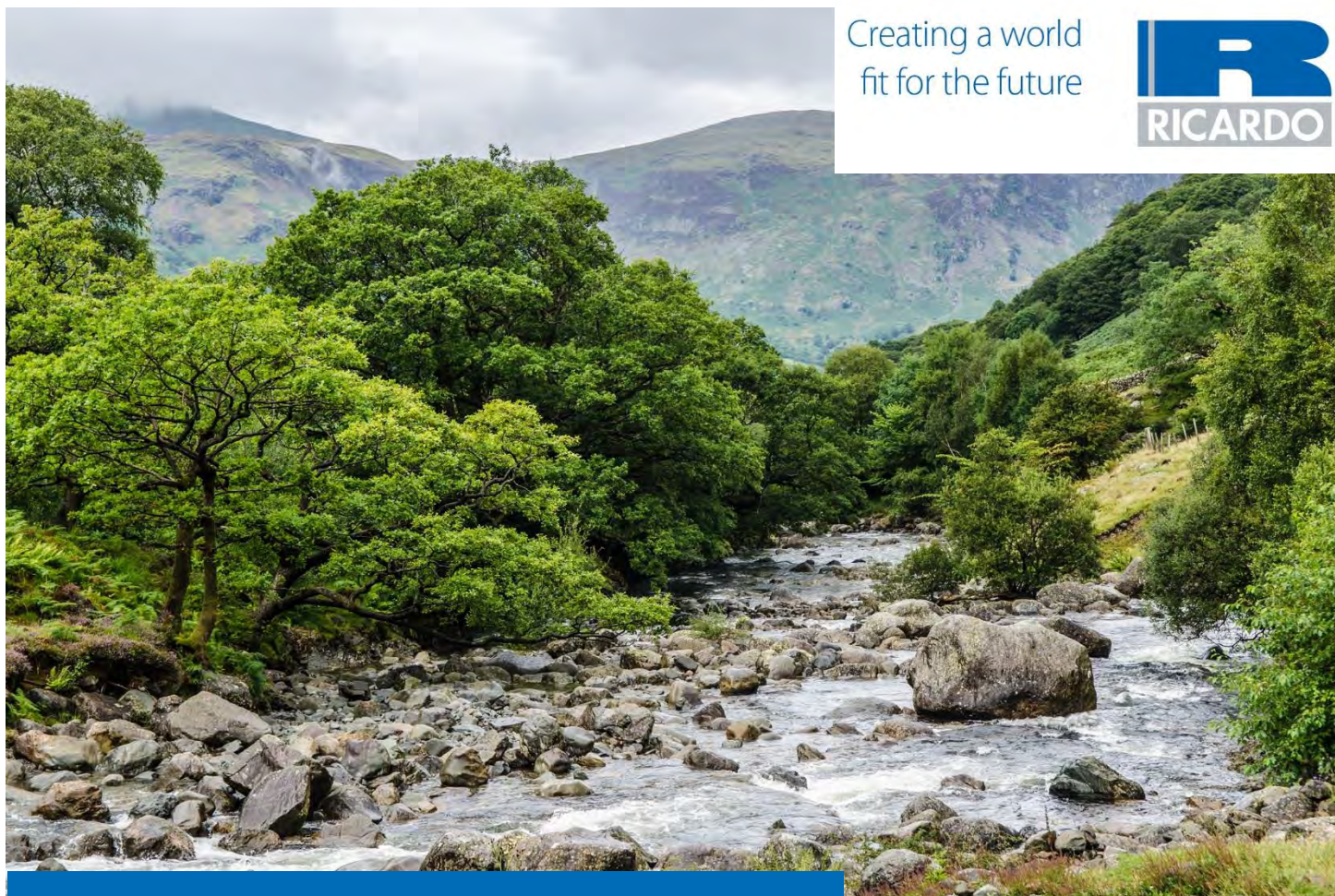


Creating a world
fit for the future



Haweswater Aqueduct Resilience Programme

Proposed Marl Hill Section Environmental Statement

Technical Appendix 9B.2

Otter Baseline

RVBC-MH-TA-009-02-002

Customer:

United Utilities

Customer reference:

3500183975

Contact:

Anne Fairhead
Ricardo Energy & Environment
Bright Building, First Floor
Manchester Science Park
Manchester, M15 6GZ
United Kingdom

T: +44 (0) 1235 753 488

E: anne.fairhead@ricardo.com

Confidentiality, copyright and reproduction:

This report is the Copyright of United Utilities and has been prepared by Ricardo Energy & Environment, a trading name of Ricardo-AEA Ltd under contract dated 29/04/2020. The contents of this report may not be reproduced, in whole or in part, nor passed to any organisation or person without the specific prior written permission of United Utilities. Ricardo Energy & Environment accepts no liability whatsoever to any third party for any loss or damage arising from any interpretation or use of the information contained in this report, or reliance on any views expressed therein, other than the liability that is agreed in the said contract.

Author(s):

Tom Priestley, Ryan Hale, Martin Ferreira

Approved by:

Anne Fairhead

Date:

23 March 2021

Ref: ED13654

Ricardo is certified to ISO9001, ISO14001, ISO27001 and ISO45001

Table of Contents

1	Introduction	1
2	Methodology	1
2.1	Desk study	1
2.2	Otter surveys.....	1
2.2.1	Habitat suitability.....	1
2.2.2	Field signs.....	1
2.2.3	Weather conditions and survey dates.....	2
2.2.4	Assumptions and Limitations	2
3	Baseline Conditions.....	3
3.1	Desk study	3
3.2	Survey Results.....	3
4	Summary.....	5
4.1.1	Otters	5
	Annexes.....	6

Annex 1: Bowland Ecology (2019) – TR4 Otter Survey Data Report

Annex 2: RSK Biocensus (2020) – Haweswater Aqueduct Resilience Programme:
 Otter and Water Vole report – TR4 Marl Hill

1 Introduction

This report is a technical appendix to Chapter 9B Aquatic Ecology of the HARP Proposed Marl Hill Section Environmental Statement. The purpose of the report is to identify the status of the Eurasian otter (*Lutra lutra*) in watercourses within the Proposed Marl Hill Section study area to inform the Ecological Impact Assessment (EclA) and the associated mitigation strategy presented in Chapter 9B Aquatic Ecology.

This report presents baseline data for otter collated from a desk study of existing ecological data and otter surveys of watercourses within the Proposed Marl Hill Section study area.

2 Methodology

2.1 Desk study

Historic records of otter from within 2km of the scheme were requested from the local environmental records centre: Lancashire Environmental Records Network (LERN) in 2019.

2.2 Otter surveys

The methodology for surveying otters broadly follows the guidance set out in English Nature¹ and includes an assessment of the (relative) suitability of the habitat for otters and a search for field signs indicating the presence, or possible presence.

2.2.1 Habitat suitability

An initial habitat assessment was undertaken as part of the Extended Phase 1 survey undertaken by Bowland Ecology in 2019 to determine the requirement for detailed otter (*Lutra lutra*) surveys. The Extended Phase 1 survey of the Marl Hill scheme is presented in the Phase 1 Technical Appendix 9A.2 (RVBC-MH-TA-009-01-002) to Chapter 9A of the Marl Hill Environmental Statement. Detailed otter surveys focused on searching for field signs of otter presence such as spraints, feeding remains, slides, footprints/tracks, potential and actual couch or holt locations.

Habitat assessments were undertaken for additional watercourses required following scheme design changes during aquatic walkover surveys in April 2020 by Ricardo Energy & Environment and were combined with detailed surveys for otter field signs described below in Section Field signs 2.2.2. During the surveys in April 2020 the location of any evidence was marked using a hand-held tablet device allowing the data to be mapped using GIS software. Photographs were taken to document otter evidence as well as the habitats present on site.

