



Rampion Offshore Wind Farm



ES Section 24 – Terrestrial Ecology Appendix 24.10

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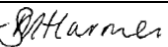
Rampion Offshore Wind Farm –
Onshore EIA

Aquatic Invertebrate
Technical Report

Prepared For E.ON Climate and
Renewables

October 2012

INTERNAL PROJECT REPORT FOR EON**RSK General Notes****Project No:** 852425**Title:** Rampion Offshore Wind Farm – Onshore EIA – Aquatic Invertebrate Technical Report**Client:** E.ON Climate and Renewables**Issue Date:** October 2012**Revision:** Rev02**Issuing Office:** Hemel Hempstead

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1 INTRODUCTION

1.1 Purpose of this Report

This report presents the findings of aquatic invertebrate surveys carried out along the alignment of a proposed cable route through Sussex associated with a proposed off-shore windfarm development. An outline of the cable route is shown in *Figure 1*.

The surveys comprised standard three minute kick/sweep net surveys with one minute visual search, carried out between May and September 2011.

1.2 Scheme Description

The proposed cable route is approximately 27 km long running south to north from a landfall site near East Worthing to a proposed substation site east of the existing Bolney substation near Twineham. Construction activities will be undertaken within a fenced strip of land, known as the working width. The working width is expected to be no wider than 40m, comprising 15m for the cable easement, and 25m for additional areas for storage of excavated material and access along the cable trench. The cable easement will not necessarily be central to the working width.

For the purposes of the ecological surveys, a survey corridor of 65m or 125m (depending on the survey-type) was used.

The term ‘cable route’ has been used throughout this report and represents the area within the Development Boundary for the onshore cable.

As shown on *Figure 1*, the ecology survey corridor for the cable route extends further north than the Development Boundary. This is due to the fact that the cable route connection with the substation was not defined at the time of the surveys and therefore a wider survey area was covered.

Ecological surveys undertaken for the proposed substation are detailed elsewhere in the Substation Technical Report (*Appendix 24.11*), although the survey areas do overlap, as shown in *Figure 2*.

1.3 Ecological Context

The proposed cable route starts at the Sussex coast on the eastern outskirts of Worthing and proceeds in a general north-east direction, crossing the South Downs National Park and terminating east of Bolney Substation.

Between the coast and the A27 road, the route crosses semi-urban habitats, including a golf course, parkland and former allotments, and a section of mostly arable farmland. It then enters the South Downs NP, passing through a landscape of rolling chalk hills predominately converted to intensive arable farming. Beyond Tottington Mount the final half of the route comprises a mixture of arable and pastoral farmland enclosed by hedges.

The route generally avoids large areas of woodland and other semi-natural habitats, though it crosses a few discrete areas of unimproved grassland, most notably at Tottington Mount and Old Erringham Farm Valley and road cutting SNCI. Other noteworthy habitats crossed include coastal shingle, the tidal River Adur (which will be crossed via directional drilling techniques) and a few narrow woodland corridors.

1.4 *Structure of this Report*

The remainder of the report is set out as follows:

- *Section 2* describes the survey and assessment methods;
- *Section 3* presents the results of the surveys;
- *Section 4* provides the evaluation and conclusions;
- *Section 5* is the reference section;
- *Section 6* provides the figures; and,
- *Appendix A* contains the raw data.

2 METHODS

2.1 Survey Scope

Due to the potential direct impact on watercourses as a result of the proposed cable route it was necessary to undertake a baseline survey of the aquatic invertebrate fauna to investigate if any species of conservation interest are likely to be affected. Aquatic invertebrate samples were collected at every crossing point, where possible.

2.2 Survey Constraints

Access was denied by landowners for a 1 km section of the route between Horn Lane and the A281 road, although it was included in the animal walkover in December 2010 so some information is available, although limited.

In addition due to the warm dry spring experienced in 2011 some watercourses were too dry to sample, however out of a potential 13 sampling points, 12 were successfully surveyed which provides a good representation of local aquatic invertebrate fauna.

There was a minor route change subsequent to the completion of the aquatic invertebrate surveys to accommodate the 'Teville Stream Restoration Project'. As a result sampling points 1 and 2 are no longer situated in the centre of the 15m cable easement. However, as samples were collected from the same waterbody which will now be crossed (or a connected waterbody in the case of sampling point 2) it was not considered necessary to repeat these surveys as the results will still provide an adequate representation of the aquatic invertebrate fauna present.

2.3 Survey Method

Aquatic invertebrate surveys were conducted between 23rd and 27th May 2011 by Victoria Gilbey and Will Holden of RSK. Both are experienced ecologists and full members of IEEM. Additional surveys were undertaken on 8th September 2011 at two crossing points where there were changes in the proposed cable route.

One-off spring or autumn samples were only collected for watercourses that will be crossed using an open cut method (i.e. not the River Adur which will be crossed by horizontal directional drilling). The sample was collected from the proposed crossing point roughly in the centre of the 15 m cable easement (except for sampling points 1 and 2 as discussed above).

The method employed to sample invertebrates included a combination of the standard three minute kick/sweep net surveys with one minute visual search technique, adhering to EA guidelines (Environment Agency 1999) and the Natural England protocol for shallow waterbodies (Surveying terrestrial and freshwater invertebrates for conservation evaluation, Natural England Research Report NERR005, 2007).

Briefly, the sampling methodology comprised:

- 30 seconds of netting of any surface-active insects, such as pond skaters (Hemiptera: Gerridae) and whirligig beetles (Coleoptera: Gyrinidae);
- 3 minutes of active kicking and disturbing substrates and sediment with additional sweeping of vegetation where present; and
- 30 seconds of hand searching for invertebrates, such as those adhering to submerged logs, stones or other debris, for example leeches (Hirudinea) and caddisfly (Trichoptera).

Care was taken to ensure that all habitats and micro-habitats, both typical and atypical, were proportionally represented in the sample, and that surface-active insects and species adhered to submerged logs and stones were included.

