

Aquatic Invertebrate Survey

Proposed Rabbit Ings Regeneration Scheme,
Near Royston, Bamsley

On behalf of the City of Wakefield Metropolitan
District Council and Yorkshire Forward

By WYG Environment

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RABBIT INGS REGENERATION SCHEME: AQUATIC INVERTEBRATE SURVEY**1. INTRODUCTION****1.1 Background to Activity**

WYG Environment (WYGE) was commissioned by Carillion on behalf of City of Wakefield Metropolitan Borough Council (WMDC) and Yorkshire Forward (YF) to undertake ecological work as part of a regeneration scheme for the Rabbit Ings site ('the Site') that covers 65.9 hectares of land near the village of Royston, Barnsley. The Site includes land formerly used as a colliery spoil heap, former drift mine and disused sports pitches/recreation ground. The Rabbit Ings Regeneration Scheme ('the Scheme') will include the importation of soil making materials, regrading of steep slopes for Health and Safety reasons, and reclamation works to provide formal and informal recreation uses including sports pitches with two team changing facilities with ancillary site access, car parks and informal open areas with landscape and ecological enhancements.

Following a Phase 1 survey undertaken by Scott Wilson at the Site in 2007, a number of specific habitat and protected/notable species surveys were recommended to accurately predict potential ecological impacts as a result of the proposals. This report provides details of ecological work undertaken at Rabbit Ings in relation aquatic invertebrates. The aims of this assessment were:

- To determine whether the Site was used by aquatic invertebrates with consequent implications for the Scheme with respect to the *Wildlife and Countryside Act 1981* (as amended), the *Conservation (Natural Habitats &c.) Regulations 1994*, and relevant planning and policy guidelines;
- To provide proposals for mitigation measures to offset any environmental impacts caused by the proposed work and to maintain the local aquatic invertebrate populations at a favourable conservation status; and
- To assist the client to operate within the law.

1.2 Site Location and General Description

The Site (centred around OS grid reference SE 381 118) is located to the north-east of the village of Royston, east of Lund Hill Lane (B6428), some 4.5km north-east of Barnsley, and covers approximately 65.9 hectares (ha). The site is within the administrative boundary of Barnsley Metropolitan Borough Council (BMBC). The majority of the site is owned by WMBC with the recreation ground owned by the Royston and Carlton Community Partnership (RCCP) and a relatively small parcel of land within the south part of the site under the ownership of BMBC.

The site effectively comprises three distinct areas, namely as follows:

- (i) the former Rabbit Ings spoil heap;
- (ii) the former Royston drift mine site located to the north-west of the spoil heap;
- and
- (iii) the RCCP recreation ground located to the south-west of the spoil heap.

The Rabbit Ings spoil heap occupies the majority of the Site covering an area of approximately 50.9ha. Sandybridge Lane forms the eastern boundary of the spoil heap and Sandybridge Dyke is located to the south. A dismantled railway, part of Lund Hill Lane, along with the former Royston Drift Mine and some existing employment land is located to the west of the former spoil heap. Open agricultural fields and a former railway line forms the northern boundary of the spoil heap.

The spoil heap comprises a mound of colliery spoil rising approximately 35m to 40m above surrounding land. There are some areas of tree and shrub growth mainly on the southern slopes of the spoil heap, but other parts are sparsely vegetated. The spoil heap appears to be terraced on its northern flank, with steep embankments separating the terrace levels. Parts of the southern flank of the spoil heap are steep sided, leading to a much flatter area of land adjacent to Sandybridge Dyke that has more established areas of tree and shrub vegetation. The top of the spoil heap is generally flat with limited vegetation cover. There is evidence of surface erosion from uncontrolled surface water run-off on parts of the spoil heap. In addition, there is evidence of unauthorised use by motor bikes and 4x4 vehicles on the spoil heap and adjacent land within the Site.

A man-made pond is located in the north-east corner of the Site and a former lagoon is located in the south-west corner.