Incidental findings of otter field signs observed during the Extended Phase 1 survey in 2019 have been included in this report and are detailed in survey results presented in **Annex 1: Bowland Ecology (2019) TR1 Ecology Survey Data Report: Otter**.

2.2.2 Field signs

Searches were undertaken for field signs as described by Chanin (2003)². Surveys were carried out where possible during periods of low rainfall. The presence of Otter may be indicated by the following signs:

- Holts
- Spraints (droppings)
- Footprints
- Evidence of feeding (fish carcasses)

The initial surveys for field signs undertaken by Bowland Ecology were completed in October 2019 for one watercourse:

- Sandy Ford Brook

¹ Chanin P. (2003) *Monitoring the Otter, Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series 10.

² Chanin P. (2003) *Monitoring the Otter, Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series 10.

The additional watercourses subject to detailed surveys for otter field signs by RSK Biocensus on behalf of Ricardo Energy & Environment in April 2020 were:

- Bashall Brook
- Unnamed Watercourse 430
- Unnamed Watercourse 431
- Unnamed Watercourse 433
- Unnamed Watercourse 442
- Unnamed Watercourse 463
- River Hodder

2.2.3 Weather conditions and survey dates

The weather conditions and survey dates for the otter field signs surveys are shown below in Error! Reference source not found. for 2019 and **Table 2.2** for 2020 surveys.

Table 2.1: Surveys dates and weather conditions for the 2019 otter field sign surveys

Survey Date	Cloud cover	Wind speed (Beaufort scale)	Temperature (°C)	Precipitation
24/10/2019	8/8	F3	12°C	No precipitation

Table 2.2: Surveys dates and weather conditions for the 2020 otter field sign surveys

Survey Date	Weather conditions
23/04/2020	19°C, sunshine, clear skies, still. No precipitation during the survey and no rainfall was recorded in the week preceding the surveys
24/04/2020	20°C, sunshine, clear skies, still. No precipitation during the survey and no rainfall was recorded in the week preceding the surveys.

2.2.4 Assumptions and Limitations

The absence of desk study records cannot be relied upon to infer absence of a species/habitat. Often, the absence of records is a result of under-recording within the given search area.

The surveys undertaken in October 2019 were carried out during an exceptionally wet autumn. Whilst the surveys were not carried out during or immediately after periods of heavy rain fall and the subsequent high water levels, the intervals between high water levels were not considered sufficiently long enough to allow otter to remark territories and re-establish signs typical of their presence. As a result, whilst the weather conditions were suitable for undertaking the surveys, the river conditions were sub-optimal.

The timings of the survey in April 2020 are considered optimal for otter and the survey was not comprised by poor weather. Surveyors were also able to access the full extent of each watercourse, therefore, there were no obvious constraints to undertaking the surveys.

3 Baseline Conditions

3.1 Desk study

The data received from LERN (the local environmental records centre) for within 2 km of the proposed scheme contained no records of otter from the River Hodder or Bashall brook catchments.

3.2 Survey Results

The watercourses scoped out for requiring surveys for otter field signs following the Extended Phase 1 survey or habitat suitability assessment are shown in **Table 3.1**. The results of the surveys of watercourses for otter field signs and habitat suitability undertaken in 2019 and 2020 are summarised in **Table 3.2**.

Seven watercourses were surveyed for evidence of otter activity within the Bashall Brook catchment across 2019 and 2020. Evidence of otter was identified at one water course, Bashall Brook, with four otter spraints identified during the survey in April 2020. No evidence of otter was identified at any on the other six watercourses surveyed. The watercourses were typically small streams with low to moderate suitability for otter and limited suitable habitat for holts or resting places.

One watercourse was surveyed in the Hodder - conf Easington Bk to conf Ribble, the River Hodder. One watercourse Unnamed watercourse 402 was considered to be unsuitable during the extended Phase 1 survey and scoped out of detailed otter surveys. Extensive evidence of recent otter activity was found on the River Hodder including 22 spraints, three potential couches, and one possible holt. The potential holt identified during the survey was located on the left bank of the River Hodder at NGR SD 68947 49671.