Samples were preserved in methylated spirits and stored in the RSK laboratory. Key aquatic invertebrate groups including Coleoptera (Water Beetles), Heteroptera (Water bugs) and Odonata (Dragonflies) were identified to species level, with the remaining invertebrates identified to family level with the relative abundance of each identified taxa recorded.

2.3.1

Interpretation

The following interpretive tools were used to examine the invertebrate datasets. Collectively, these are referred to as the biotic scores of a sample and are explained below. Although the BMWP (Biological Monitoring Working Party) and ASPT (Average Score per Taxon) scores were developed for use in rivers and streams, they can also be an interpretive tool to analyse the quality of standing waters such as ditches.

The BMWP score relates to the pollution tolerance of an invertebrate assemblage and, therefore, the biological water quality. This ascribes a numerical score (from 1 to 10) to a range of invertebrate families, depending on their tolerance of pollutants. Pollution-sensitive families score more than pollution-tolerant families. Therefore, the cumulative score of these assigned values gives a good indication of biological water quality, with higher values indicating better water quality.

Table 1 allows general comparisons to be drawn regarding BMWP scores and actual water quality categories, as used by the Environment Agency.

Table 1: Biological Water Quality Categories (Environment Agency, 1999)

Category	BMWP Score
Very Good	>150
Good	101 – 150
Fair	51 – 100
Poor	16 – 50
Very Poor	0 – 15

The ASPT is a derived index, which is obtained simply by dividing the BMWP score by the number of scoring families. The product is, therefore, somewhat independent of the taxon richness. Using ASPT together with BMWP thus allows easier comparisons across samples and sites. Both measures are routinely used by the EA in assessing the biological water quality of rivers.

As a guide, a BMWP score of over 80 and an ASPT score of 5.0 or above indicates ‘good to very good’ biological water quality. A BMWP score of 50 to 80 and ASPT score of 4.0 to 5.0 indicates ‘moderate to good’ water quality. BMWP scores less than 50 and ASPT scores of less than 4.0 suggest ‘reduced to poor’ water quality.

Taxon richness (or NTAXA) is the number of invertebrate taxa recorded, and is the most widely used measure of biodiversity. A taxon is a group of related animals, such as a species, genus or family.

Species distribution and conservation status was also checked using the Recorder 6 software package and National Biodiversity Network (NBN).

3

RESULTS

Aquatic invertebrate samples were collected from 11 of 12 sampling points identified along the proposed cable route. One sample point was dry during the spring surveys (sample point 5) and so was not sampled, and one (sample point 13b) was surveyed in September (later than the others) due to changes in the proposed cable route.

A full list of the invertebrate assemblages recorded within the waterbodies is presented in *Appendix A*. A summary of each sampling location, together with their BMWP, ASPT and Taxon Richness scores are provided in *Table 2*.

Table2: Summary of sampling locations and biotic scores

Sample Point	Grid reference	Description	BMWP	Taxon richness	ASPT
1	TQ16385 03980	1-2m wide, <0.5m deep ditch, slow moving with silt substrate and dense vegetation.	32	7	4.57
2	TQ15826 04815	1-2m wide, <0.5m deep ditch, slow moving with silt substrate and dense vegetation. It is bordered by grazing stock and there is some evidence of hoof-poaching.	33	9	3.67
3	TQ19833 07569	1-2m wide, 0.5-1m deep ditch, slow moving with silt substrate and vegetation. Some evidence of agricultural run-off was noted.	38	10	4.22
4	TQ19967 07709	1-2m wide, 0.5-1m deep ditch, slow moving with silt substrate and vegetation.	36	10	4.00
5	TQ22947 12986	Dry ditch	-	-	-
6	TQ22931 13037	1m wide, <0.5m deep stream with moderate flow and gravel/stone substrate. Shaded by riparian trees, minimal in-stream vegetation.	71	13	5.46
7	TQ22982 13259	1- 2m wide, <0.5m deep stream with moderate flow and gravel/stone substrate. Shaded by riparian trees, minimal in-stream vegetation.	57	11	5.70
8	TQ23018 15367	1m wide, <0.5m deep ditch, slow moving with silt substrate and vegetation.	38	8	5.43
9	TQ23262 15607	1-2m wide, <0.5m deep ditch, slow moving with silt substrate and dense vegetation.	46	10	4.11

Sample Point	Grid reference	Description	BMWP	Taxon richness	ASPT
10	TQ23897 17136	2-5m wide, 1-2m deep river, slow moving with silt substrate and vegetation. Some evidence of agricultural run-off was noted.	73	15	4.87
13b	TQ24397 18997	1m wide, <0.5m deep ditch, slow moving with silt substrate and overgrown with dense bramble scrub, nettles and tall ruderals.	36	9	4.00
14	TQ24603 19414	Herrings Stream. 2-5m wide stream, 1-2m deep. Slow moving and meandering, with instream vegetation and compacted silt substrate.	96	19	5.05
15	TQ24613 19903	1-2m wide, 1-2m deep stream bordered by grazing stock. Slow moving and meandering, with instream vegetation and compacted silt substrate.	62	13	4.77

The overall diversity of invertebrates over the sites sampled is not particularly high and all beetle, bug, damselfly species recorded are common.

The biotic scores range between 32 – 96 (BMWP) and 3.67 – 5.70 (ASPT) with the majority of watercourses crossed classed as having ‘moderate to good’ water quality. The Herrings Stream sample (sample point 14) had the highest diversity of aquatic invertebrate taxa found (19) and BMWP and ASPT scores which correspond to a ‘good to very good’ biological water quality.

EVALUATION AND CONCLUSIONS

All aquatic invertebrate species recorded within the samples are common and widely distributed within suitable habitats.

Water quality was found to be variable in waterbodies sampled across the proposed cable route with the majority of watercourses crossed classed as having ‘moderate to good’ water quality. However results are based on a single survey visit and must therefore be treated with some caution. They do however provide a useful baseline for comparison to post construction conditions.

The Herrings Stream sample had the highest diversity of aquatic invertebrate taxa found during the current survey and measures should be put in place to minimise the disturbance to this watercourse during construction.

REFERENCES

Environment Agency (1999). *Procedures for collecting and analysing macro-invertebrate samples*.

