodiens*) and polecat (*Mustela putorius*) however all of these species were over 6km from the site. Polecat was also recorded in 1998, approximately 2km north-east of the site.

Notable Habitats

The woodland resource within part of the proposed access route has been identified as ancient semi-natural woodland which make up much of the County Wildlife Site (CWS) designation. The remainder of the designated area is comprised of wet woodland, which is also an ecologically important woodland habitat type.

Marshy grassland fields in the north west corner of the site are also designated as CWSs due to the diverse assemblage of aquatic and marginal plants which they support.

4.0 WOODLAND NVC SURVEY RESULTS

4.1 Broad Habitat Description

Semi-natural broadleaved woodland on the banks of the River Yealm show a gradual shift between community types, largely influenced by differing hydrological regimes and woodland management.

The valley floor woodland shows some evidence of past management and a large block of the woodland is dominated by a canopy of mature beech (*Fagus sylvatica*) which is probably of plantation origin. Smaller plantations of Douglas fir (*Pseudotsuga menziesii*) and poplar species are more modern recent and have a lesser influence on the woodland community types present. Mature standard English oaks (*Quercus robur*), abundant ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*) occur scattered throughout the woodland, with willow (*Salix* sp.) and alder (*Alnus glutinosa*) dominating in wetter stands.

A series of earth works were identified immediately north and east of quadrat 5 and may be remnants of former trackways from the adjacent quarry, now a landfill.

4.2 Field Survey Results – Woodland Community Types

The results of the Phase II survey are included as Appendix 1. Table A1/1 lists all the species recorded in each quadrat with the locations of quadrats shown on Drawing 1. Table A1/2 illustrates the closest match to NVC community types for each quadrat using Tablefit. The following section describes each woodland type recorded in more detail.

The vegetation sampled was found to be broadly representative of three woodland community types:

- **W8** - *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland
- **W12a** *Fagus sylvatica*-*Mercurialis perennis* woodland *Mercurialis perennis* sub-community
- **W7a** – *Alnus glutinosa*-*Fraxinus excelsior*-*Lysimachia nemorum* woodland *Urtica dioica* sub-community

Typically NVC W8 is the climax woodland community on relatively dry calcareous soils in lowland Britain; although field maple (*Acer campestre*) is uncommon in wetter peninsular areas of south-west Britain, where it is usually replaced with sycamore (*Acer pseudoplatanus*). This type of woodland dominated the areas of drier woodland outside of the beech plantation.

Quadrats 1, 4 and 5 recorded a woodland community that closely resembles the NVC W8 community type. Survey results indicate that woodlands were most closely associated with NVC W8d *Hedera helix* sub-community, although the stands surveyed were generally more species-rich than would typically be expected; perhaps indicative that continued management was interrupting canopy shade and reducing the dominance of ivy. Bluebell, yellow archangel and great woodrush were frequent in the ground flora throughout this woodland type. Within this community, small stands were dominated by wild garlic (*Allium ursinum*), e.g. in quadrat 1, and therefore this stand is more closely associated with W8f *Fraxinus excelsior*-*Acer campestre*-*Mercurialis perennis* woodland *Allium ursinum* sub-community.

Quadrats 2 and 3 also showed similarity in ground flora with the W8 NVC community, although with beech (*Fagus sylvatica*) dominant in the canopy. These woodlands are there perhaps best considered as W12a *Fagus sylvatica-Mercurialis perennis* woodland *Mercurialis perennis* sub-community.

The survey results indicate that for the majority of the drier woodlands surveyed the influence of management type, e.g. selection for a beech-dominated high forest management system, is a more important factor on the woodland communities present here than any edaphic (soil) or micro-climatic differences.

One quadrat was taken in wet woodland areas, which occur on both sides of the River Yealm valley floor, typically occurring in shallow flushed areas where side streams drain into the main river channel. The community type surveyed most closely resembled W7a – *Alnus glutinosa-Fraxinus excelsior-Lysimachia nemorum* woodland *Urtica dioica* sub-community.

5.0 DISCUSSION

5.1 Woodland Habitats

5.1.1 Woodland Communities

The woodland community types identified during the current survey are typical of the community types expected to occur in semi-natural broad-leaved woodlands on base-rich soils in the south-west of England. The majority of variation observed can be related to management interventions selecting, and most likely supplemented by planting, beech as a high-forest canopy tree to replace ash and oak. The community types recorded are typical and widespread within the UK.

Flushed areas of the valley floor support an alder-dominated woodland community that is also typical of these conditions and local but relatively widespread in the UK. The community is more typically found in the wetter north and west of the country. Due to the local distribution of flush and/or spring-influenced semi-natural woodlands, woodlands of this type have been identified as a priority for action in the UK Biodiversity Action Plan⁶ and are identified as an Annex 1 habitat within the EU Habitats Directive 1992 (Habitat type 91E0 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*)⁷. The JNCC has identified 6500 hectares of this community type in the UK with 2500 hectares in England.