Table 3.1 Watercourses scoped out of surveys for otter field signs

Watercourse name	WFD catchment	Results of scoping exercise
Unnamed watercourse 402	Hodder - conf Easington Bk to conf Ribble	Not suitable for otter
Unnamed watercourse 441	Bashall Brook	Not suitable for otter
Cow Hey Brook	Bashall Brook	Not suitable for otter

Table 3.2: Otter survey results summary

Watercourse name	WFD catchment	Upstream NGR	Downstream NGR	Habitat suitability	Otter Field signs present	Otter resting place present
Sandy Ford Brook	Bashall Brook	SD70854521	SD71184486	Low	No evidence of otter	No suitable couch or holt locations
Bashall Brook	Bashall Brook	SD69928 44567	SD 70018 44057	Moderate	Evidence of otter was recorded: four spraints	No holts or resting places identified. Suitable habitat for holts and resting places in the adjacent wooded banks.
Unnamed watercourse 430	Bashall Brook	SD71521 44978	SD71527 44907	Moderate	No evidence of otter	No holts or resting places identified. Suitable habitat for holts and resting places in the adjacent wooded banks.
Unnamed watercourse 431	Bashall Brook	SD71727 45030	SD71737 44952	Low	No evidence of otter	No holts or resting places identified. Limited suitable habitat for holts and resting places
Unnamed watercourse 433	Bashall Brook	SD71960 45103	SD71975 45019	Moderate	No evidence of otter	No holts or resting places identified. Suitable habitat for holts and resting places in the adjacent scrub on the banks.
Unnamed watercourse 442	Bashall Brook	SD70293 44498	SD70454 44396	Low	No evidence of otter	No holts or resting places identified. Limited suitable habitat for holts and resting places
Unnamed watercourse 463	Bashall Brook	SD71799 45413	SD71919 44809	Moderate	No evidence of otter	No holts or resting places identified. Limited suitable habitat for holts and resting places
River Hodder	Hodder - conf Easington Bk to conf Ribble	SD69231 49703	SD68876 49580	High	Extensive evidence of recent otter activity was found including 22 spraints	Three potential couches and one possible holt were identified within the surveyed reach. The potential holt was located on the left bank at NGR SD 68947 49671

4 Summary

4.1.1 Otters


The otter is recognised as nationally important in the UK due to its inclusion as a priority species under Section 41 of the NERC Act (2006).

Otter field signs were identified at one of the seven watercourses surveyed in the Bashall Brook catchment. Multiple field signs were identified at Bashall Brook which indicates this watercourse is used regularly by foraging otters. No otter holts or lie-up sites were identified. Due to the presence of otter within the Bashall Brook catchment and the large home range of otters it is likely that all suitable watercourses in the catchment are intermittently used by foraging otters.

Studies suggest that the otter has a relatively large home range with population densities around 1 adult otter per 15 km to 27 km of river or 1 otter per 17 km² of river catchment. Due to the difficulties of defining which watercourses should be included in a calculation on population density via river length, this calculation has not been attempted. Instead, an estimate of population distribution has been calculated based on the figure of 1 otter per 17 km² for catchment areas. The catchment area of Bashall Brook is 17.8km². Based on the numbers above, this would suggest that there is likely to be only one otter in the Bashall Brook catchment, given the low suitability of a number of the watercourses surveyed it is likely to form part of a wider otter territory within the catchment. The catchment area of the Hodder - conf Easington Bk to conf Ribble waterbody is 69. km². Based on the numbers above, this would suggest that there might be around four otters in the River Hodder waterbody. This indicates that Unnamed Watercourse 388 and Unnamed Watercourse 402 are highly unlikely to support otters independently due to the small size and limited suitable habitat but have potential to be used infrequently by otters from the wider River Hodder catchment.