L.E.Friday (1988). *A Key to the Adults of British Water Beetles*.

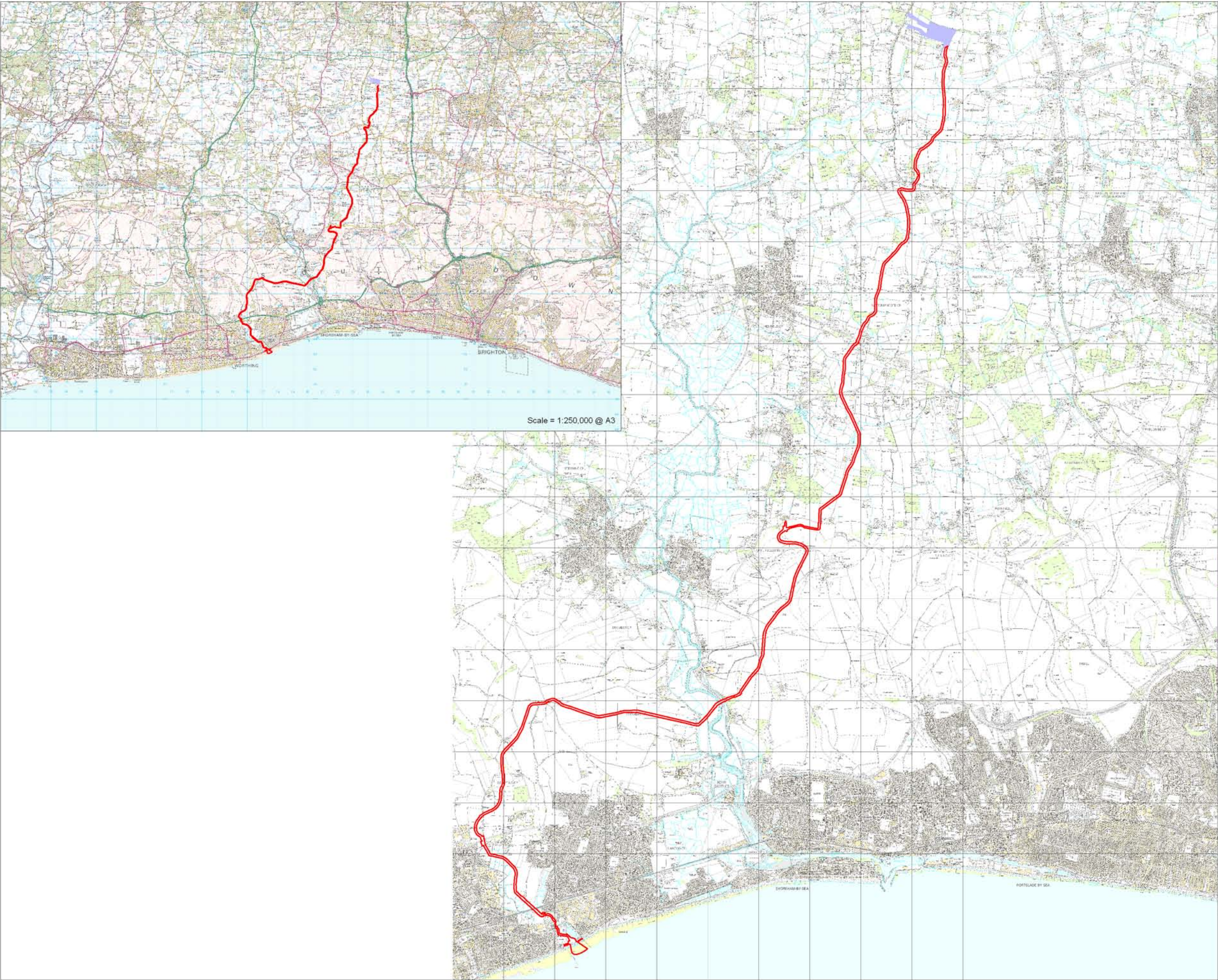
C.O.Hammond & R.Merritt (2nd edition, 1997). *The Dragonflies of Great Britain and Ireland*.

A.A.Savage (1989). *Adults of the British Aquatic Hemiptera Heteroptera*.

6***FIGURES***

Figure 1 – Site location plan

Figure 2 – Sampling locations



Legend :

