Harworth Group

Land at Hay Green Lane, Birdwell, Barnsley

Biodiversity Impact Assessment

October 2020

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1.0 INTRODUCTION

1.1 This report has been prepared by FPCR Environment and Design Ltd on behalf of the Harworth Group in support of an outline planning application for a proposed residential development located site off Hay Green Lane, Birdwell, Barnsley, South Yorkshire (central OS grid ref: SE347 013).

Site Description

1.2 The 3.6ha site comprises grazed and mown field compartments with associated native hedgerows, an area of dense scrub and allotments. There are a range of agricultural buildings comprising wooden stables, allotment sheds and greenhouses. Trees were found in association with boundary features and the scrub area.

Proposals

1.3 Proposals are for the construction of up to 118 houses, associated green infrastructure, attenuation features and public footways.

Biodiversity Impact Assessment Context

1.4 The overall aim of utilising a biodiversity metric is to provide a mechanism by which conservation activities are designed to deliver biodiversity benefits in compensation for losses, which can be delivered with a measurable outcome.

1.5 Using the biodiversity metric means that a developer employs a standardised formula to calculate the number of biodiversity 'units' to be lost as a result of their development, based on the habitat(s) and hedgerow(s) affected, their condition and extent. The developer then provides an 'offset' (where necessary) to deliver an equivalent number of biodiversity units; these ideally should be within the development boundary (habitat enhancement/creation) or off-site.

1.6 Biodiversity offsetting is to compensate for adverse impacts on biodiversity identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been undertaken, according to the mitigation hierarchy as required by National Planning Policy Framework (NPPF, 2019 (as amended)). Any subsequent changes to planning proposals may affect the credit requirement of the site and a review of the changes would be required.

Legislative Context

1.7 The UK Government, as signatory to the Rio Convention on Biological Diversity, is committed to conserving and enhancing biodiversity. This commitment is further enforced in the Natural Environment and Rural Communities Act (NERC) 2006 and the Natural Environment White Paper (June 2011).

1.8 DEFRAs 25 Year Environment Plan (2018) seeks to embed a 'net environmental gain' principle for development to deliver environmental improvements locally and nationally. Current policy is that the planning system should provide biodiversity net gains where possible however this is moving towards a mandatory requirement.

1.9 NPPF (2019) in particular seeks to ensure that the planning system contributes to and enhances the natural and local environment, protect and enhance biodiversity and geodiversity by:

170. d) Minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;

174. b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

1.10 The Barnsley local plan supplementary planning document: Biodiversity and Geodiversity states

The LPA will not support applications that would damage the ecological network and cause a net-loss in biodiversity in line with the NPPF.

1.11 With specific reference to sites located within the Nature Improvement Area the above document states:

Within the NIA (Nature Improvement Area) we require specific biodiversity enhancements with developments over and above the minimum mitigation/ compensation measures……

…….Such quantifiable, significant benefits could include:

- *New woodland;*
- *New wetland;*
- *Enhancing areas of poor environmental quality;*
- *Improving public access, or*
- *Improving the management of existing habitats;*

2.0 METHODOLOGY

Habitat assessment

2.1 Data was drawn from a number of surveys and reports to inform the baseline habitat values. These were-

- Barnsley Biological Records Centre (BBRC) - hosted by Sheffield City Council and accessed via Sheffield Biological Records Centre (SBRC),
- Extended Phase 1 Survey –Helen Feetham FISC 4 and James Hutchison FISC 3, FPCR 2019).
- Preliminary Ecological Assessment 217/HN6A – Adjacent site (Wildscapes 2014).
- Preliminary Ecological Assessment 217/H9– Adjacent site (Wildscapes 2013).

Existing Value

2.2 DEFRA has developed a metric based on evaluating each individual habitat's value. While the DEFRA metric is still under development and subject to future review, a 'beta test' version 2.0 is available for use. The calculator is in excel format and is used to measure the biodiversity value of habitats and hedgerows within an application site before and after development, therefore calculating the expected change in biodiversity value.

2.3 The development site is mapped and divided into existing habitat criteria. Habitats are defined under UK Habitat Classification with further information providing habitat area, distinctiveness and condition, which are used to calculate the value of each habitat.

2.4 Linear habitats require different treatments, utilising lengths rather than areas. Therefore, in accordance with the guidance hedgerows are considered separately.

2.5 Full detail of the calculation methodology is provided in the Biodiversity metric 2.0 – User Guide1.

Compensation

2.6 In addition to quantifying the biodiversity value of habitats / hedgerows to be lost, to determine the offsetting requirement it is also necessary to measure the offsetting potential of mitigation measures. This allows for the potential quantity of off-site units required to be calculated. For this to take place a number of factors must be considered:

- the size of the mitigation areas;
- the habitat distinctiveness band it is assigned currently, and the target band once improved; and
- the condition of the habitat at the start of the offset project, and its condition at the end.

2.7 The potential compensation value is derived from the difference in quality between the habitat to be lost and that to be created. The area from which the same number of units can be achieved may allow for the area required for mitigation to be smaller than that which is being lost. For example, if a habitat of low distinctiveness and poor condition is improved to create a habitat of

[1] Natural England, The biodiversity metric 2.0 (2019) Available at: http://publications.naturalengland.org.uk/publication/5850908674228224

high distinctiveness in good condition, the area needed to offset can theoretically be less than that lost.

Risk Multipliers

2.8 Once the maximum potential value of the mitigation is calculated (the difference between the current value and the proposed value) a set of risk multipliers is utilised to quantify the difference between the area to be lost and the area to be created/enhanced.

2.9 The aim of a multiplier is to correct for a disparity or risk. There are three main types of risk that are associated with habitat creation:

2.10 Temporal risks: Many factors influence how long a habitat takes to go from the point of creation or restoration to the desired end point condition. Within the metric average time estimates have been used, accepting that there will be variation from this central estimation. Average estimates of the time to target condition were largely expert driven.