Annexes

Annex 1: Bowland Ecology (2019) – TR4 Otter Survey Data Report

1 Project Details			
Project Name:	Haweswater Aqueduct Resilience Programme	Project Number:	80061155
Written:	Ellen Milner, <i>Principal Ecologist</i>	Approved:	Alice Helyar, <i>Principal Ecologist</i>
Report reference:	TR4 Otter Report 2019 V1 TR4 Otter Report 2019 V2	Date:	05/11/2019 24/06/2020
2 Project Drawings			
TR4 Otter Survey Plans – October 2019 (Ref: BOW167_HARP_9.5_OTTER_TR4)		Sheet 1	
3 Ecology Surveys			
Surveyors:	Mark Breaks BSc (Hons) Abi Hamer BSc (Hons)		
Survey date(s):	24/10/2019		
Survey Method:	<p>An initial habitat assessment was undertaken as part of the Extended Phase 1 survey to determine the requirement for detailed otter (<i>Lutra lutra</i>) surveys.</p> <p>Detailed otter surveys focused on searching for field signs of otter presence such as spraints, feeding remains, slides, footprints/tracks, potential and actual couch or holt locations.</p> <p>This report also details any findings of otter field signs observed during the extended Phase 1 survey.</p>		
Weather Conditions:	Cloud cover 8/8, Wind Beaufort F3, 12°C, no precipitation.		
Limitations to the survey:	<p>The surveys were undertaken during an exceptionally wet autumn. Whilst the surveys were not carried out during or immediately after periods of heavy rainfall and subsequent high water levels, the intervals between high water levels were not considered long enough to allow otter to re-mark territories and re-establish field signs typical of their presence. As a result, whilst the weather conditions were suitable for undertaking the surveys, the watercourse conditions were sub-optimal.</p> <p>This report is based on a single visit only.</p>		
4 Survey Results			
TR4.WC1/2 (Sandy Ford Brook)			
		<p>WC1 Upstream: SD70854521</p> <p>WC1 Downstream: SD71184486</p> <p>WC2 Upstream: SD71234499</p> <p>WC2 Downstream: SD71144496</p> <p>No evidence of otter. Considered to be low suitability – no suitable couch or holt locations. Evidence of recent flooding.</p> <p>A ditch with running water and sections of steep and shallow earth banks. The water depth is less than 0.5 m. It becomes wider and more steep-sided in the downstream sections.</p> <p>The bordering vegetation is grazed grassland. The ditch is approximately 1 m with some sections of slow flowing water and some faster flowing sections.</p> <p>The bankside vegetation comprises dominant rush, with</p>	

	occasional bankside trees, and more rarely bushes and herbs. There is no evidence of human disturbance. There is also a locally dominant stand of bankside Himalayan balsam.
--	--

References

- National Rivers Authority (1993). Otters and River Habitat Management. Conservation Technical Handbook Number 3.
- Ward, D., Holmes, N., and Jose, P., (1994) The New Rivers & Wildlife Handbook. Royal Society for the Protection of Birds (RSPB).
- Chanin P (2003) Monitoring the Otter *Lutra lutra*. Conserving Natura 2000 Rivers Monitoring Series No.10, English Nature, Peterborough.

Annex 2: RSK Biocensus (2020) – Haweswater
Aqueduct Resilience Programme: Otter and Water Vole
report – TR4 Marl Hill



Haweswater Aqueduct Resilience Programme

Protected species survey report – TR4 Marl Hill

Project No. 2480524

MARCH 2021

RSK GENERAL NOTES

Project No.: 2480524



Title: Haweswater Aqueduct Resilience Programme: Protected Species Surveys
 Report – TR4 Marl Hill


Client: Ricardo Energy and Environment

Date: March 2021

Office: Helsby

Status: REV2

Author	<u>Ben Faulkner</u>	Technical and quality reviewer	<u>Matthew Davison</u>
			
Signature	<u></u>	Signature	<u></u>
Date:	<u>04/03/2021</u>	Date:	<u>05/03/2021</u>