The former Royston Drift Mine site occupies an area of land approximately 6.5ha, located to the north-west of the spoil heap, east of Lund Hill Lane, and to the north of existing industrial land. It comprises a relatively flat area of land with an area of hardstanding along with the remains of former roadways and footings for former colliery buildings.

The RCCP derelict sports pitches/recreation ground is located adjacent to the south-west part of the spoil heap and covers an area of approximately 8.5ha. The sports pitches are in poor condition and are infrequently used; they have been 'ploughed' to prevent motorcycle and 4x4 access. The eastern boundary of this part of the Site is formed by a disused railway line adjacent to the spoil heap. The western boundary is formed by a public footpath, with Lund Hill Lane to the west, and the southern boundary by a hedgerow.

A public footpath runs generally along the northern site boundary, in part within the Site, providing a link between Lund Hill Lane in the west and Sandybridge Lane to the east. In addition, a public footpath runs from Lund Hill Lane in a south-east direction, to the north of the sports pitches/recreation ground, and leaves the southern boundary of the Site to connect with the wider rights of way network including the Trans Pennine Trail.

1.3 Surrounding Area

Land to the north and east of the Site includes open fields used for agriculture. The village of Shafton is located approximately 0.5km to the south-east of the spoil heap with intervening agricultural land. The Sandybridge Dyke is located along the southern boundary of the Site and the Trans Pennine Trail, with woodland areas and agricultural land to the south.

South-west of the spoil heap and outside the Site is a restored waste disposal tip (Cudworth Landfill Site) forming a prominent mound rising 10m above the surrounding land. West of the RCCP recreation ground is a railway line that runs north-south, passing over Lund Hill Lane, approximately 100m west of the site boundary. In addition, a former landfill site is located outside and to the north of the former drift mine part of the Site.

Between Lund Hill Lane and the former spoil heap is an area of land that is currently used for employment purposes, including a pallet yard and a number of other business activities.

The Monkton Coke and Chemical Works is located to the west of the Site and Lund Hill Lane. North of this coke works and to the west of Lund Hill Lane is a coal storage yard.

Royston Village is located to the south-west of the Site. Some residential properties and a nursery school on the east side of this village are located to the west of Lund Hill Lane approximately 100m distant from the south-west of the Site boundary. There are some residential properties along Lund Hill Lane approximately 250m north of the Site.

The Site is surrounded by arable land to the north, amenity fields and agricultural fields beyond to the south and is bordered by Lund Hill Lane and Sandybridge Lane to the west and east respectively.

1.4 **Proposed Work**

The Scheme provides for the regeneration of the Site and will primarily involve some importation of soil making materials, regrading and reclamation works to provide formal and informal recreation uses including sports pitches with two team changing facilities, ancillary site access, car parks, and informal open space areas with landscape and ecological enhancements. The Scheme will take 12-18 months to complete, subject to works being progressed within the appropriate soil handling season.

2. DESK STUDY

2.1 Legislation and Guidance

There are a number of invertebrate species that are protected by European and UK legislation including those listed on Schedule 5 of the *Wildlife and Countryside Act 1981* (as amended) and the *Conservation (Natural Habitats, &c.) Regulations 1994* (as amended). As a result, some species are protected from some or all of the following (amongst others): (i) killing, injuring or taking; (ii) possession or control; (iii) damage to, destruction of or obstruction of access to any places used for shelter or protection; and (iv) disturbance while using such a structure. Following a review in 2007 of species listed on the UK Biodiversity Action Plan (BAP), there has been a significant increase in the number of invertebrates included. The current UK BAP now lists 411 invertebrate species.

