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AN ECOLOGICAL SURVEY OF STURGESS FIELD SITES FOR NATURE RESERVE CONSERVATION IN DERBYSHIRE, UNITED KINGDOM.

By

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### ABSTRACT

*The Sturgess field sites was surveyed based on the standard and methodology of the extended phase 1 habitat survey between (October –November, 2013). The result shown no statutory designated nature conservation sites (SSSI) within the Sturgess field sites, however the adjacent Markeaton Brook and Markeaton Park are designated non-statutory nature conservation sites (Local wild life sites (LWS)). Three notable habitats which fall under the UK Biodiversity Action Plan (BAP) habitats were recorded, semi natural grassland, broadleaved mixed woodland and Rivers and streams. Records of protected species, species protected under the wild life Country side Act 1981 and species under the UK and County Local Biodiversity Action Plan (BAP) were evaluated. No records of protected white clawed Cray fish, water voles, and otters were found on this site. But however due to the records of this species in the adjacent Markeaton Brook and the suitability of this habitats to supports these species, they are considered to be present. In view of these findings recommendations were proffered for the management of the entire sites as nature reserve, this include planting of native wild life flowers within the meadow, hedgerow and scrub management, and introduction of additional bats and bird's boxes and also eradication of Himalayan balsam invasive weed among others.*

**Keywords:** Habitat survey, Woodland, Hedgerow.

### INTRODUCTION

#### *Site Description and Background information*

A Sturgess field site is situated in the north western Derby, between Kedleston road and the A38 adjacent to Markeaton Park. The field consisted of three different fields which are mixed with grassland, mature broad leaved woodland habitats and Markeaton brook which runs the fields. The whole field of 8.6 hectare is currently owned by the University of Derby, and field A and C are used by the University as playing grounds (Ecological Audit, 2007).

The Sturgess fields A and C are classify as a Green Wedge land, which has its main policy to maintain

areas of largely undeveloped, wild or agricultural land that may run through an urban area. The Green Wedges lands are also designated areas that support important wild life corridors and varieties of wild life sites (City of Derby Local Plan Review, 2003). The Sturgess field sites supports important Wild life including Woodpeckers, slow worms, warblers, Bats, Kingfisher. The sites also support abundance of different species of Dragon flies and Damselflies especially in the summer. The Markeaton brook(LWS) which runs through the Sturgess boundaries field sites also provide important linkage to habitats of Markeaton Park(LWS)(Ecological Audit, 2007).

The field sites was formerly owned by the Mundy family, before it was transferred to Derbyshire County Council in the 1940s and later became the Sturgess School. The school occupied the meadow field A, but due to continuous problems of flooding, the school was closed in the mid-1980s and completely demolished in 1989 (Frith, J., 2009). Formerly in the 1901 maps, the Sturgess field site appeared continuous as parkland with Markeaton Park to the North West before it was separated from the Park when Queensway was built in 1920s. Recently a planning permission was sought by the University of Derby to build a road through the fields to connect their two Campuses, but this was rejected by the City Council.

## METHODOLOGY

### *Desk study*

This entails finding relevant information and consultation with organisations to obtain previous surveys information or records of protected species, or any designated nature conservation sites such as Sites of Special Scientific Interest (SSSI), Local Wild Life Sites (LWS), National Nature Reserve (NNR), Special Area of Conservation (SAC), Special protection Area (SPA), Regionally Important Geological site (RIGS). The desk study is also essentials to find any previous records of species on the UK Biodiversity Action Plan (BAP), Local Biodiversity Action Plan (LBAP) or records of Red Data List species. For this survey relevant information were obtained from the following organisation:

1. Derby city Council
2. Derbyshire wild life trust website
3. Friends of Markeaton Brook
4. Derbyshire biodiversity web site
5. Magic Website for nature conservation sites
6. Derbyshire Flora website
7. National Biodiversity Network (NBN)
8. Derbyshire wild life sites

### *Phase one Habitat survey*

The Sturgess field sites, A, B, and C were surveyed on the 21<sup>st</sup> October, 2013 based on the standard and methodology of the extended phase I habitat survey by (JNCC, 2010). Different habitats were noted based on the phase one habitat types (Figure 1) and their suitability for protected species, UK BAP and LBAP species were also observed. Target notes were used to record features of special interest, habitat types and other features of significant important (Table 4.3 and figure 4.1).

Protected and notable species were also considered during the survey in particular signs of any species protected under part I of the wild life and country side Act (as amended), the conservation of species and habitats Regulation 2010 and the protection of Badgers Act 1992 were noted.