The current survey has shown that the woodland is similar in condition to that described in the citation for the County Wildlife Site – Mackerall Parks, Southwood Woods Strashleigh Hams CWS⁸; these areas are therefore still considered to be of **County** value.

Much of the woodland surveyed is also identified as Ancient Semi-Natural Woodland on the Ancient Woodland Inventory⁹ with the exception of the wet woodland of Southwood Woods, however areas of Plantation on and Ancient Woodland Site are also considered to be present within Challonsleigh Plantation and Swainstone Hams however these areas are still considered to be ecologically valuable. Field survey has confirmed that the woodland supports a number of species and features that are typical of ancient woodlands.

5.1.2 Woodland Species

The current survey did not identify any species that are recognised as nationally rare or uncommon. However, the woodland habitats surveyed do support a number of species that are considered indicators of ancient woodlands in the south-west¹⁰, i.e.

- Sanicle;
- Moschatel;
- Yellow archangel;
- Ramsons/wild garlic;
- Great wood rush;
- Yellow pimpernel;
- Wood meadow grass;

⁶ (<http://www.ukbap.org.uk/UKPlans.aspx?ID=4>)

⁷ <http://www.jncc.gov.uk/publications/JNCC312/habitat.asp?FeatureIntCode=H91E0>

⁸ Devon Wildlife Trust – Site Survey Card (30/10/92) File Ref: 55SE26

⁹ <http://www.magic.gov.uk/website/magic/> (NGR SX 598 544) Last accessed 26/11/09

¹⁰ Rose, F (1999) *Indicators of Ancient Woodland*. British Wildlife. April 1999 p 241 - 251

- Pignut.

Spindle (*Euonymus europaeus*), another ancient woodland indicator in the south-west, has also been recorded within the woodland in the past⁸.

5.1.3 Summary Evaluation

Using criteria described by the Institute of Ecology and Environmental Management¹¹ and with reference to the 'Ratcliffe' criteria¹² the contiguous block of woodland known as Mackerall Parks, Southwood Woods & Strasleigh Hams is considered to be of county value. This woodland includes a variety of woodland community types typical of the prevailing conditions and a large block of ancient semi-natural woodland and replanted ancient woodland. The woodland is quite species-rich and supports a number of indicators of ancient woodlands, which confirm the community's long-established nature, naturalness and representativeness.

Wet woodland habitats identified within the wider woodland block characterised above are sufficiently diverse and uncommon locally and nationally that they are considered to be of county value independent of the value of surrounding habitats.

5.2 Other Habitats

A number of habitats of county significance were recorded during the habitat survey, with marshy grassland, ancient semi-natural woodland and wet woodland present within or adjacent to the application site. While none of these habitats receive legal protection they are included in the national and local BAPs, and are also protected through the local planning policies.

5.2.1 Ephemeral Vegetation

The areas of relatively sparse ephemeral vegetation are still species-rich in places. This type of habitat is likely to be relatively uncommon in the local pastoral landscape and is therefore considered to be significant at a **Parish** (Yealmton) level.

5.2.2 Unimproved Neutral Grassland

The areas of unimproved neutral grassland on the tops of the quarry are herb-rich. These areas are therefore considered to be significant in a **Parish** context.

5.2.3 Marshy Grassland

The marshy grassland area to the north west of the main void has declined hugely in its abundance in the last 50 years through drainage and other agricultural grassland improvements. As such it is very important within south Devon due to the diversity of plants and other species that rely on such habitats. This habitat is confirmed as being of **County** importance through its designation as a County Wildlife Site.

¹¹ IEEM (2006) *Guidelines for Ecological Impact Assessment in the United Kingdom*

¹² Ratcliffe – Criteria for determining the nature conservation value of a site, first published in A Nature Conservation Review (1977).

5.2.4 River Yealm

The River Yealm forms an important ecological link between Dartmoor to the north and the Yealm estuary to the south. The river also feeds into the Plymouth and Sounds SAC and plays a vital role in the dynamics and ecological processes of this sensitive ecosystem. The stretch adjacent to the site is also of inherently high ecological value due to its mature trees, riffles and sand banks. The River Yealm is therefore considered to be of **County** significance.

5.3 Potential Value to Fauna

5.3.1 Bats

Archived records of nine bat species in the wider area indicate that the site is situated in a landscape that is very important for bat species. Buildings, tunnels, rock faces and mature trees within the site all offer potential roost features for a wide range of bat species. Indeed, the desk study has records of bats for the site and signs, while greater horseshoe and lesser horseshoe droppings were also recorded in some of these during the survey confirming these species roost on site. Horseshoe bats have a very restricted range (south west England) and are much less common than other species of bat at a UK wide level. Running and standing water, woodland, scrub and species rich grasslands also provide an excellent foraging resource and potential commuting corridors for local bat populations.