2.11 Delivery risks: The risks associated with the actual delivery of the offset due to the uncertainty in the effectiveness of restoration and/or habitat creation/management techniques.

2.12 Spatial risks: These reflect ecological risks deriving from the change in location of the habitat or resource. For example, it may be that recreating a type of habitat in a new location may reduce its biodiversity value.

2.13 The above risks are automatically factored into the calculations completed using the metric calculator.

Connectivity

2.14 The guidance documentation for the metric prescribes that all High and Very High distinctiveness habitats should be assigned a medium connectivity multiplier while all other habitats are to be given low connectivity multiplier.

Strategic Significance

2.15 The site is set within the Dearne Valley Nature Improvement Area and as such all habitats meet the criteria for inclusion within the maximum valued strategic significance category- "*within area formally identified in local strategy*".

Considerations

2.16 Natural ecological communities are susceptible to change; at times this change can be rapid as a result of internal and external environmental factors. The biodiversity offsetting calculations are based on ecological assessments of habitats carried out during 2019; as a result, changes which may affect the conclusions of this report may occur, if a prolonged period of time elapses prior to the commencement of the project.

2.17 The proposed site layout in terms of division between green spaces and built areas were based on the illustrative master plan produced by JRP (drawing number 17 5085 12, November 2019). The components of the green spaces have been modified to provide an overall net gain in value for habitats and should be adopted in finalised design and landscaping plans.

2.18 The aim of biodiversity offsetting is to compensate for significant adverse impacts on biodiversity identified after appropriate avoidance, minimisation and on-site rehabilitation measures have been taken, according to the mitigation hierarchy as required by NPPF. Any changes to planning proposals or decisions may affect the credit requirement of the site. As mentioned previously, as the project is currently at outline, all the specific details of the design are yet to be determined and will not be available until the project progresses to full planning; therefore some changes are likely to the framework and GI provision, meaning that the calculations will need to be reassessed. Thus, all scores within this assessment are indicative, and should be treated as such.

3.0 RESULTS

Biodiversity Units – Existing Value

Habitats

3.1 The baseline Habitats are show in Figure 1.

3.2 The biodiversity units for each habitat on the site have been calculated and are presented in Table 1. Justifications for condition scores are detailed below with species lists provided in Appendix B.

Table 1: Biodiversity Units: Existing On-Site Habitats

Habitat	Area (ha)	Condition	Biodiversity Units
Grassland: Modified grassland (g4)	2.57	Poor	5.91
Heathland and shrub- Mixed Scrub (h3)	0.49	Poor	2.25
Urban- allotments (c 910)	0.48	Poor	2.21
Urban – developed land (u)	0.07	n/a	0
Total	**3.62**		**10.37**

Please note there may be minor discrepancies (rounding errors) between the columns and the totals, however, the numbers duplicate those presented within the matrix calculator.

Modified Grassland (g4)

3.3 Agricultural grassland field compartments managed for livestock grazing. These were horse grazed or mown in the larger eastern fields, with mixed grazing in the western compartments adjoining the allotments.

3.4 All fields were broadly of similar composition being dominated by palatable grasses (>75% cover) and herb species typical of neutral soil. Perennial ryegrass characterised the fields with dominant or abundant distributions, while cock's foot Dactylis glomerata, Yorkshire fog, rough meadow grass and smooth meadow grass were generally frequent to abundant. Herbs were confined to common and widespread forbs and tall herbs typical of such grassland habitats and generally included frequent to abundant meadow buttercup, white clover and ribwort plantain.

3.5 The grassland was assessed as being in poor condition. Tables 2 details the primary assessment criteria used.

Table 2: Grassland Condition Assessment Criteria

Condition Assessment	Result	Description
1. The area is clearly and easily recognisable as a good example of this type of habitat and there is little difference between what is described in the relevant habitats classifications and what is visible on site.	FAIL	The grassland was subject to agricultural management through regular mowing and grazing. The swards were characterised by fast growing grasses, predominantly perennial rye-grass, with frequent to abundant white clover, indicative of improvement.
2. The appearance and composition of the vegetation on site should very closely match the characteristics for the specific Priority Habitat [i.e. as described by either the Phase 1 habitat Classification of the UK Habitat Classification], with species typical of the habitats representing a significant majority of the vegetation.	FAIL	Does not match with Priority Habitat descriptions.
3. Wildflowers, sedges and indicator species for the specific Priority grassland habitat are very clearly and easily visible throughout the sward and occur at high densities in high frequency.	FAIL	Wildflowers and indicator species for priority neutral grassland did not occur at high densities or frequencies (such as: meadow vetchling Lathyrus pratensis, bird's-foot Trefoil Lotus corniculatus, ox-eye daisy Leucanthemum vulgare, lady's bedstraw Galium verum, cowslip Primula veris, black knapweed Centaurea nigra, rough hawkbit Leontodon hispidus, bulbous buttercup Ranunculus bulbosus).
4. Undesirable species and physical damage is below 5% cover	FAIL	White clover, common ragwort, common nettle, creeping thistle, spear thistle, broad-leaved dock and creeping buttercup totalled > 5% cover.
5. Cover of bare ground greater that 10% (including localised areas, for example, rabbit warrens).	FAIL	Continuous sward.
6. Cover of bracken is less than 20% and cover of scrub and bramble habitats is less than 5%.	PASS	No Bracken. Scrub limited to peripheries.

Mixed Scrub (h3)

3.6 Low distinctiveness dense scrub, predominantly bramble with a number of other woody species recorded as rare or occasional.