### *Survey Limitations*

The phase I habitat survey should have been conducted from April to September, because is the best time to surveyed Grassland and Mixed wood instead of October (JNCC, 2010). Due to time constraint of this work, limited number of visit to sites was done which we might likely to miss out some important features.

## RESULTS

### *Desk Top Results*

There are no designated nature conservation sites for the (SSSI, NNR, SAC,) within the Sturgess field, and the sites are not classified as Local wildlife site (LWS). But however the adjacent Markeaton Brook which has two of its tributaries fall within the Sturgess field sites are designated as local wild life sites (LWS) for its notable invertebrate assemblage (Derbyshire Wild life site register, 2003). In addition the Sturgess field sites A and C are classified as Green Wedge sites under the Derby City Council policy (Wood, L., 2010). The Markeaton Park is also an important designated local wild life site (LWS) (Derbyshire Wild life site register, 2003).

**Records of protected Species**

There are records of protected species within the Markeaton brook (Table 4.1) and some within the Markeaton Park (Table 4. 2). A record from Derbyshire

wild life sites Register also shows presence of protected species white-clawed Cray fish, water vole, and invertebrate assemblage on Grid reference SK 3300 3890 (Derbyshire Wild life site register, 2003).

**Table 4.1:** list of protected species recorded within the Markeaton brook.

SN	Species	Records	Legislation/Conservation
1.	White Clawed Cray fish	Records from 1975 to 2008	Fully protected under UK and European legislation. UK and County BAP priority species.
2.	Water Vole	Records 1964 to 2003	Partially protected under UK legislation. UK and County BAP priority species.
3.	Otter	Several records from 2000 and 2002.	Fully protected under UK and European legislation. UK and County BAP priority species

Source: Ecological survey and management measures, (2012).

**Table 4.2:** list of protected species recorded within the Markeaton Park.

SN	Species	Records	Legislation/Conservation
1.	Common Frog ( <i>Rana temporaria</i> )	Record from 2010	Partially protected under UK legislation.
2.	Common toad ( <i>Bufo bufo</i> )	Record from 2010	Partially protected under UK legislation. UK and County BAP priority species.

Source: Ecological survey and management measures, 2012.

**Survey Results**

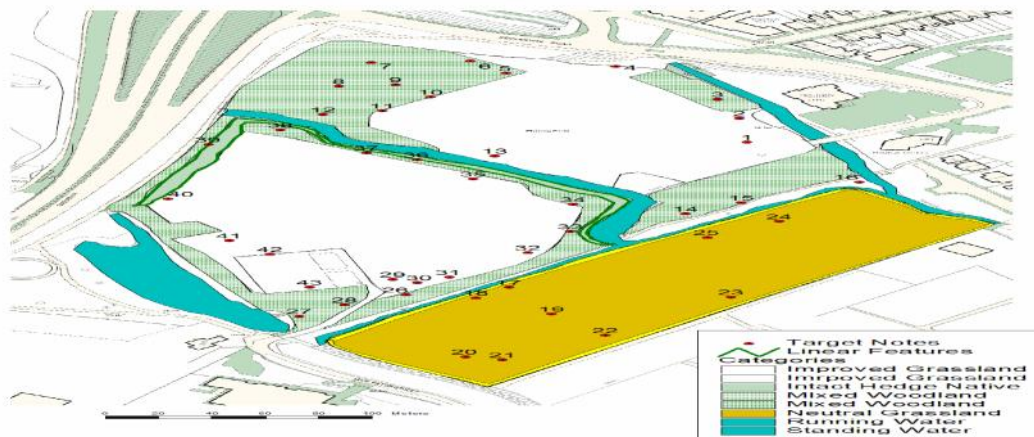


Figure 4.1: Shows survey features and target notes on Sturgess field.

### **Habitat types**

The habitat types recorded during the first 1 habitat survey on Sturgess field sites includes different types of grassland, mixed wood land, and the streams from the Markeaton Brook running through the Sturgess fields (Figure 1). The habitats present were classified into three BAP habitats as specified in the Lowland Derbyshire Biodiversity Action Plan (Lowland Derbyshire biodiversity partnership, 2011). These include the following habitat types;