Paragraph 14 of Planning Policy Statement 9: Biodiversity and Geological Conservation (2005) states that 'Development proposals provide many opportunities for building-in beneficial biodiversity or geological features as part of good design. When considering proposals, local planning authorities should maximise such opportunities in and around developments, using planning obligations where appropriate.' Therefore, where developments requiring planning permission may affect protected or notable species, such as those invertebrate species listed on the UK BAP, it is preferable that an appropriate mitigation strategy is produced to ensure they are protected from the adverse effects of development and options to negate the impact should be considered

2.2 Baseline Data

The British Dragonfly Society (BDS) has a section of their web site designated to the 'key sites' of the British Isles (<http://www.dragonflysoc.org.uk/keysites.html>). From this site the vice-counties that make up Yorkshire currently have one nationally or locally important damselfly and four dragonflies. These are red-eyed damselfly (*Erytroma najas*), migrant hawk, emperor dragonfly, broad-bodied chaser and the black-tailed skimmer.

The Rob Frith and Associates Ltd. report (2003) states that the section of Sandybridge Dyke running along the southern boundary of the Site has a nationally scarce B species, this being the *Helophorus griseus* (A national scarce category B

species is one that does not fall within Red Data Book (RDB) categories but which is still uncommon within Great Britain and are thought to occur in between 31 and 100 10km squares of the national grid or for less well recorded groups between eight and twenty vice-counties). The ponds adjacent to the northern boundary of the Site (Ponds 2a, 2b and 3) were found to support the following nationally scarce water beetles: *Helophorus griseus*, *Helophorus punctatus* and *Rhantus suturalis*; while Pond 4 supported *Helophorus punctatus* and *Rhantus suturalis*.

Data from the National Biodiversity Network (NBN) gateway revealed the following historic record in 1965 of a mud pond snail *Omphiscola glabra* within 2km of the site.

3. METHODOLOGY

The Site was visited on three occasions between May and August 2008 to record the aquatic macro-invertebrates within the aquatic habitats. The survey dates were 30th May, 1st July and 13th August. On each occasion the macro-invertebrates within 11 ponds (refer to Plan 1 for locations) were sampled using a dipping net (New, 1998). The macro-invertebrates within these samples were then identified to produce the Biological Monitoring Working Party (BMWP) and the Average Score Per Taxon (ASPT) scores. These provide standard biotic indices of the water quality. During all site visits the odonata (dragonflies and damselflies) were recorded. This was carried out as odonata have an aquatic larval stage which may last from several months to five to seven years depending upon the temperature of the water body, availability of food, altitude and latitude. Thus, odonata can be used as an indicator of aquatic site quality (Corbet, 1999; Eyre, 1996).

4. SURVEY RESULTS

The following table details the BMWP and ASPT scores for each pond on each survey date. The location of each pond within the site is shown on Plan 1 and detailed survey results are presented in Appendices 1 to 3.

Table 1: Summaries of the BMWP and ASPT scores for each pond.

Feature	Location	Date of survey	BMWP Score	ASPT Score	Interpretation
Pond 1	SE 376 121	30 th May	31	3.9	moderate
		1 st July	28	4.7	moderate
		13 th August	53	4.8	good
		AVERAGE SCORES	37.3	4.47	MODERATE
Pond 2a	SE 378 121	30 th May	43	4.8	moderate
		1 st July	29	4.1	moderate
		13 th August	27	4.5	moderate
		AVERAGE SCORES	33.0	4.47	MODERATE
Pond 2b	SE 378 121	30 th May	40	4.4	moderate
		1 st July	54	4.9	good
		13 th August	17	3.4	poor
		AVERAGE SCORES	37.0	4.23	MODERATE
Pond 3	SE 378 121	30 th May	46	5.1	moderate
		1 st July	DEEP MUD	N/A	N/A
		13 th August	16	3.2	poor
		AVERAGE SCORES	31.0	4.15	MODERATE
Pond 4	SE 381121	30 th May	28	5.6	moderate
		1 st July	45	6.4	moderate
		13 th August	26	4.3	moderate
		AVERAGE SCORES	33.0	5.43	MODERATE
Pond 5	SE 385 119	30 th May	25	3.6	poor
		1 st July	28	3.5	moderate
		13 th August	33	4.1	moderate
		AVERAGE SCORES	28.6	3.73	MODERATE
Pond 6	SE 377 113	30 th May	23 / 25	4.6 / 3.6	poor
		1 st July	27	4.5	moderate
		13 th August	19	4.8	poor
		AVERAGE SCORES	23.3	4.47	POOR
Pond 7	SE 376 113	30 th May	DRY	N/A	N/A
		1 st July	DRY	N/A	N/A
		13 th August	20	5.0	poor
		AVERAGE SCORES	20.0	5.00	POOR
Pond 8	SE 376 113	30 th May	23	3.8	poor
		1 st July	DRY	N/A	N/A
		13 th August	16	4.0	poor