3.7 The scrub was assessed as being in poor condition. Tables 3 details the primary assessment criteria used.

Table 3: Scrub Condition Assessment Criteria

Condition Assessment	Result	Description
1. There are at least three woody species, with no one species comprising more than 75% of the cover (except common juniper, sea buckthorn or box, which can be 100% cover).	FAIL	A mix of woody species, however bramble dominates with more than 75% cover.
2. There is a good age range – a mixture of seedlings, saplings, young shrubs and mature shrubs.	FAIL	Bramble provides a uniform age cover, with very limited diversity in age structure of other species.
3. Pernicious weeds and invasive species make up less than 5% of the ground cover.	FAIL	No invasive species recorded. Common nettle and creeping thistle >5%
4. The shrub has a well-developed edge with un-grazed tall herbs.	FAIL	Bordered by grazed fields, amenity grassland and a hedgerow.
5. There are many clearings and glades within the scrub.	FAIL	No glades or clearings

Urban- allotments (c 910)

3.8 Use of the allotments was terminated in April 2020. While there is evidence of vegetative encroachment by scrub and coloniser species the allotment area contained no notable diversity of habitats, no notable species were recorded, and there was no evidence of management for biodiversity.

3.9 The condition assessment for allotments is currently unclear with the UK habitat code classifying allotments under cropland, while the DEFRA metric provides a category under urban habitats.

3.10 A condition score of poor applies to all the cropland categories except for Cropland-traditional Orchards.

3.11 The urban condition assessments are targeted to assess whether a habitat is defined as Open Mosaic Habitat on Previously Developed Land (OMH), a Habitat of Principal Importance.

3.12 The allotments do not fit the urban habitat type habitat description for open mosaic habitat as-

- They are not a habitat formed on previous developed land.
- There is no evidence of soil removal or nutrient depletion
- There is not spatial variation throughout the site.

- They do not mimic semi-natural habitats.

3.13 Given the lack of conformity to the urban habitat description, the accepted poor condition score for agricultural categories, the lack of management for biodiversity and the lack of structural diversity or notable species, then it is considered that a condition assessment of poor is appropriate. It should be noted that the urban-allotment category provides an inherent increased baseline value for this habitat over similar cropland categories of horticulture, cereal and non-cereal crops by increasing the distinctiveness modifier from low to medium. This increase is considered adequate to account for the variation in biodiversity value.

Hedgerows

3.14 The biodiversity units for each hedgerow on the site have been calculated and are presented in Table 4.

Table 4: Biodiversity Units: Existing On-Site Hedgerows

Habitat	Length (km)	Condition	Biodiversity Units
H1 Native Species Rich Hedgerow with trees	0.14	Good	1.932
H2 Native Species Rich Hedgerow	0.08	Good	1.104
H3 Native Species Rich Hedgerow with trees	0.1	Good	1.38
H4 Native Species Rich Hedgerow	0.12	Good	1.656
H5 Native Species Rich Hedgerow with trees	0.1	Good	1.38
H6 Native Species Rich Hedgerow with trees	0.05	Good	0.69
H7 Hedge Ornamental Non-Native	0.04	Good	0
Total	**0.63**	**-**	**8.14**

Please note there may be minor discrepancies (rounding errors) between the columns and the totals, however, the numbers duplicate those presented within the matrix calculator.

3.15 Hedgerow H1 through H6 of the hedgerows were considered native species rich with a diverse native species composition. Hedgerow H7 consisted almost entirely of garden privet and was classified as a non-native ornamental hedge.

3.16 Condition assessments for all hedgerows returned a good condition, meeting at least 6 of the criteria, and failing no 2 in any one subcategory.

3.17 The 6 conditions that were met were:

- A1 Hedgerow is on average above 1.5m high.

- A2 Hedgerow is on average over 1.5m wide.
- B1 Gaps between the ground and the base of the canopy are below 0.5m for over 90% of length (excluding lines of trees).
- B2 Horizontal gaps make up less that 10% of the hedgerow and canopy gaps do not exceed 5m.
- C2 Plant species indicative of nutrient enrichment of soils dominate less than 20% of ground cover i.e. nettles (Uticia spp.) and docks (Rumex spp.).
- D2 Over 90% of the hedgerow and undisturbed ground is free of damage caused by human activities.

3.18 The conditions that all hedgerows failed was:

- C1 Over 90% of the hedgerow must hold a width of over 1m undisturbed ground on at least one side containing perennial herbaceous vegetation.

3.19 Only hedgerow H7 failed the condition:

- D1 over 90% of hedgerow and undisturbed ground is free of invasive, non-native and neophyte species.

Post-Development Habitats

Enhancement

3.20 Habitat retention is illustrated in figure 2.

3.21 A 0.16ha section of the scrub area on the south west of the site will be retained and targeted for improvement. Management will be undertaken in conjunction with new adjoining scrub habitat creation in order to provide a continuous belt of scrub habitat along the south west of the site. This will link to new hedgerows detailed below to improve habitat connectivity around the site. The scrub will be targeted to reach good condition. Further details are provided below.

3.22 All hedgerows are to be retained with the exception of small breaches and the loss of 30m at the north of hedgerow H5. These hedgerows will be included within the long term site management to maintain their condition.

Creation

3.23 Post development habitats are shown in figure 3, with target notes to assist in clarity.

3.24 The following section outlines the habitats to be created and enhanced and provides a summary of the conditions required for these scores within the metric. A separate management plan will provide additional details on long term management to achieve these goals.