- Development Boundary
- Substation Development Boundary

00	21.11.12	Loc	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

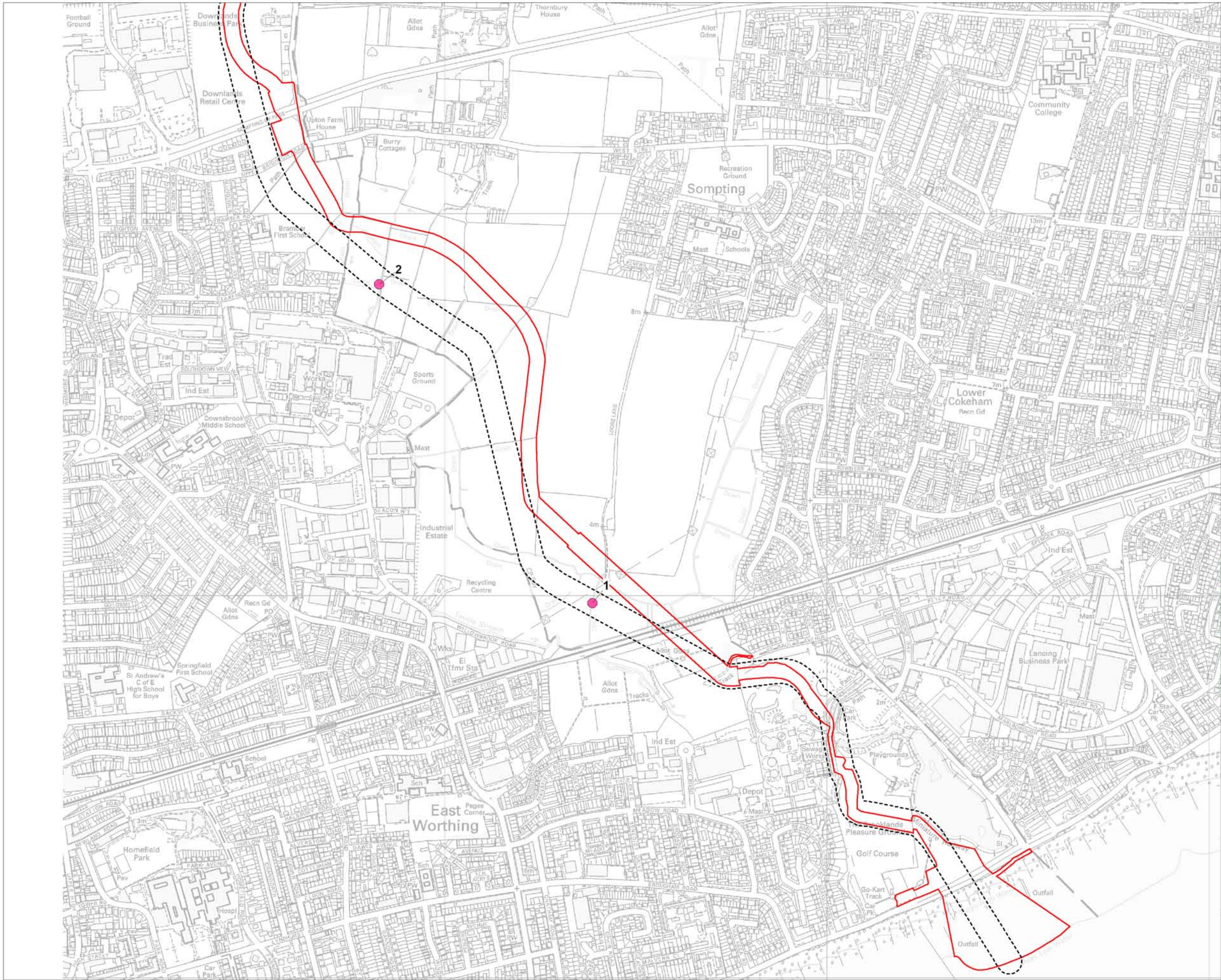
RSK e-on

Title :
Figure 1 -
Site Location Plan

0 1 2
kilometres
Scale = 1:75,000 @ A3

N
W
E
S

REV 16



- Legend:
- Ecology survey corridor (65m)
 - Development Boundary
 - Substation Development Boundary
 - No access
 - Sample point reference
 - Sample point reference - dry

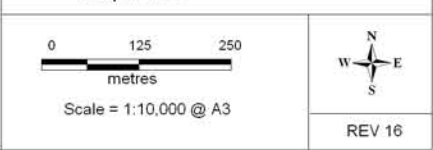


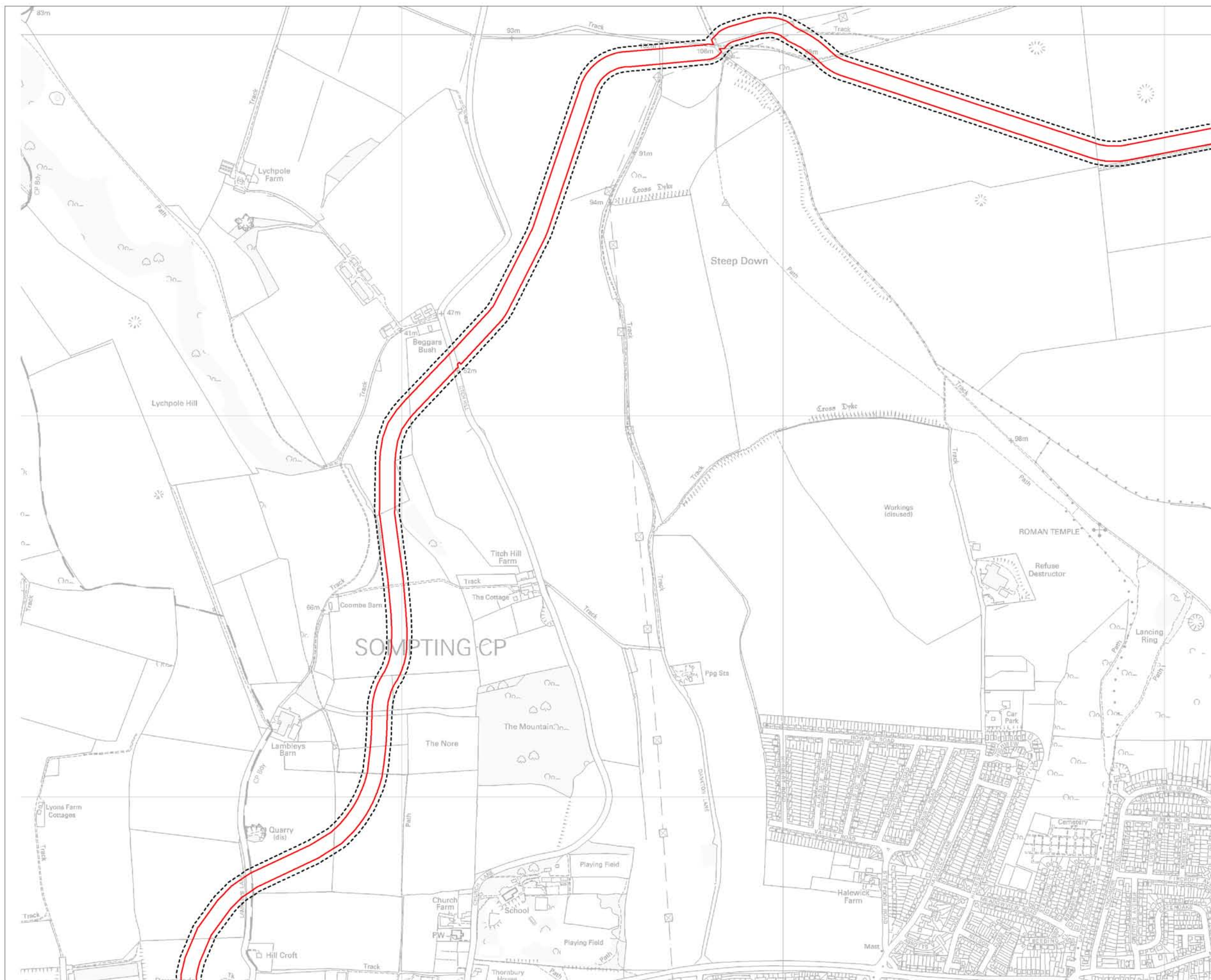
00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm



Title:
Figure 2 -
Aquatic Invertebrate Sampling
Locations
Map 1 of 8





Legend :

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Boundary
- No access
- Sample point reference
- Sample point reference - dry

Rev	Date	Description	Drn	Chk	App
00	21.11.12	P2	RG	NH	VG

Rampion Wind Farm

RSK e-on

Title :

Figure 2 - Aquatic Invertebrate Sampling Locations
Map 2 of 8

0 125 250 metres
Scale = 1:10,000 @ A3

N
W E
S

REV 16



- Legend:
- Ecology survey corridor (65m)
 - Development Boundary
 - Substation Development Boundary
 - No access
 - X Sample point reference
 - X Sample point reference - dry

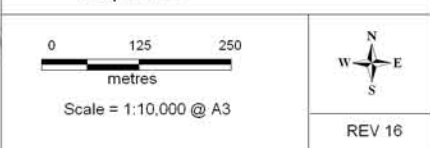


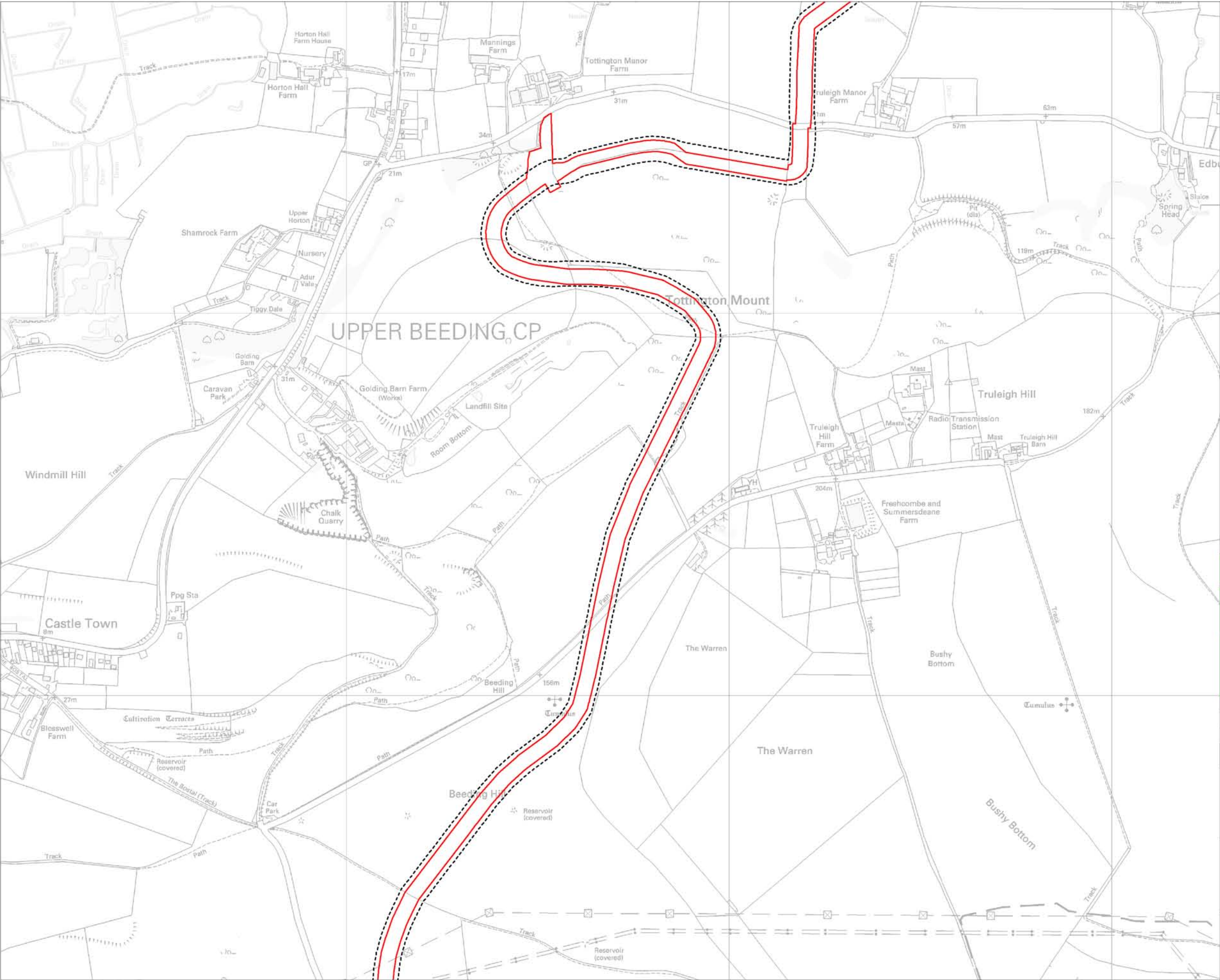
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Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm



Title:
Figure 2 -
Aquatic Invertebrate Sampling
Locations
Map 3 of 8





Legend:

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Boundary
- No access
- Sample point reference
- Sample point reference - dry

00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

RSK e-on

Title:

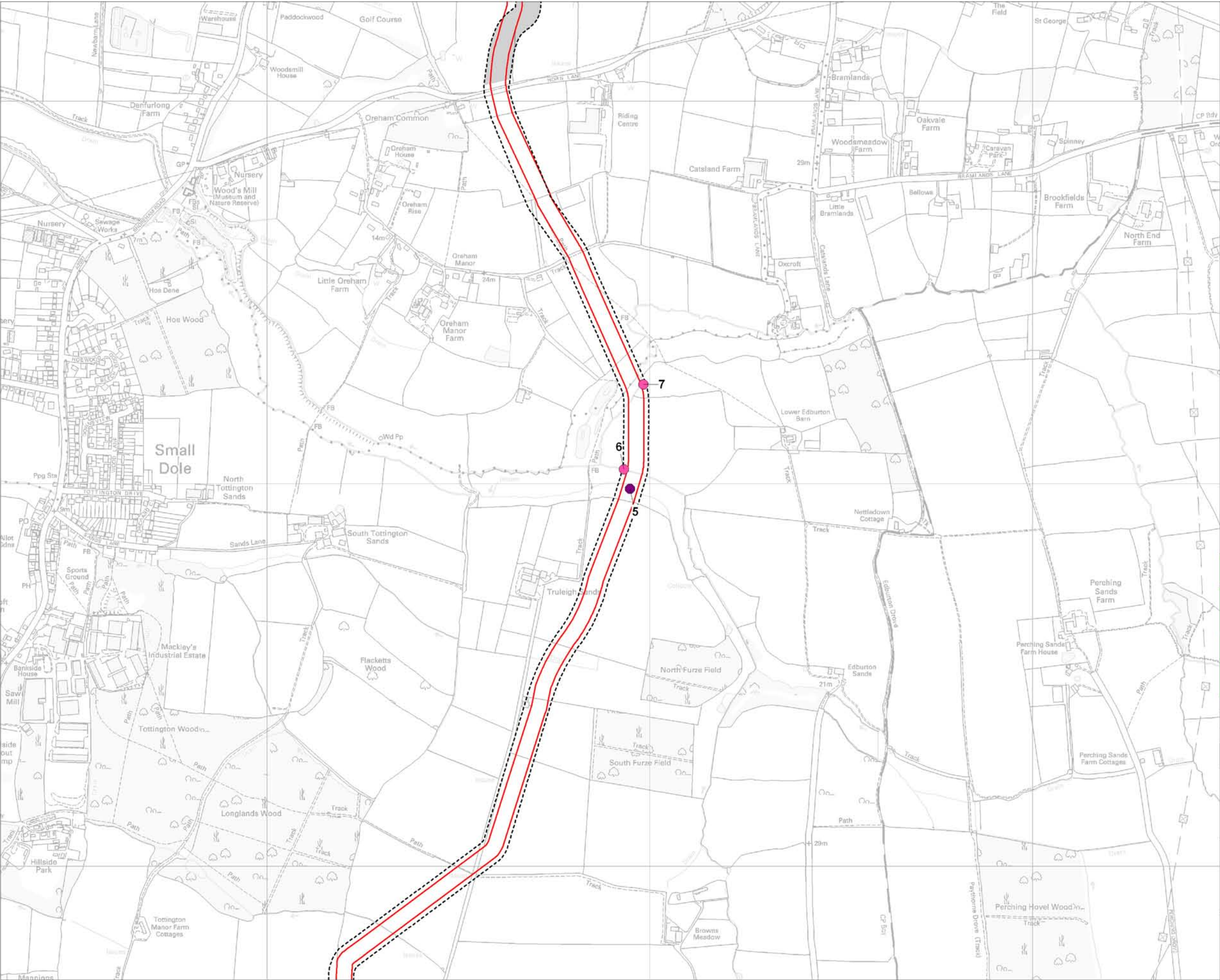
Figure 2 -
Aquatic Invertebrate Sampling
Locations
Map 4 of 8

0 125 250
metres

Scale = 1:10,000 @ A3

N
W E
S

REV 16



Legend :

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Boundary
- No access
- Sample point reference
- Sample point reference - dry

00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

RSK e-on

Title :

Figure 2 -
Aquatic Invertebrate Sampling
Locations
Map 5 of 8

0 125 250
metres

Scale = 1:10,000 @ A3

N
W
E
S

REV 16



Legend:

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Boundary
- No access
- X Sample point reference
- X Sample point reference - dry

00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

RSK e-on

Title:

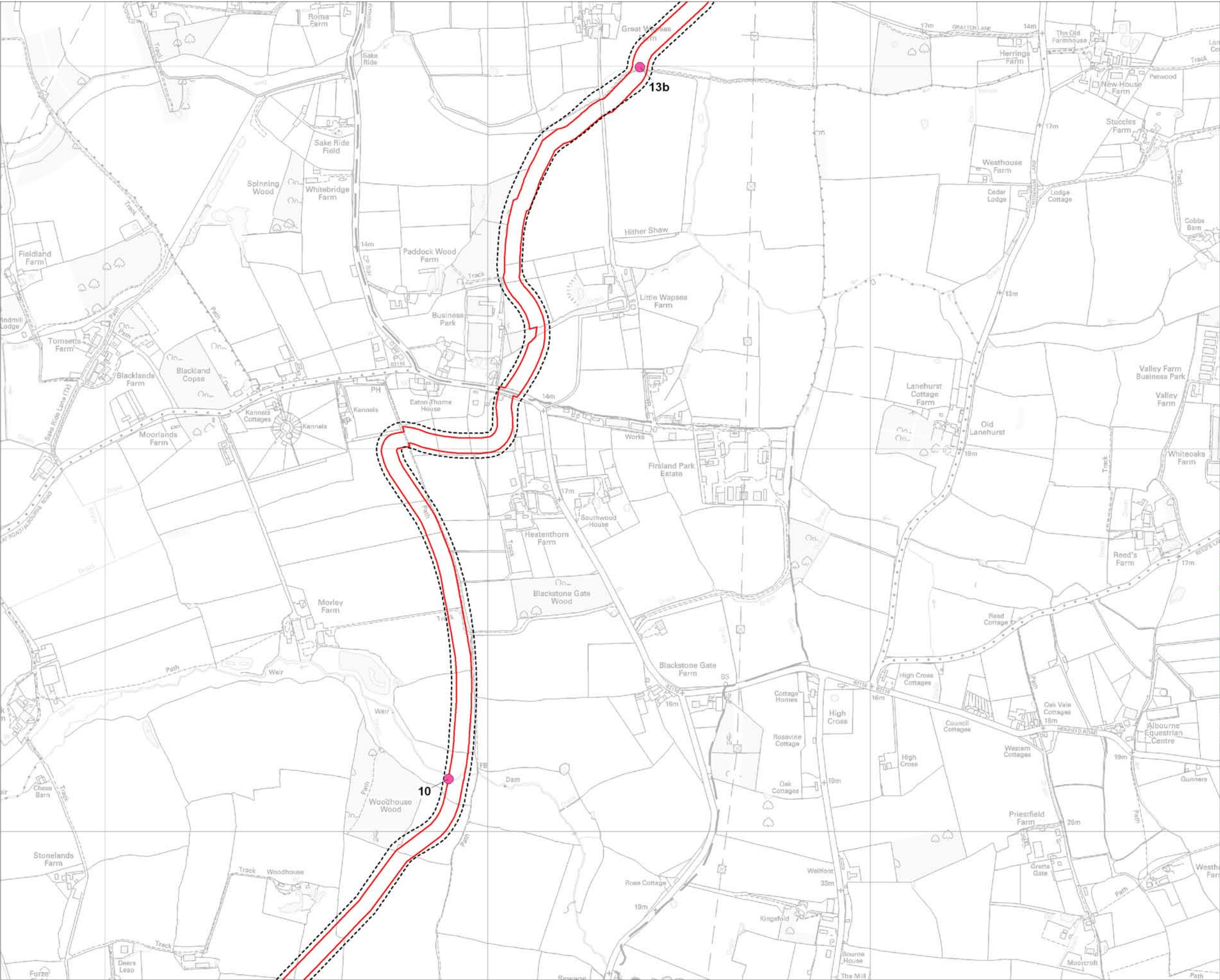
Figure 2 - Aquatic Invertebrate Sampling Locations
Map 6 of 8