Feature	Location	Date of survey	BMWP Score	ASPT Score	Interpretation
AVERAGE SCORES			19.5	3.90	POOR
Pond 9	SE 376 113	30 th May	50	5.6	moderate
		1 st July	40	4.4	moderate
		13 th August	19	4.8	poor
AVERAGE SCORES			36.3	4.94	MODERATE
Pond 10	SE 377 116	30 th May	30	5.0	moderate
		1 st July	31	4.4	moderate
		13 th August	16	4.0	poor
AVERAGE SCORES			25.7	4.47	MODERATE

Higher BMWP scores indicate that the pond which has been assessed supports a greater diversity of aquatic macro-invertebrates. The invertebrates with higher scores are those which are less tolerant to water pollution, therefore, indicating better water quality than those with a lower score (see appendices 1 to 3). The results indicate that Ponds 1, 2b and 9 have a greater diversity of macro-invertebrates while Ponds 7 and 8 are of lower value.

A higher ASPT score indicates a larger number of invertebrates with a higher BMWP score thus indicating a less polluted aquatic habitat. Higher ASPT scores indicate that there are more taxons with a higher score and are thus less pollution tolerant. The results given above indicate that Ponds 6, 7 and 8 (which are located within a wooded area) are less valuable for aquatic macro-invertebrates than other ponds within the Site. Ponds 1 and 2a (ponds 2a and 2b join together to form one pond in the winter due to higher water levels) are of a greater value for aquatic macro-invertebrates, as these ponds have higher BMWP scores indicating increased water quality.

Table 2: Adult Odonata recorded on site.

Common name	Latin name	Location (pond nos.)
Azure Damselfly	<i>Coenagrion puella</i>	1, 2a, 2b
Black-tailed Skimmer	<i>Orthetrum cancellatum</i>	1
Blue-tailed Damselfly	<i>Ischnura elegans</i>	1, 2a, 2b, 5
Broad-bodied Chaser	<i>Libellula depressa</i>	1, 2a, 2b, 5
Brown Hawker	<i>Aeshna grandis</i>	1, 2a, 2b, 4, 5, 9
Common Blue Damselfly	<i>Enallagma cyathigerum</i>	1, 2a, 2b, 5
Common Darter	<i>Sympetrum striolatum</i>	1, 2a, 2b, 4, 5, 9

Emerald Damselfly	<i>Lestes sponsa</i>	1, 2a, 2b, 4
Emperor Dragonfly	<i>Anax imperator</i>	1, 2a, 2b, 4, 5
Four-spotted Chaser	<i>Libellula quadrimaculata</i>	1, 2a, 2b, 5
Large Red Damselfly	<i>Pyrrosoma nymphula</i>	4
Migrant Hawker	<i>Aeshna mixta</i>	1, 2a, 2b, 3
Ruddy Darter	<i>Sympetrum sanguineum</i>	1, 2a, 2b
Southern Hawker	<i>Aeshna cyanea</i>	1, 2a, 2b

The number of Odonata species currently recorded on site stands at fourteen. This indicates that the site has water of sufficient quality to allow those species to complete their life cycle, especially during the larval stage. In accordance with British Dragonfly Society guidance which states that a site within Yorkshire should have eight species recorded within the last ten years to qualify as a key site, Rabbit Ings is considered to qualify as a key site for Odonata.

5. IMPACTS AND RECOMMENDATIONS.

The ponds within and adjacent to the Site are considered to form an important part of the ecological network for aquatic invertebrates and other species and the Site itself is considered to qualify as a key site for Odonata. The characteristics of the ponds vary and they are at differing stages of succession which allows the Site to support a greater diversity of aquatic macro-invertebrates.