1. Semi –natural grassland
2. Broadleaved mixed wood land
3. Rivers and streams

### **Grassland**

Amenity grassland is the predominant habitat present in the Sturgess playing fields. The grassland is an intensively managed and is characterized by annual meadow grass (*Poa annua*), a perennial rye grass (*Lolium perenne*) and other species including daisy (*Bellis perennis*), common cats-ear (*Hypochaeris radicata*), red fescue (*Festuca rubra*), yarrow (*Achillera millefolium*) and dandelion (*Taraxacum spp*). Amenity grassland is generally characterized with low plant species diversity and with a uniform structure, in view of these characteristics they considered to have small conservation values (Sutherland and Hill, 2008). The sturgess field (C) sites are not generally intensively managed, resulting to areas of semi-improved unmanaged neutral grassland (Field C). This areas are characterized with predominant grass species such as York fog (*Holcus lanatus*), false oat grass (*Arrhenatherum elatius*), perennial rye-grass,cock's foot (*Dactylis glomerata*), rough meadow grass (*Poa trivialis*). Other herb species recorded at the site include meadow butter cup (*Ranunculus acris*), common ragwort (*senecio jacobaea*), cut-leaved cranes bill (*Geranium dissectum*), cow parsley (*Anthriscus sylvestris*), red clover (*Trifolium pratense*) and bush vetch (*vicia sepium*). The species composition of the neural grassland recorded at the Sturgess field site is approximately poor in species, and fragmented.

More over because of their poor species diversity and small size, this grassland are of local significance for nature conservation (Sutherland and Hill, 2008).

### **Broad leaved mixed woodland**

The sturgess field sites are composed of straight wood land along the boundaries of the grassland which follow the Markeaton Brook course. The woodland habitat is composed of plantation woodland, with different variety of species. The woodland are predominantly made up ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*), others species recorded includes bramble (*Rubus fruticosus*), elder (*Sambucus nigra*) grey willow (*salix cinerea*) and hawthorn (*Crataegus monogyna*).

### **Standing Water**

The two mill ponds were also recorded at the southern boundary of the site .The ponds are characterized with small aquatic vegetation and cover with little shade. The ponds are composed of with small patches of introduced water lily species (*Nymphaea spp*), and other species including (*phragmites australis*) reed sweet grass (*Glyceria maxima*) are also recorded.

### **Running Water**

The running water from Markeaton Brook runs through the north of Sturgess field site joined the millponds to the Brook by a small tributary stream. Both the Brook and the streams are generally composed of substrates made up from sands and pebble and cobbles. The presence of densely shaded over hanging trees, fallen trees, ivy, dead woods and small riparian vegetation were also were also recorded surrounding both the Brook and tributary streams.

### **Species poor intact hedgerows**

A number of hedgerows were recorded within the Sturgess field site, however these were all species poor dominated with hawthorn, Himalayan balsam, cow

parsley, and nettles surrounding the boundary iron fence.

1. Semi-natural grassland
2. Broadleaved mixed wood land
3. Rivers and streams

**DISCUSSION AND EVALUATION**

**Habitat Evaluation**

The habitats types recorded were classified into three Biodiversity Action Plan (BAP) habitats as specified in the Lowland Derbyshire Biodiversity Action Plan (Lowland Derbyshire biodiversity partnership, 2011). However there are no statutory nature designated nature conservation sites on Sturgess field. These habitats include the following habitat types:

Markeaton Park and Markeaton Brook are non-statutory designated nature conservation sites, Local wild file sites (LWS) (Derbyshire Biodiversity, 2013) and they both provide an important corridor linkage for many protected species in Sturgess field. The habitats types recorded on Sturgess field were evaluated for their potentiality to supports different flora and fauna species (Table 5.1).

**Table 5.1:** shows the evaluated potential of Sturgess field habitats

S/N	Habitats	Evaluation
1.	Improved Grassland	This habitat is generally specie poor and contains small variety of biodiversity. It is less likely to provide potential habitats for many fauna species. But may serve as a suitable transition area for wood land grassland transition species.
2.	Neutral Grassland	This habitat is less intensively managed and has the potential to support large varieties biodiversity.
3.	Broad leaved mixed woodland	This habitat will provide potentially habitats for nesting birds, bats and insects.
4.	Running water	This habitat is an important corridor for both flora and fauna species. It is a potential good habitat for the Cray fish, Water vole, Otters, amphibians, mayflies insect.
5.	Hedgerow(intact species)	This habitat provides important ecological corridors linking the other habitats. It is a potential habitat for nesting birds, beetles, and butterflies.

**Protected/notable Species**

**Faunal Species**

*White-clawed Cray fish*

White-clawed Cray fish (*Austropotamobius pallipe*) was not recorded during this survey, but records showed the presence of this specie in Markeaton Brook. No Crayfish were recorded during this survey, but however because of the presence of this specie in Markeaton Brook downstream. The presence of this specie in the Sturgess field sites cannot be rule out, especially where suitable habitats like overhanging tress roots are present. The specie is declining due habitat modification and management of

water course and threats from non-native species (Wild life Country side Act, 1981).