Project manager	<u>Ben Faulkner</u>
	
Signature	<u></u>
Date:	<u>04/03/2021</u>

CONTENTS

1	INTRODUCTION	1
1.1	Purpose of this report	1
1.2	Site information.....	1
2	METHOD	3
2.1	Survey timings	3
2.2	Otter surveys	3
2.3	Water vole surveys and habitat suitability assessment.....	3
2.4	White-clawed crayfish habitat suitability assessment.	4
2.5	Survey constraints	4
2.6	Biosecurity	5
3	RESULTS	6
4	APPENDICES – SURVEY MAPS	18

1 INTRODUCTION

1.1 Purpose of this report

RSK Biocensus (RSK) was commissioned by Ricardo Environment and Energy (Ricardo) to provide specialist aquatic ecological support in relation to the Haweswater Aqueduct Resilience Programme (HARP). Otter (*Lutra lutra*), water vole (*Arvicola amphibius*) and white-clawed crayfish (*Austropotamobius pallipes*) surveys are required to inform a Water Framework Directive (WFD) assessment, Environmental Impact Assessment (EIA) and mitigation strategy for the scheme.

As part of the scheme United Utilities propose to replace several sections of the existing single line aqueduct. The replacement sections are proposed to be delivered over five distinct sections. From north to south these sections are named as follows:

- Docker (TR1);
- Swarther (TR2);
- Bowland (TR3);
- Marl Hill (TR4); and
- Haslingden to Walmersley (TR5/6).

Nine planning applications are required to cover all five sections. These will be accompanied by an Environmental Statement (ES) for each section and a Habitat Regulations Assessment (HRA) as required for each section.

This report details surveys undertaken on watercourses within the Marl Hill (TR4) section which will likely be impacted by the proposed works.

1.2 Site information

Figure 1 shows the location of the survey reaches and the survey extents for each watercourse identified that will be impacted by the works for section TR4 of the scheme. *Table 1* summarises the survey requirements at each watercourse which were specified by Ricardo.

Table 1. Site information and survey requirements, TR4 Marl Hill

Name	Watercourse ID	Section	Eastings and Northings		Date of survey	Surveys Required		
			Upstream	Downstream		Water Vole	Otter	White Clawed Crayfish
Bashall Brook	W512	T04	X: 369928 Y: 444567	X: 370018 Y: 444057	24/04/2020	-	Yes	-
Unnamed Watercourse 430	W520	T04	X: 371521 Y: 444978	X: 371527 Y: 444907	24/04/2020	Yes (x2)	Yes	-
Unnamed Watercourse 431	W521	T04	X: 371727 Y: 445030	X: 371737 Y: 444952	24/04/2020	-	Yes	-
Unnamed Watercourse 433	W523	T04	X: 371960 Y: 445103	X: 371975 Y: 445019	24/04/2020	-	Yes	-
Unnamed Watercourse 442	W533	T04	X: 370293 Y: 444498	X: 370454 Y: 444396	24/04/2020	-	Yes	-
Unnamed Watercourse 463	W557	T04	X: 371799 Y: 445413	X: 371919 Y: 444809	24/04/2020	-	Yes	-
Waddington Brook	W506	T04	X: 372043 Y: 447548	X: 372137 Y: 446634	05/06/2020	Yes	Yes	-
Waddington Brook (Upstream Ribble confluence).	W506	T04	X: 373521 Y: 443840	X: 373924 Y: 443617	01/02/2021	Yes (survey timing sub optimal - habitat suitability assessment only)	Yes	Yes (survey timing sub optimal - habitat suitability assessment only)
Unnamed Watercourse 430 (downstream)	W520	T04	X: 371578 Y: 444453	X: 371684 Y: 444111	05/06/2020	Yes	Yes	-
Unnamed Watercourse 446	W538	T04	X: 371373 Y: 444791	X: 371177 Y: 444010	09/06/2020	Yes	Yes	-
Unnamed Watercourse 445	W537	T04	X: 371255 Y: 444749	X: 371200 Y: 444302	05/06/2020	Yes	Yes	-
Sandy Ford Brook	W530	T04	X: 371051 Y: 445379	X: 371183 Y: 444306	09/06/2020	Yes	Yes	-
Greg Sike	W2321	T04	X: 373964 Y: 443939	X: 374095 Y: 443580	01/02/2021	Yes (survey timing sub optimal - habitat suitability assessment only)	Yes	Yes (survey timing sub optimal - habitat suitability assessment only)
River Ribble	RW03-05	T04	X: 372037 Y: 446276	X: 372261 Y: 445877	24/11/2020	Yes (survey timing sub optimal - habitat suitability assessment only)	Yes	Yes (survey timing sub optimal - habitat suitability assessment only)
River Ribble	W2325	T04	X: 374488 Y: 443947	X: 374020 Y: 443440	01/02/2021	Yes (survey timing sub optimal - habitat suitability assessment only)	Yes	Yes (survey timing sub optimal - habitat suitability assessment only)
Unnamed Watercourse X	RW17	T04	X: 372024 Y: 447501	X: 372011 Y: 447110	02/12/2020	Yes (survey timing sub optimal - habitat suitability assessment only)	Yes	Yes (survey timing sub optimal - habitat suitability assessment only)