Although the Scheme is considered likely to be of overall benefit to the local aquatic macro-invertebrate population due to (i) the creation of more and varying aquatic habitats; (ii) the reduction of disturbance; and (iii) the implementation of appropriate long-term management, some temporary adverse impacts are expected as a result of the proposed works.

Only one pond (Pond 1) will be destroyed as part of the Scheme; this pond was assessed to be of moderate quality to invertebrates (indicated by the BMWP and ASPT scores) and is especially important for the broad-bodied chaser and black-tailed skimmer dragonflies due to its early successional stage along with the basking areas provided by the surrounding hardstanding. Pond 1 will be replicated through the creation of a new pond 230m south-east of the existing pond towards the end of the Scheme and will mimic many of the characteristics offered by the

existing pond i.e. it will have at least one shallow side and will be sufficiently deep in the centre to ensure it does not dry out in the summer months. The shallow side will allow for a good draw down zone which is important for plants and invertebrates (Abrahams, 2005).

Pond 4 was assessed to be of moderate quality; this pond will be fenced prior to the commencement of work and will remain undisturbed. However, to ensure its longevity as a resource for the local aquatic macro-invertebrate population, the management plan (which will be implemented for at least five years after completion of the Scheme) will incorporate the control but not complete removal of greater reedmace (*Typha latifolia*) before this causes the pond to dry out. This work will be undertaken in late autumn over several years to minimise disturbance to nesting birds and to ensure sufficient habitat is retained to support the species present.

6. REFERENCES

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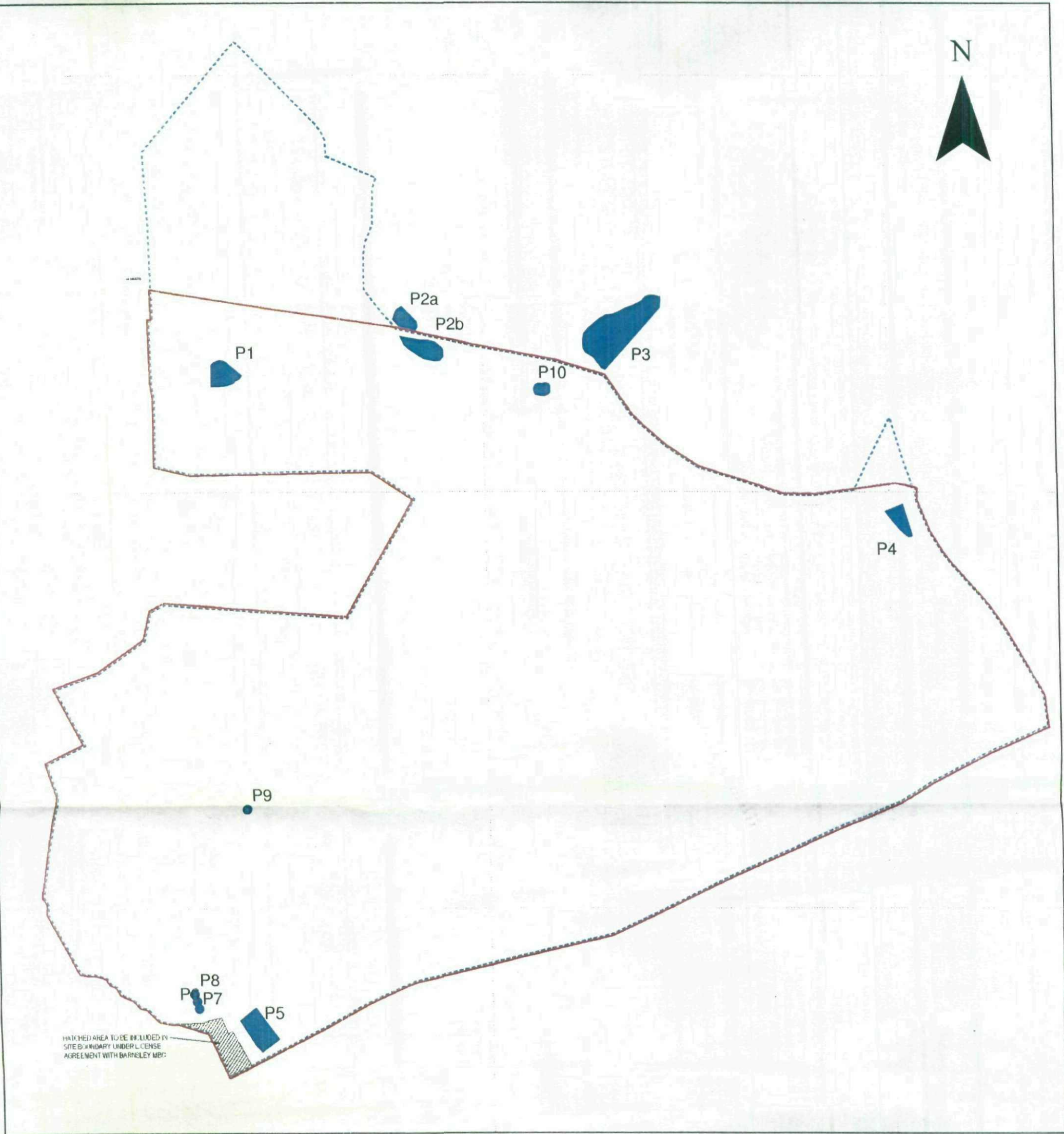
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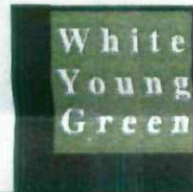
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Environmental