3.25 The proposed onsite mitigation and their target conditions are presented in Tables 5 and 6.

Table 5: Biodiversity Units: On-site Habitat Creation

Proposed Habitat	Area (ha)	Target Condition	Biodiversity Units
Urban - Developed Land; Sealed surface (Hardstanding)	0.63	n/a	0
Urban - Developed Land; Sealed surface (Buildings)	0.87	n/a	0
Urban – Vegetated Garden	1.27	Poor	2.82
Urban – Rain Garden	0.03	Moderate	0.13
Urban – Amenity Grassland	0.05	Poor	0.11
Urban – Street Tree	0.2442	Moderate	0.43
Lakes – Ponds (Non-Priority)	0.09	Moderate	1.23
Grassland – Other Neutral	0.32	Moderate	2.06
Heathland and Shrub – Mixed Scrub	0.09	Good	0.97
Heathland and Shrub – Mixed Scrub	0.11	Moderate	0.91
Total	**3.46**		**8.66**

Please note, there may be minor discrepancies (rounding errors) between the columns and the totals; however, the numbers duplicate those presented within the matrix calculator

Table 6: Biodiversity Units: On-site Habitat Enhancement

Proposed Habitat	Area (ha)	Target Condition	Biodiversity Units
Heathland and Shrub – Mixed Scrub	0.16	Good	1.77

Please note, there may be minor discrepancies (rounding errors) between the columns and the totals; however, the numbers duplicate those presented within the matrix calculator

<u>Urban- Amenity Grassland (TN1)</u>

3.26 Small areas of grassland habitat will be located along the street frontage surrounding the rain water garden. Given the restrictive size and exposed nature of these areas, expectations have been restricted to amenity grassland in poor condition.

Urban- Rainwater Gardens (TN2)

3.27 A swale feature is planned to run through the development. In order to maximise its biodiversity value this should be designed as a rainwater garden (https://raingardens.info/wp-content/uploads/2012/07/UKRainGarden-Guide.pdf). As discussed above the urban habitat description and condition assessment is focused to OMH habitat and does not reflect the value of this habitat type. Within the metric rain water gardens are listed as a low distinctiveness habitat, equivalent to amenity grassland. By including a diverse planting scheme, targeting native species and those with notable wildlife benefits, the biodiversity value provided will be increased, justifying a condition score of moderate.

Urban- Street Tree

3.28 The inclusion of 60 medium (regular standard) street trees spread throughout the development will provide additional foraging and commuting habitat for mobile species, particularly urban bird species. The metric classes street trees as a low distinctiveness habitat however, it also restricts condition assessments to moderate condition, reflecting their improved value relative to amenity grassland. The targeted condition score for these trees is therefore moderate.

Lakes – Ponds (non-priority)

3.29 Two new waterbodies are to be created on site in association with swale and attenuation features. These will be over-deepened to ensure that they hold permanent water (at least 60cm depth) and planted and managed to benefit biodiversity, particularly for amphibians.

3.30 The ponds will be shaped to provide a range of bank angles and heightsand where possible will be enhanced by the excavation of small embayments. This will create differing conditions of light and temperature and will thus maximise and encourage the diversification in the flora and associated fauna. The inclusion of areas of shallow margins and shelving will maximise productivity and the potential for wildlife.

3.31 The waterbodies will be planted with marginal and emergent vegetation to facilitate rapid establishment.

3.32 A range of hibernacula features will be created surrounding the ponds.

3.33 The target habitat condition for ponds is moderate. Due to the rapid rate aquatic vegetation, invertebrates and amphibians colonise at, ponds can quickly become a valuable resource. Ponds will be designed and created in order to ensure water quality is not reduced by factors such as pollution run off. To reach the target condition of moderate ponds will be designed to meet the following criteria:

- Are of good water quality, with clear water (substrate can be seen) and no obvious sign of pollution in the water body.
- The water body should have semi natural riparian land for at least 10 m from the pond edge.
- Should be dominated by plants, be they submerged or floating.
- Should not be shaded more than 50%
- Non-native species should be absent.
- Less than 10% of the pond should be covered with duckweed or filamentous algae.

- Fish should not be stocked.

Grassland- Other Neutral

3.34 Grassland creation is planned for several areas where it will provide a buffer for scrub and pond habitats. The habitat is targeted for moderate condition. Seed mix from a reputable source (ideally of local provenance). Such as Emorsgate EM2 General Purpose Meadow Mixture or similar is recommended to be sown in accordance with manufacturer's recommendations. No artificial fertilizers should be applied to the ground and ideally low nutrient subsoils should be used.

3.35 The following criteria should be targeted by design and management:.

- Rye grass cover less than 25%
- Wildflowers and sedges to be spread throughout the sward.
- Undesirable species and physical damage less 5% cover.
- Cover of bracken less than 20% and cover of scrub and bramble less than 5%.

Mixed scrub (TN3 and TN4)

3.36 Mixed scrub creation on site is divided into two groups. The large area in the south west of the site will consist of a mixture of retained and new planting totalling 0.25ha, which provides scope to achieve good condition. Whips will be clump-planted randomly to create diversity in structure; unplanted gaps will be left to infill naturally. Clearings and glades will be incorporated in order to provide plentiful edge habitats. Further diversity will be encouraged through rotational management.

3.37 The scrub must be suitably planted and managed to prioritise biodiversity and environmental value. To achieve good condition the habitat must meet all five of the following criteria:

- Must contain at least three woody species with no one species comprising over 75% of cover.
- Varied age range including a mixture of seedlings, saplings, young shrubs and mature shrubs.
- Pernicious weeds and invasive species make up less than 5% of ground cover.
- The scrub contains a well-developed edge including ungrazed tall herbs.
- Contains many clearing and glades.

1.2 The remaining smaller areas of scrub will be targeted to achieve moderate condition. While the planting specification and management will provide a diversity in species and age structure, physical structure will be limited by the scale of these area and clearings and glades will not be incorporated.

Hedgerow Creation

3.38 Three substantial hedgerows (NH1,2 and 5) are proposed as part of the new habitat creation. A further 2 shorter hedgerows (NH3 and 4) will connect into existing hedgerows to increase their connectivity. The length and target conditions of these hedgerows are presented below in Table 7.