Further detail on the species of bat present within the site and the legal implications and mitigation strategies can be found in Technical Appendix 12.4.

5.3.2 Otter

The River Yealm runs alongside the main body of the application site and provides high potential habitat for this species. The records received for the site were sparse though records for the wider area of the application site suggest that the otter population within Devon is very strong.

Further surveys of the river have confirmed the presence of this species along this stretch of the river. The full results of these surveys are presented in Technical Appendix 12-6.

5.3.3 Dormouse

Records were returned for dormouse within the wider landscape and a previous survey undertaken on the site has also recorded the presence of this species. The scrub margins of the main void and the woodland surrounding and within the site offers good potential to support this species. While some of the woodland is sub-optimal with a poorly defined shrub layer the majority is open in nature with a high canopy. The margins of the woodland however are typically provide more suitable habitat, comprising denser scrub with a higher proportion of hazel and other woody species.

Details of species specific survey work undertaken on the site can be found in Technical Appendix 12-5.

5.3.4 Badger

Several records were returned for badger within the vicinity of the application site and several setts were also recorded during the survey, mostly located within woodland areas. The habitats present within the quarry were broadly unsuitable for foraging or sett construction, however those recorded in the surrounding areas offer good potential for both cover and availability of grassland areas for foraging.

The site was also subject to a full survey for this species the results of which and implications for the development are discussed in Technical Appendix 12-9.

5.3.5 Reptiles

Records of grass snake, slow worm, common lizard and adder were returned from within the vicinity of the site. The bare ground and woodland habitats which dominate the site are broadly unsuitable for this group, however the marshy grassland fields to the west of the void and the dry grassland on the top of the main face do offer potential habitat for all four species of reptile which are known to be present in the area.

Reptile survey was undertaken on the site, the full findings of which are presented in Technical Appendix 12-7.

5.3.6 Invertebrates

The natural and man made habitats within the site offer a huge range of habitat niches for invertebrate species. The abundance of disturbed bare ground, slopes and cliff with different aspects and wetland areas are all important niches for invertebrates.

A full study on the invertebrate diversity present within the application site has been undertaken and is discussed in Technical Appendix 12-9.

6.0 SUMMARY AND CONCLUSIONS

The application site is dominated by a former quarry which has been abandoned for some time and has developed a mosaic of habitats including standing water, bare ground, ephemeral vegetation, species-rich grassland, scrub and woodland. The site also includes an area of marshy grassland to the north west of the former quarry which has been identified as being of County importance, which the route of the proposed access road includes areas of semi-improved grassland, scrub and ancient / wet woodland which has been recognised as being of County importance.

The habitats present offer suitable habitat for a wide range of protected and notable species; these species groups have been studied and the results of these studies are reported elsewhere in this chapter.

The woodland habitats form part of a larger contiguous woodland block that has been identified as ancient semi-natural woodland and has been designated as a non-statutory County Wildlife Site. The current survey has confirmed the general quality of the woodland habitat present and identified three major community types: dry ash woodland, beech high forest and alder-willow dominated wet woodland. These communities have been compared with the NVC community descriptions published in Rodwell et al (1991). Wet woodland habitats are of exceptional quality and are considered to be of county nature conservation value.

Continuation of appropriate management practices and the control of invasive species, including Himalayan balsam (*Impatiens glandulifera*), should ensure the maintenance of the conservation value of these habitats. Management of ash and beech-dominated woodlands as high forest, with wet woodland managed through minimum-intervention or coppice-with-standards are considered to be appropriate silvicultural systems for maintaining these woodlands.

7.0 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.

This report is for the exclusive use of Viridor; no warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the client and others in respect of any matters outside the agreed scope of the work.