0 125 250 metres

Scale = 1:10,000 @ A3

N
W
E
S

REV 16



Legend:

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Bounday
- No access
- Sample point reference
- Sample point reference - dry

00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

RSK e-on

Title:

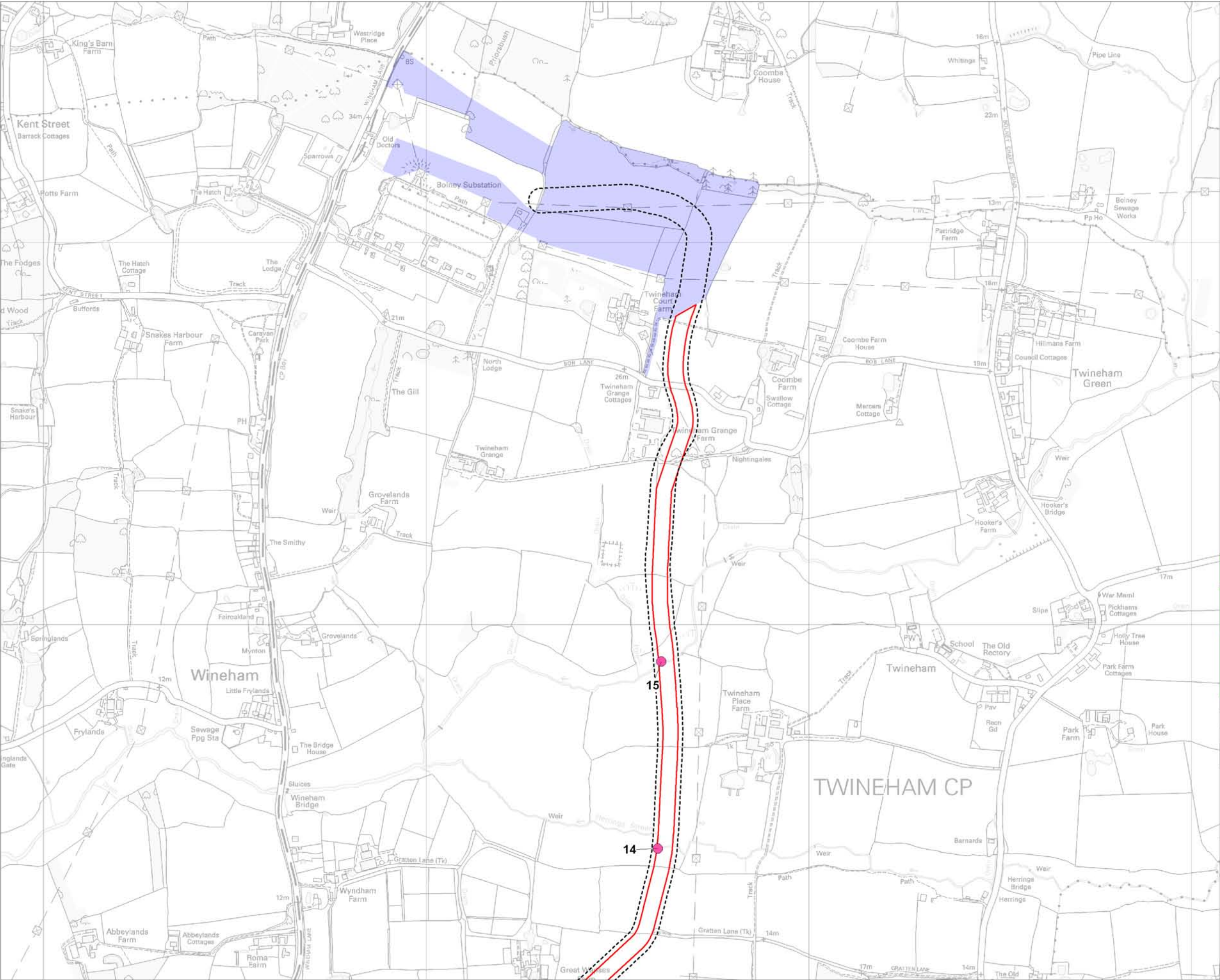
Figure 2 - Aquatic Invertebrate Sampling Locations
Map 7 of 8

0 125 250
metres

Scale = 1:10,000 @ A3

N
W
E
S

REV 16



Legend:

- Ecology survey corridor (65m)
- Development Boundary
- Substation Development Boundary
- No access
- Sample point reference
- Sample point reference - dry

00	21.11.12	P2	RG	NH	VG
Rev	Date	Description	Drn	Chk	App

Rampion Wind Farm

RSK e-on

Title:

Figure 2 -
Aquatic Invertebrate Sampling
Locations
Map 8 of 8

0 125 250
metres

Scale = 1:10,000 @ A3

N
W
E
S

REV 16

APPENDIX A – RAW DATA

Species	Description	Habitat	Conservation Status	BMWP Score	Sampling location											
					1	2	3	4	6	7	8	9	10	13b	14	15
COLEOPTERA																
Haliplidae				5												
<i>Haliplus lineatocollis</i>	A water beetle	mainly slow running water	Common	5									1			
<i>Haliplidae</i> sp (larvae)	A water beetle			5				2								
Hydrophilidae				5												
<i>Helophorus</i> sp. (female)	A water beetle			5	1											
<i>Helophorus brevipedpis</i>	A water beetle	slow flowing water	Common	5											1	
<i>Laccobius minutus</i>	A water beetle	ponds and lakes	Common	5										1		
Elmidae				5												
<i>Limnius volckmari</i> (L)	A riffle beetle	running water	Common	5					1	1			2			
Helodidae																
<i>Helodidae</i> sp (larvae)	A marsh beetle	fast flowing water		N/A						1	1					
Gyrinidae				5												
<i>Gyrinidae</i> sp (larvae)	A whirligig betle	slow flowing water		5									1			
<i>Gyrinus substriatus</i>	A whirligig betle	slow flowing water	Common	5												
Dytiscidae				5												
<i>Dytiscidae</i> sp (larvae)	A diving beetle			5		4	1	4				1	1	1		
<i>Agabus bipustulatus</i>	A diving beetle	Wide range of waterbodies	Common	5	1											
<i>Ilybius quadriguttatus</i>	A diving beetle	Wide range of waterbodies	Common	5								1				
<i>Ilybius fuliginosus</i>	A diving beetle	Wide range of waterbodies	Common	5										1		
<i>Potamonectes depressus elegans</i>	A diving beetle	running water	Common	5									1		1	
HEMIPTERA																
Notonectidae				5												
<i>Notonecta glauca</i>	A backswimmer	Still and slow flowing lowland waterbodies	Common	5									1			1
<i>Notonecta</i> sp (nymph)				5								1			4	
Corixidae				5												
<i>Hesperocorixa sahlbergi</i>	A lesser water boatman	Densely vegetated and heavily shaded pools	Common	5			1									
<i>Sigara dorsalis</i>	A lesser water boatman	Open clear lakes and slow flowing waters	Common	5				2								
<i>Sigara falleni</i>	A lesser water boatman	Open clear lakes and slow flowing waters	Common	5											1	
<i>Corixidae</i> sp (nymph)	A lesser water boatman			5								1				
<i>Corixidae</i> sp (female)	A lesser water boatman			5									2			
Veliidae				5												
<i>Velia</i> sp (nymph)				5										1		
TRICHOPTERA																
Limnephilidae	Cased caddisfly			7	2	1	2		3		2	1			3	4
Polycentropidae	Caseless caddisfly			7							1	1				1
Sericostomatidae	Cased caddisfly			10					1							
Psychomyiidae	Caseless caddisfly			8						1						
Hydropsychidae	Caseless caddisfly			5					2	1						1

EPHEMEROPTERA																
Baetidae	Mayfly			4				6	8				4			
Caenidae	Mayfly			7									3		2	
Leptophlebiidae	Mayfly			10					1	1	1		1			
Ephemeridae	Burrowing mayfly			10					1	1			2		1	
ODONATA																
Gomphidae																
Gomphus sp (juvenile)	A dragonfly			8												
Aeshnidae																
Aeshna cyanea	A dragonfly	Breeds in ponds, lakes and canals	Common	8											1	
Coenagriidae												1				
Ischnura elegans	A damselfly	Breeds in weedy ponds, lakes, slow moving and brackish waters	Common	6				2					1		1	
Enallagma cyathigerum	A damselfly	Breeds in weedy ponds, lakes, slow moving and brackish waters	Common	6									1			
Pyrrhosoma nymphula	A damselfly	Breeds in ponds, canals, streams and marshes	Common	6											1	
Calopterygidae																
Calopteryx splendens	A damselfly	Breeds in sluggish streams	Common	8												1
MEGALOPTERA																
Sialidae	An alderfly			4			1							1	1	
CRUSTACEA																
Asellidae	Water hoglouse			3	19	8		9				20	10	25	10	12
Gammaridae	Freshwater shrimp			6	13	4	6		16	12	6	12		4	8	20
DIPTERA																
Chironomidae	Non-biting midge			2		12	8	6	10		10		12	22		
Anthomyidae	Stable fly			N/A			1									
Stratiomyidae	Soldier fly			N/A				1								
Simuliidae	Blackfly			5					9							
GASTROPODA																
Sphaeriidae	Pea mussel			3	6	4	3			6	5			4	2	18
Planorbiidae	Ramshorn snail			3		2	3	6					4		2	
Physidae	Bladder snail			3											2	
Ancylidae	River limpet			6						3					1	
Lymnaeidae	Pond snail			3		6	2	4				2	6	3	3	6
Succineidae	Amber snail			NA								1				
Hydrobiidae	Operculate snail			3					12	8					9	24
HIRUNDINEA																
Glossiphonidae				3					4		4					
Erpobdellidae				3	4										2	4
Piscicolidae				4												2
TRICLADIDA																
Planariidae	Flatworm			5												1
OLIGOCHAETEA																
Lumbricidae	Worm			1		2			2	1						
Taxon Richness					7	9	10	10	13	11	8	10	15	9	19	13
BMWP Score					32	33	38	36	71	57	38	46	73	36	96	62
Number of Scoring Families					7	9	9	9	13	10	7	9	15	9	19	13
ASPT					4.57	3.67	4.22	4.00	5.46	5.70	5.43	5.11	4.87	4.00	5.05	4.77