Table 7: Biodiversity Units: On-Site Hedgerow Creation

Habitat	Length (km)	Target Condition	Biodiversity Units
NH1 Hedges: Native species rich hedgerow	0.09	Moderate	0.46
NH2 Hedges: Native species rich hedgerow	0.09	Moderate	0.46
NH3 Hedges: Native species rich hedgerow	0.01	Moderate	0.05
NH4 Hedges: Native species rich hedgerow	0.04	Moderate	0.21
NH5 Hedges: Native species rich hedgerow	0.11	Moderate	0.57
Total	**0.34**	**-**	**1.75**

Please note, there may be minor discrepancies (rounding errors) between the columns and the totals, however, the numbers duplicate those presented within the matrix calculator.

3.39 Management of the new hedgerows will be targeted to reach good condition to match those of existing hedgerows on site however, to allow flexibility in delivery, a condition score of moderate has been applied within the metric. Good condition requires no more than 2 condition failures with no more than 1 condition failure in any functional group. Moderate condition allows for a maximum of four failures with a maximum of 1 functional group failing both criteria.

Habitat Trading

3.40 The habitats provided on site are appropriate to the local area and no high or very high distinctiveness habitats will be lost as part of the development.

3.41 3.73 units of medium distinctiveness habitats will be lost through the development consisting of

- Heathland and Shrub -Mixed Scrub (1.52 units)
- Urban – Allotments (2.21 units)

3.42 A gain in Mixed Scrub will be provided producing a net improvement of 2.13 units inn this broad habitat type.

3.43 The urban allotments are not being directly compensated for within the urban habitat type. The provision of further urban habitat is not considered to be appropriate for this residential scheme. Compensation through the provision of scrub and grassland habitat provides a total net change in medium distinctiveness habitats of +1.98units.

4.0 CONCLUSION

4.1 The approach to habitat creation has aimed to maximise biodiversity value with consideration to the requirements of the Nature Improvement Area.

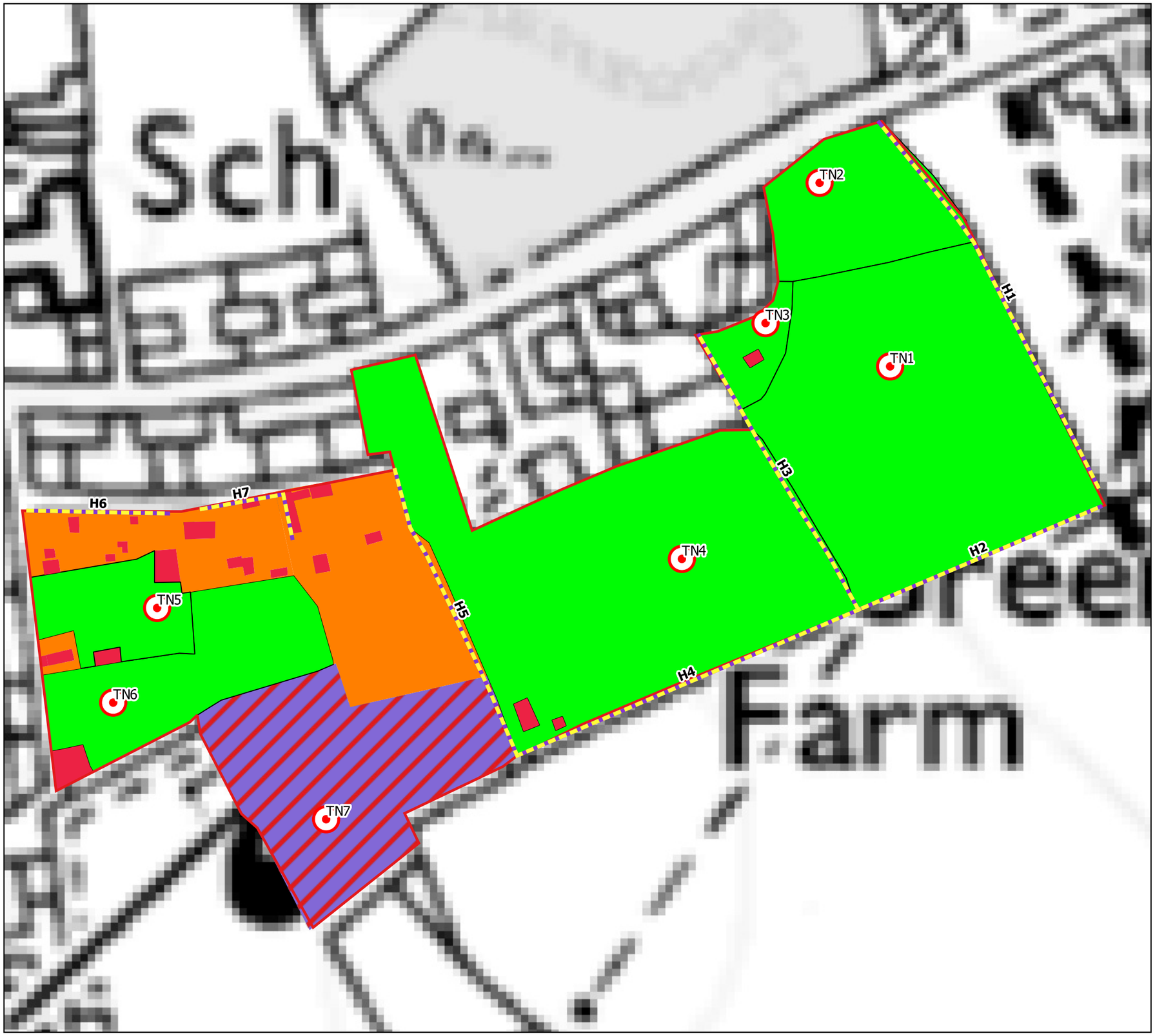
4.2 Biodiversity offsetting has been used to inform the habitat creation and enhancement proposals for the scheme.

4.3 The results of the assessment demonstrate that the outline scheme currently has the ability to lead to the delivery of a total net gain in biodiversity for habitats and linear features in line with NPFF.