APPENDIX 1 – RESULTS OF DATA FROM WOODLAND NVC SURVEY

Table A1/1 – Results from Woodland NVC Survey

Species	Botanical Name ¹³	Quadrat / Domin Score					
		1	2	3	4	5	6
Canopy							
Ash	<i>Fraxinus excelsior</i>	5	7	5	5	4	4
Beech	<i>Fagus sylvatica</i>	7	5	10	5	5	
Sycamore	<i>Acer pseudoplatanus</i>	7	4	4	4	3	4
Pedunculate oak	<i>Quercus robur</i>	2	-	-	-	4	1
Goat willow	<i>Salix caprea</i>	5	-	-	-	4	5
Sweet chestnut	<i>Castanea sativa</i>	1	-	-	-		
Alder	<i>Alnus glutinosa</i>	-	-	4	4	3	9
Douglas fir	<i>Pseudotsuga menziesii</i>	-	-	-	4		
Hazel	<i>Corylus avellana</i>	-	-	-	-	5	
Understory							
Hazel	<i>Corylus avellana</i>	5	4	4	4	4	
Holly	<i>Illex aquifolium</i>	4	4	4	4	3	
Sycamore	<i>Acer pseudoplatanus</i>	4	-	-	-	-	
Ash	<i>Fraxinus excelsior</i>	4	-	-	-	-	
Ivy	<i>Hedera helix</i>	-	4	-	-	-	
Downy birch	<i>Betula pubescens</i>	-	-	-	4	-	
Groundflora							
Ash	<i>Fraxinus excelsior</i>	4		2	3	2	
hazel	<i>Corylus avellana</i>	2					
Beech	<i>Fagus sylvatica</i>	1		3			
Alder	<i>Alnus glutinosa</i>		1				
Ivy	<i>Hedera helix</i>	6	5	5	3	5	
Lesser celandine	<i>Ranunculus ficaria</i>	4		1		4	
Wild garlic	<i>Allium ursinum</i>	9	6	5			
Sanicle	<i>Sanicula europaea</i>	4		1		5	4
Cleavers	<i>Galium aparine</i>	4	4		4	4	
Yellow archangel	<i>Lamium galeobdolon</i>	5	4	5	5	4	2
Enchanter's nightshade	<i>Circaea lutetiana</i>	2					1
Pignut	<i>Conopodium bulbocastanum</i>	1		1			
Great wood rush	<i>Luzula sylvatica</i>	1	2	8	2		
honeysuckle	<i>Lonicera periclymenum</i>	1		3			3

¹³ Nomenclature follows Stace, C (1997) *Field Flora of The British Isles*, Cambridge University Press

		Quadrat / Domin Score				
Bramble	<i>Rubus fruticosus</i>	3	5	4	3	
Wood avens	<i>Geum urbanum</i>	1	2			
Bluebell	<i>Hyacinthoides non-scripta</i>	7		5	8	5
Hemlock water-dropwort	<i>Oenanthe crocata</i>					5
Elder	<i>Sambucus nigra</i>					1
Narrow leaved bitter cress	<i>Cardamine impatiens</i>					1
Bugle	<i>Ajuga reptans</i>					4
Meadowsweet	<i>Filipendula ulmaria</i>					4
Primrose	<i>Primula vulgaris</i>		2			
Wood meadow grass	<i>Poa nemoralis</i>		1			
Lord's and Ladies	<i>Arum maculatum</i>		1			
Hedge woundwort	<i>Stachys sylvaticum</i>		1			
Wood speedwell	<i>Veronica</i>		2	4	3	2
Hogweed	<i>Sphondylium</i>		1	1		
Dog rose	<i>Rosa canina</i>		5			
Dog's Mercury	<i>Mercurialis perennis</i>	5	9	4	4	10
Daffodil (native)	<i>Narcissus pseudonarcissus</i>			1		
Holly	<i>Ilex aquifolium</i>			1		2
Sycamore	<i>Acer pseudoplatanus</i>			3		3
Marsh valerian	<i>Valeriana dioica</i>					1
Greater stitchwort	<i>Stellaria</i>				2	
Hard fern	<i>Blechnum spicant</i>				1	
Scaly male fern	<i>Dryopteris affinis</i>	1				1
Broad-buckler fern	<i>Dryopteris dilatata</i>	1	2		1	
Soft shield fern	<i>Polystichum setiferum</i>		2			
Yellow pimpernel	<i>Lysimachia nemorum</i>					1
Herb robert	<i>Geranium robertii</i>					1
Marsh marigold	<i>Caltha palustris</i>					3
Alternate-leaved golden saxifrage	<i>Chrysosplenium alternifolium</i>					5
Yellow iris	<i>Iris pseudacorus</i>					3
Creeping buttercup	<i>Ranunculus repens</i>					4
Lady fern	<i>Athyrium filix-femina</i>		2	1	1	1
Hart's tongue	<i>Asplenium scolopendrium</i>					1
Water horsetail	<i>Equisetum fluviatile</i>					1
False wood brome	<i>Brachypodium sylvaticum</i>		1			
Hairy Brome	<i>Bromus ramosus</i>			1	3	
Reed canary grass	<i>Phalaris arundinacea</i>					8
Moschatel	<i>Adoxa moschatellina</i>					2

Table A1/2 – NVC Community Match

	Quadrat					
	1	2	3	4	5	6
NVC Community	W 8f	W12a	W12a	W12a	W 8b	W7
% Match	70	49	45	42	49	29