*Water vole*

Water vole was not recorded during this survey, no burrows or feeding signs and foot prints were found at the time of our survey. But Water voles were known to occur in Markeaton Brook from records. Water voles are protected under the wildlife and country sides Act 1981(as amended) <sup>1</sup> they are prevented from killing, taking. Their resting and breeding places are also protected from destruction under this legislation (Wild life Country side Act, 1981).

*Otter Lutra lutra*

No otter or sign of otter such as latrine sites, feeding signs were recorded during this survey. But records showed otters to have been recorded in Markeaton Brook. Otters are protected.

*Moths*

Many moths' species from the previous survey species list on sturgess field sites are classified as UK BAP and LBAP priority biodiversity species (Table 5.1). These species require urgent conservation effort. None of the Moths species from our list is listed under the Wild life Country side Act 1981(as amended) for fully protection (Derbyshire Biodiversity, 2013).

*Amphibians*

Amphibians Common Frog (*Rana temporaria*) and Common Toad (*Bufo bufo*) were known to have been recorded in Markeaton Brook and on Sturgess field sites (Table 4.1 and 5.1). But none of the specie was recorded at the time of this survey; however the specie should be consider present. The Common toad (*Bufo bufo*) is protected under the wild life and Countryside Act, 1981 and is classified as UK BAP and County local BAP priority species. The common frog is partially protected under the UK laws, but is not listed as UK or local BAP priority specie (Derbyshire Biodiversity, 2013).

*House Sparrow*

House Sparrow (*Passer domesticus*) was not recorded during this survey, but however the species was recorded from previous survey on the site. In view of this, the specie will be considered present

*Bird's species*

All the birds species listed on the species list (see appendix) are protected under the wild life Country side Act 1981(as amended). This legislation protects all birds' species from illegal killing, taking, destruction of their nest and its content (Wild life Country side Act, 1981).

*Floral Species*

## Large-leaved lime

There are records of large-leaved lime (*Tilia platyphyllos*) from previous survey list on Sturgess field sites. This tree species falls under category (3) nationally scare tree in the Derbyshire Red data list of vascular plants (Moyes and willmot, 2009). Necessary measures should be put in place to protect this specie during development.

**RECOMMENDATIONS FOR THE MANAGEMENT OF THE ENTIRE SITE AS A NATURE RESERVE**

**Grassland management:** The grassland habitat on this site are predominant improved grassland, should be enhance to provide more wild life flowers. This grassland area should be mown once a year in mid-June to July and the clipping should also be removing after few days, to prevent soil nutrients enrichment. This is essential to avoid excessive growth of competitive grasses, which will out- compete the wild flowers (Sutherland and Hill, 2008). The cutting should be carefully done and should not be too low, usually not less than 4cm. This is important to avoid removing the cover grass and create excessive bare ground, which would encourage weed infestation. However small bare ground should be created for the establishment of wild life flowers (Malcolm, 2007).

Fertilizer application should be avoided on the grassland, to maintain biodiversity and to avoiding killing of grassland fungi. The grassland is also rich in fungi, so moss killers should be discourage. This is because moss form fungi usually have biological relationships with mosses (Kirby, 2001).

**Grassland enhancement by planting wild flowers**

Wild life flowers should be grown into the existing grassland habitat, this will increase biodiversity by attracting variety of insect and invertebrate species (Morris et al., 1994). Native species of wild flowers characteristics of a low and hay meadows should be chosen, and the suitability of this specie for the soil condition should be taken into

recognition. This will also increase additional food sources that would support a variety of insects and invertebrate species (Sutherland and Hill, 2008). The following British wild flower species are recommended, ox-eye Daisy, common Knapweed, Blue purple, White clover, Pink purple, Lady's bedstraw, cowslip, and red clover. Additional small micro habitats should also be introduced, such as large stones. This is important for variety of insects and invertebrates to utilize as sun spots during the summer (Kirby, 2001).

### ***Grassland Margins***

The margins of all this fields should be cut once a year by mid-June or July to halt the grassland growing into scrub. A distance of 3-6 metres near the edges of the fields should not be mown, to allow growing into taller grasses or should be planted with taller grasses and wild life flowers. This is important because they provide food, shelter and refuge habitats for invertebrates, amphibians, small reptiles and mammals (Malcolm, 2007). This would provide additional corridor habitat for variety of species in the nearby woodland, streams habitats, by providing a refuge corridor for invertebrates, small mammals, birds and amphibians as they transit around these habitats (Kirby, 2001).