4.4 In order to ensure that the benefits of the proposed habitat creation are maximised it is recommended that a Biodiversity Management Plan be produced detailing habitat creation measures and long-term management prescriptions for the site.

Key

- Site Boundary
- g4 - modified grassland
- h3 - dense scrub
- c - cropland (c 910 allotments)
- u - urban
- h2 - hedgerow



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client
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project
Land at Hay Green Lane, Birdwell

drawing title
Baseline Habitat

scale @ A3
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Figure 1

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Key

- Site Boundary
- Retained Habitat
- Lost Habitat
- Retained Hedgerow
- Lost Hedgerow

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Habitat Retention

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Key

- Site Boundary
- g4 - urban amenity grassland
- g3c - other neutral grassland
- h3 - mixed scrub
- u - urban (buildings)
- u1 - built-up areas and gardens
- u1b - developed land. sealed surface
- r1 - standing open water
- Hedgerows
- Street trees (60 medium)

TN3: MIXED SCRUB (MODERATE)

TN3: MIXED SCRUB (MODERATE)

TN1: AMENITY GRASSLAND
TN2: RAINWATER GARDENS

TN4: MIXED SCRUB (GOOD)

H1 H2 H3 H4 H5 H6 H7 NH1 NH2 NH3 NH4 NH5

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Post-Development Habitats

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Appendix A: Biodiversity Impact Assessment Calculator Sheets

Baseline Habitats

	Habitats and areas			Habitat distinctiveness	Habitat condition	Ecological connectivity	Strategic significance	Suggested action to address habitat losses	Ecological baseline		Retention category biodiversity value							
Ref	Broad Habitat	Habitat type	Area (hectares)	Distinctiveness	Condition	Ecological connectivity	Strategic significance		Total habitat units		Area retained	Area enhanced	Area succession	Baseline units retained	Baseline units enhance	Baseline units succession	Area lost	Units lost
1	Grassland	Grassland - Modified grassland	2.57	Low	Poor	Low	Within area formally identified in local strategy	Same distinctiveness or better habitat required	5.91					0.00	0.00	0.00	2.57	5.91
2	Heathland and shrub	Heathland and shrub - Mixed scrub	0.49	Medium	Poor	Low	Within area formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required	2.25			0.16		0.00	0.74	0.00	0.33	1.52
3	Urban	Urban - Allotments	0.48	Medium	Poor	Low	Within area formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required	2.21					0.00	0.00	0.00	0.48	2.21
4	Urban	Urban - Developed land; sealed surface	0.07	V.Low	N/A - Other	Low	Within area formally identified in local strategy	Compensation Not Required	0.00					0.00	0.00	0.00	0.07	0.00

Habitat Creation

Post development/ post intervention habitats							
				Ecological	Strategic significance	Temporal	Difficulty	
Proposed habitat	Area (hectares)	Distinctiveness	Condition	Ecological connectivity	Strategic significance	Time to target condition/years	Difficulty of creation category	Habitat units delivered
Urban - Developed land; sealed surface	0.63	V.Low	N/A - Other	Low	Within area formally identified in local strategy	0	Low	0.00
Urban - Developed land; sealed surface	0.87	V.Low	N/A - Other	N/A	Within area formally identified in local strategy	0	Low	0.00
Urban - Vegetated garden	1.27	Low	Poor	N/A	Within area formally identified in local strategy	1	Low	2.82
Lakes - Ponds (Non- Priority Habitat)	0.09	High	Moderate	Medium	Within area formally identified in local strategy	3	Low	1.23
Grassland - Other neutral grassland	0.32	Medium	Moderate	Low	Within area formally identified in local strategy	10	Low	2.06
Heathland and shrub - Mixed scrub	0.11	Medium	Moderate	Low	Within area formally identified in local strategy	3	Low	0.91
Heathland and shrub - Mixed scrub	0.09	Medium	Good	Low	Within area formally identified in local strategy	7	Low	0.97
Urban - Rain garden	0.03	Low	Moderate	Low	Within area formally identified in local strategy	1	Low	0.13
Urban - Street Tree	0.2442	Low	Moderate	Low	Within area formally identified in local strategy	27	Low	0.43
Urban - Amenity grassland	0.05	Low	Poor	Low	Within area formally identified in local strategy	1	Low	0.11

Habitat Enhancement

	Baseline habitats	Change in distinctiveness and condition			Area (hectares)	Distinctiveness	Condition	Ecological connectivity	Strategic significance	Temporal multiplier	Difficulty multipliers	Habitat units delivered
Baseline ref	Baseline habitat	Proposed habitat (Pre-populated but can be overridden)	Distinctiveness change	Condition change				Ecological connectivity score	Strategic significance	Time to target condition/years	Difficulty of enhancement category	
2	Heathland and shrub - Mixed scrub	Heathland and shrub - Mixed scrub	Medium - Medium	Poor - Good	0.16	Medium	Good	Low	Within area formally identified in local strategy	10	Low	1.77

Hedgerow Baseline

	UK Habitats - existing habitats			Habitat distinctiveness	Habitat condition	Ecological connectivity	Strategic significance		Ecological baseline	Retention category biodiversity value					
Baseline ref	Hedge number	Hedgerow type	length KM	Distinctiveness	Condition	Ecological connectivity	Strategic significance	Suggested action to address habitat losses	Total hedgerow units	Length retained	Length enhanced	Units retained	Units enhanced	Length lost	Units lost
1	1	Native Species Rich Hedgerow with trees	0.14	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	1.932	0.14		1.932	0	0	0
2	2	Native Species Rich Hedgerow	0.08	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	1.104	0.08		1.104	0	0	0
3	3	Native Species Rich Hedgerow with trees	0.1	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	1.38	0.09		1.242	0	0.01	0.138
4	4	Native Species Rich Hedgerow	0.12	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	1.656	0.12		1.656	0	0	0
5	5	Native Species Rich Hedgerow with trees	0.1	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	1.38	0.06		0.828	0	0.04	0.552
6	6	Native Species Rich Hedgerow with trees	0.05	Medium	Good	Low	Within area formally identified in local strategy	Like for like or better	0.69	0.05		0.69	0	0	0
7	7	Hedge Ornamental Non Native	0.04	V.Low	Good	Low	Within area formally identified in local strategy	Same distinctiveness band or better	0	0.03		0	0	0.01	0