Project

Rabbit Ings Colliery

Drawing Title:

Aquatic macro-invertebrate survey
Pond locations

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Base map provided by

APPENDIX 1

Survey results from 30th May 2008

GROUP	FAMILIES	BMWP	SAMPLING POINTS - 30th May 2008											
			Pond 1	Pond 2a	Pond 2b	Pond 3	Pond 4	Pond 5	Pond 6	Pond 6a	Pond 7	Pond 8	Pond 9	Pond 10
Stoneflies	<i>Perlodidae</i>	10				10							10	
Dragonflies	<i>Lestidae</i>	8		8		8						8		
	<i>Aeshnidae</i>	8					8							
	<i>Libellulidae</i>	8		8	8		8		8				8	
Caddis or Sedge flies	<i>Limnephilidae</i>	7			7									7
	<i>Gammaridae</i>	6				6							6	6
Dragonflies	<i>Coenagruidae</i>	6	6					6					6	
Bugs	<i>Nepidae</i>	5						5						
	<i>Corixidae</i>	5	5	5	5	5	5	5	5	5			5	
Beetles	<i>Dytiscidae</i>	5	5	5	5	5	5		5	5		5	5	5
	<i>Hydrophilidae</i>	5												5
Caddis or Sedge flies	<i>Hydropsychidae</i>	5		5										
Mayflies	<i>Baetidae</i>	4	4	4	4	4				4		4	4	4
Snails	<i>Hydrobiidae</i>	3	3							3				
	<i>Lymnaeidae</i>	3	3		3	3				3			3	
	<i>Planorbidae</i>	3		3	3									
Cockles	<i>Sphaeriidae</i>	3	3											
Leeches	<i>Hirudidae</i>	3						3						
Hog Louse	<i>Asellidae</i>	3		3	3	3		3	3	3		3	3	3
Midges	<i>Chironomidae</i>	2	2	2	2	2	2	2	2	2		2		
Worms	<i>Oligochaeta</i>	1						1				1		
BMWP score			31	43	40	46	28	25	23	25	0	23	50	30
ASPT			3.9	4.8	4.4	5.1	5.6	3.6	4.6	3.6	0	3.8	5.6	5.0
Interpretation			moderate	moderate	moderate	moderate	moderate	poor	poor	poor	DRY	poor	moderate	moderate