### ***Scrub Control***

Scrub areas developing on these fields should be maintained to increase biodiversity on the grassland. The cover scrub should be mown to prevent over growth, but however scrub such as hawthorn, wild rose, willow and alder on this fields should be retained and maintained. This is because they provide important breeding, feeding, and roosting sites for insects, birds. More so unwanted scrub on this field should be cleared each year and stumps be treated with herbicide (Duffey et al., 1974).

### ***Hedge management***

The hedge along the margins of this field should be managed as dense, tall and broad. A distance of 1-2 metre of tall grass around the existing hedges

should be allowed, and this would provide habitat for nesting birds and other invertebrates (Malcolm, 2007). The hedge around field C should be filled in with additional native species to reduce the existing gaps. The following native species are recommended, Hawthorn, Hazel, elder, Maple. The hedge should be cut on a 3 years period, particular thick ones. Cuttings should be done in various shapes to provide good stocking and shelter (Sutherland and Hill, 2008).

### ***Streams (Bank side)***

Trees along the streams are very important, because they provide important shelter, habitat, nesting places for many invertebrates, amphibians (Kirby, 2001). However the trees around the bank side of these streams should be cut to reduces the shade, to increases light penetration around the streams. This is important to enhance the invertebrates' biodiversity especially the White clawed Cray fish along the streams (Kirby, 2001). Trees species such as alder should be coppiced at ground level and allow to re growing, but dead wood should be retained.

The large Crack willow (Target note. 17) near the foot bridge should be pollard, rotational pollarding of the willow tree is recommended over 10 years period. This is important to reduce the destruction to invertebrates nesting on the branches as well as twigs (Kirby, 2001).

### ***Himalayan Balsam control (Impatiens glandulifera)***

Himalayan Balsam is invasive plant weed species, recorded on this field on (Target notes 3, 10, 12). It forms a very dense stands which out-compete and suppress the growth of other native British plant and grass (Centre for Ecology and Hydrology, 2004). This invasive weed should be eradicated by hand pulling and regular mowing before it start flowering. The weed should be regularly inspected along the stream bank and grassland in the spring and hand pick, before it starts flower (Malcolm, 2007).

### ***Wood land management (Dead wood)***

Deadwood are very important and an integral part of woodland ecosystem, they provide habitats and shelter for a wide range of organisms such as bats, hedgehogs, birds, voles, insects, fungi and mosses (Blakesley and Buckley, 2010). Therefore the existing dead woods on these fields (Target notes 14, 20,) and others within the woodland both felled and standing should be retained, to provide more habitats and increase biodiversity. Pollarding of over grown tress is also recommended to provide additional dead wood.

### ***Woodland shrub management***

The woodland understorey is currently taking over by dense and over shading young tress. The woodland understorey tress should be reduces by thinning, hand pulling should be employed to remove species such as hawthorn, oak (Peterken, 1993).

### ***Bird and Bats boxes***

Due to the small opportunities for nesting birds holes on this woodland field. There is need for the provision of nest boxes for both the birds and bats species, this will be providing additional roosting sites for these species (Blakesley and Buckley, 2010). The boxes should be fix on trees, with a reasonable high of 5m, to reduces damage. Boxes should also be attached on locations, which are easily visible and inspected. Activities close to these boxes should be avoided, and over hanging branches should be remove. Maintenance and inspection should be conducted by license personnel, from June to mid-August (Blakesley and Buckley, 2010).

### **CONCLUSION**

This survey has found no statutory designated nature conservation sites (SSSI) within the Sturgess field sites, however the adjacent Markeaton Brook and Markeaton Park are designated non-statutory nature conservation sites( Local wild life sites (LWS)). Three notable habitats which fall under the UK Biodiversity Action Plan (BAP) habitats were recorded, semi natural

grassland, broadleaved mixed woodland and Rivers and streams. Records of protected species, species protected under the wild life Country side Act 1981 and species under the UK and County local Biodiversity Action Plan (BAP) were evaluated. No records of protected white clawed Cray fish, water voles, and otters were found on this site. But however due to the records of this species in the adjacent Markeaton Brook and the suitability of this habitats to supports these species, they are considered to be present.

In view of these findings, recommendations were also outlined for the management of the entire sites as nature reserve this include planting of native wild life flowers within the meadow, hedgerow and scrub management, introduction of additional bats and birds boxes and eradication of Himalayan balsam invasive weed among others.

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