Hedgerow Creation

		Proposed habitats		Habitat distinctiveness	Habitat condition	Spatial quality		Temporal multiplier	Hedge units delivered
Baseline ref	New hedge number	Habitat type	Length km	Distinctiveness	Condition	Ecological connectivity	Strategic significance	Time to target condition/years	
1		Native Species Rich Hedgerow	0.09	Medium	Moderate	Low	Within area formally identified in local strategy	5	0.46
2		Native Species Rich Hedgerow	0.09	Medium	Moderate	Low	Within area formally identified in local strategy	5	0.46
3		Native Species Rich Hedgerow	0.01	Medium	Moderate	Low	Within area formally identified in local strategy	5	0.05
4		Native Species Rich Hedgerow	0.04	Medium	Moderate	Low	Within area formally identified in local strategy	5	0.21
5		Native Species Rich Hedgerow	0.11	Medium	Moderate	Low	Within area formally identified in local strategy	5	0.57

Appendix B: Botanical Species Lists

TN1 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
Cock's-foot	*Dactylis glomerata*	A
Perennial Rye-grass	*Lolium perenne*	A
White Clover	*Trifolium repens*	A
Creeping Thistle	*Cirsium arvense*	F
Crested Dog's-tail	*Cynosurus cristatus*	F
Meadow Foxtail	*Alopecurus pratensis*	F
Ribwort Plantain	*Plantago lanceolata*	F
Rough Meadow-grass	*Poa trivialis*	F
Smooth Meadow-grass	*Poa pratensis sens.lat.*	F
Yorkshire-fog	*Holcus lanatus*	F
Barren Brome	*Anisantha sterilis*	O
Bramble	*Rubus fruticosus agg.*	O
Broad-leaved Dock	*Rumex obtusifolius*	O
Bush Vetch	*Vicia sepium*	O
Cat's-ear	*Hypochaeris radicata*	O
Cleavers	*Galium aparine*	O
Common Nettle	*Urtica dioica*	O
Common Ragwort	*Senecio jacobaea*	O
Cow Parsley	*Anthriscus sylvestris*	O
Creeping Buttercup	*Ranunculus repens*	O
Cut-leaved Crane's-bill	*Geranium dissectum*	O
Dandelion	*Taraxacum officinale agg.*	O
False Oat-grass	*Arrhenatherum elatius*	O
Good King Henry	*Chenopodium bonus-henricus*	O
Great Willowherb	*Epilobium hirsutum*	O
Lesser Trefoil	*Trifolium dubium*	O
Meadow Buttercup	*Ranunculus acris*	O
Pineapple Weed	*Matricaria discoidea*	O
Red Bartsia	*Odontites vernus*	O
Shepherd's-purse	*Capsella bursa-pastoris*	O
Soft-brome	*Bromus hordeaceus*	O
Spear Thistle	*Cirsium vulgare*	O
Charlock	*Sinapis arvensis*	R
Common Mouse-ear	*Cerastium fontanum*	R
Perennial Sow-thistle	*Sonchus arvensis*	R

TN2 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
Perennial Rye-grass	*Lolium perenne*	D
Meadow Buttercup	*Ranunculus acris*	A
Ribwort Plantain	*Plantago lanceolata*	A
White Clover	*Trifolium repens*	A
Broad-leaved Dock	*Rumex obtusifolius*	LA
a common knapweed	*Centaurea nigra ssp. nigra*	F
Common Mouse-ear	*Cerastium fontanum*	F
Creeping Buttercup	*Ranunculus repens*	F

Yorkshire-fog	*Holcus lanatus*	F
Common Nettle	*Urtica dioica*	LF
Pineapple Weed	*Matricaria discoidea*	O/LA
Annual Meadow-grass	*Poa annua*	O
Bramble	*Rubus fruticosus agg.*	O
Common Ragwort	*Senecio jacobaea*	O
Common Sorrel	*Rumex acetosa*	O
Creeping Thistle	*Cirsium arvense*	O
Crested Dog's-tail	*Cynosurus cristatus*	O
False Oat-grass	*Arrhenatherum elatius*	O
Greater Plantain	*Plantago major*	O
Meadow Foxtail	*Alopecurus pratensis*	O
Red Clover	*Trifolium pratense*	O
Knotgrass	*Polygonum aviculare sens.str.*	R
Prickly Sow-thistle	*Sonchus asper*	R
Selfheal	*Prunella vulgaris*	R

TN3 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
White Clover	*Trifolium repens*	LD
Pineapple Weed	*Matricaria discoidea*	A/LD
Perennial Rye-grass	*Lolium perenne*	A
Ribwort Plantain	*Plantago lanceolata*	A
Broad-leaved Dock	*Rumex obtusifolius*	F
Cock's-foot	*Dactylis glomerata*	F
Common Nettle	*Urtica dioica*	F
False Oat-grass	*Arrhenatherum elatius*	F
Meadow Buttercup	*Ranunculus acris*	F
Chickweed	*Stellaria media agg.*	O
Cleavers	*Galium aparine*	O
Creeping Thistle	*Cirsium arvense*	O
Knotgrass	*Polygonum aviculare sens.str.*	O
Shepherd's-purse	*Capsella bursa-pastoris*	O
Soft-brome	*Bromus hordeaceus*	O
Bush Vetch	*Vicia sepium*	R
Common Ragwort	*Senecio jacobaea*	R
Elder	*Sambucus nigra*	R
Hedge Bindweed	*Calystegia sepium*	R
Perennial Sow-thistle	*Sonchus arvensis*	R
Red Clover	*Trifolium pratense*	R