APPENDIX 2

Survey results from 1st July 2008

GROUP	FAMILIES	BMWP	SAMPLING POINTS - 1st July 2008										
			Pond 1	Pond 2a	Pond 2b	Pond 3	Pond 4	Pond 5	Pond 6	Pond 7	Pond 8	Pond 9	Pond 10
Mayflies	<i>Leptophlebiidae</i>	10					10						
Dragonflies	<i>Lestidae</i>	8			8		8						
	<i>Aeshnidae</i>	8			8		8					8	
	<i>Libellulidae</i>	8			8		8					8	
Caddis or Sedge flies	<i>Limnephilidae</i>	7		7	7				7				7
Dragonflies	<i>Coenagriidae</i>	6	6					6					
Bugs	<i>Gerridae</i>	5	5					5					
	<i>Nepidae</i>	5											5
	<i>Corixidae</i>	5	5	5	5		5		5			5	5
Beetles	<i>Dytiscidae</i>	5	5	5	5		5		5			5	5
Mayflies	<i>Baetidae</i>	4	4	4				4	4				
Alderflies	<i>Sialidae</i>	4						4					
Snails	<i>Hydrobiidae</i>	3											3
	<i>Lymnaeidae</i>	3	3		3				3			3	
	<i>Planorbidae</i>	3		3	3								
Cockles	<i>Sphaeriidae</i>	3										3	
Leeches	<i>Hirudidae</i>	3			3			3				3	3
Hog Louse	<i>Asellidae</i>	3		3	3			3	3			3	3
Midges	<i>Chironomidae</i>	2		2				2				2	
Worms	<i>Oligochaeta</i>	1			1		1	1					
BMWP score			28	29	54	0	45	28	27	0	0	40	31
ASPT			4.7	4.1	4.9	0	6.4	3.5	4.5	0	0	4.4	4.4
Interpretation			moderate	moderate	good	deep mud	moderate	moderate	moderate	DRY	DRY	moderate	moderate

APPENDIX 3

Survey results from 13th August 2008

GROUP	FAMILIES	BMWP	SAMPLING POINTS - 13th August 2008										
			Pond 1	Pond 2a	Pond 2b	Pond 3	Pond 4	Pond 5	Pond 6	Pond 7	Pond 8	Pond 9	Pond 10
Dragonflies	<i>Libellulidae</i>	8	8				8					8	
Caddis or Sedge flies	<i>Limnephilidae</i>	7	7	7						7			
Shrimps	<i>Gammaridae</i>	6							6				
Dragonflies	<i>Coenagriidae</i>	6	6	6				6					
Bugs	<i>Nepidae</i>	5						5		5	5		
	<i>Notonectidae</i>	5	5					5					
	<i>Corixidae</i>	5	5				5						5
Beetles	<i>Haliplidae</i>	5							5				
	<i>Dytiscidae</i>	5	5		5		5	5		5	5	5	5
	<i>Elmidae</i>	5		5									
Craneflies/Blackflies	<i>Tipulidae</i>	5	5						5				
Mayflies	<i>Baetidae</i>	4		4				4					
Alderflies	<i>Sialidae</i>	4				4							
Snails	<i>Hydrobiidae</i>	3	3		3								3
	<i>Lymnaeidae</i>	3	3		3	3		3		3	3	3	3
	<i>Planorbidae</i>	3	3	3	3	3	3						
Cockles	<i>Sphaeriidae</i>	3	3										
Leeches	<i>Hirudidae</i>	3				3							
Hog Louse	<i>Asellidae</i>	3			3	3	3	3	3		3	3	
Midges	<i>Chironomidae</i>	2		2			2	2					
BMWP score			53	27	17	16	26	33	19	20	16	19	16
ASPT			4.8	4.5	3.4	3.2	4.3	4.1	4.8	5.0	4.0	4.8	4.0
Interpretation			good	moderate	poor	poor	moderate	moderate	poor	poor	poor	poor	poor