TN4 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
Perennial Rye-grass	*Lolium perenne*	D
Rough Meadow-grass	*Poa trivialis*	A
White Clover	*Trifolium repens*	A
Yorkshire-fog	*Holcus lanatus*	A
Pineapple Weed	*Matricaria discoidea*	LA
Charlock	*Sinapis arvensis*	F
Cock's-foot	*Dactylis glomerata*	F

Common Ragwort	*Senecio jacobaea*	F
Creeping Buttercup	*Ranunculus repens*	F
Creeping Thistle	*Cirsium arvense*	F
Hedge Mustard	*Sisymbrium officinale*	F
Meadow Buttercup	*Ranunculus acris*	F
Meadow Foxtail	*Alopecurus pratensis*	F
Ribwort Plantain	*Plantago lanceolata*	F
Annual Meadow-grass	*Poa annua*	O
Broad-leaved Dock	*Rumex obtusifolius*	O
Chickweed	*Stellaria media agg.*	O
Common Mouse-ear	*Cerastium fontanum*	O
Common Nettle	*Urtica dioica*	O
Dandelion	*Taraxacum officinale agg.*	O
False Oat-grass	*Arrhenatherum elatius*	O
Greater Plantain	*Plantago major*	O
Lesser Trefoil	*Trifolium dubium*	O
Red Fescue	*Festuca rubra agg.*	O
Timothy	*Phleum pratense sens.lat.*	O
Bush Vetch	*Vicia sepium*	R
Cut-leaved Crane's-bill	*Geranium dissectum*	R
Hogweed	*Heracleum sphondylium*	R
Lesser Stitchwort	*Stellaria graminea*	R
Parsley Piert	*Aphanes arvensis agg.*	R
Red Clover	*Trifolium pratense*	R

TN5 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
Common Nettle	*Urtica dioica*	LD
Perennial Rye-grass	*Lolium perenne*	A
White Clover	*Trifolium repens*	A
Annual Meadow-grass	*Poa annua*	F
Broad-leaved Dock	*Rumex obtusifolius*	F
Dandelion	*Taraxacum officinale agg.*	F
Knotgrass	*Polygonum aviculare sens.str.*	F
Meadow Buttercup	*Ranunculus acris*	F
Bramble	*Rubus fruticosus agg.*	O
Chickweed	*Stellaria media agg.*	O
Common Ragwort	*Senecio jacobaea*	O
Creeping Buttercup	*Ranunculus repens*	O
Crested Dog's-tail	*Cynosurus cristatus*	O
Greater Plantain	*Plantago major*	O
Red Fescue	*Festuca rubra agg.*	O
Shepherd's-purse	*Capsella bursa-pastoris*	O
Foxglove	*Digitalis purpurea*	R

TN6 Modified Grassland (g4)

Common Name	Scientific Name	Frequency
Perennial Rye-grass	*Lolium perenne*	D
Cock's-foot	*Dactylis glomerata*	A
White Clover	*Trifolium repens*	A

Common Nettle	*Urtica dioica*	LD/F
Broad-leaved Dock	*Rumex obtusifolius*	F
False Oat-grass	*Arrhenatherum elatius*	F
Yorkshire-fog	*Holcus lanatus*	F
Ribwort Plantain	*Plantago lanceolata*	O/LF
Barren Brome	*Anisantha sterilis*	O
Bramble	*Rubus fruticosus agg.*	O
Cleavers	*Galium aparine*	O
Common Mouse-ear	*Cerastium fontanum*	O
Creeping Thistle	*Cirsium arvense*	O
Dandelion	*Taraxacum officinale agg.*	O
Hawthorn	*Crataegus monogyna*	O
Hedge Mustard	*Sisymbrium officinale*	O
Meadow Buttercup	*Ranunculus acris*	O
Perennial Sow-thistle	*Sonchus arvensis*	O
Red Clover	*Trifolium pratense*	O
Common Vetch	*Vicia sativa*	R
Hogweed	*Heracleum sphondylium*	R

TN7 Mixed Scrub (H3)

Common Name	Scientific Name	Frequency
Bramble	*Rubus fruticosus agg.*	D
Annual Meadow-grass	*Poa annua*	LD
Cleavers	*Galium aparine*	LD
Common Nettle	*Urtica dioica*	LD
Creeping Thistle	*Cirsium arvense*	A
False Oat-grass	*Arrhenatherum elatius*	A
Red Fescue	*Festuca rubra agg.*	LA
Rosebay Willowherb	*Chamerion angustifolium*	LA
Creeping Cinquefoil	*Potentilla reptans*	LF
Ivy	*Hedera helix*	LF
Field Bindweed	*Convolvulus arvensis*	O/LF
Apple	*Malus domestica*	O
Ash	*Fraxinus excelsior*	O
Common Sorrel	*Rumex acetosa*	O
Cow Parsley	*Anthriscus sylvestris*	O
Dandelion	*Taraxacum officinale agg.*	O
Elder	*Sambucus nigra*	O
Hawthorn	*Crataegus monogyna*	O
Hogweed	*Heracleum sphondylium*	O
Pedunculate Oak	*Quercus robur*	O
Common Vetch	*Vicia sativa*	R
Hedge Woundwort	*Stachys sylvatica*	R
Horse-radish	*Armoracia rusticana*	R
Meadow Vetchling	*Lathyrus pratensis*	R
Rowan	*Sorbus aucuparia*	R
Russian Comfrey	*Symphytum asperum x officinale (S. x uplandicum)*	R
Wall Barley	*Hordeum murinum*	R