2 METHOD

2.1 Survey timings

Surveys were undertaken in April, June and December 2020 as well as early February 2021 by a team of highly experienced aquatic ecologists. For most of the surveys the weather was fine and clear, however in June occasional light rain was recorded.

In the week preceding each of the surveys no significant rainfall was recorded.

2.2 Otter surveys

Otter surveys followed an amended methodology derived from that detailed within Chanin 2003¹. Where access permitted, both banks of each watercourse were surveyed to look for and record signs of otter. Emphasis was given to investigating prominent features such as bridge arches, fallen trees and root systems as well as rocks and ledges along the banks where spraints, footprints, evidence of resting or breeding sites and feeding remains were most likely to be present. Presence of access points, such as slides or runs, were also recorded. The location of any evidence was marked using a hand-held tablet device allowing the data to be mapped using GIS software. Photographs were taken to evidence sign of otter as well as the habitat present on the site.

2.3 Water vole surveys and habitat suitability assessment

The water vole surveys followed the standard methods outlined within Strachan (2011)² and Dean *et al.* (2016)³ respectively. Where accessible, surveyors searched both banks of each watercourse for evidence of water voles including burrows, feeding platforms, grazing (including food remains), latrines and footprints.

The location of any water vole evidence was recorded using a hand-held tablet device allowing the data to be mapped using GIS software. Photographs were also taken to evidence water vole activity as well as the habitat present on site.

Where surveys were undertaken outside the survey season for water vole (April – September) the suitability of the habitat for Water Voles was assessed using the following criteria (Dean *et al.*, 2016⁴):

¹ Chanin, P. 2003. Ecology of the European Otter. Conserving Natura 2000 Rivers Ecology Series No. 10. English Nature, Peterborough.

² Strachan, R. (2011). Water Vole Conservation Handbook – The Third Edition. Wildlife Conservation Research Unit, Oxford

³ Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series). Eds Fiona Mathews and Paul Chanin. The Mammal Society, London

⁴ Dean, M., Strachan, R., Gow, D. and Andrews, R. (2016). *The Water Vole Mitigation Handbook (The Mammal Society Mitigation Guidance Series)*. Eds Fiona Mathews and Paul Chanin. The Mammal Society, London.

- Bank profile;
- Bank substrate, specifically its suitability for burrowing;
- Water depth;
- Likely frequency and height of water level changes, relative to bank height;
- Amount of shading from trees/shrubs;
- Bankside herbaceous vegetation type (tall tussocky grass, mown grass etc.);
- Bankside herbaceous vegetation density;
- In-channel herbaceous vegetation type;
- In-channel herbaceous vegetation width (from toe of bank to the point at which the Bank meets water level);
- In-channel herbaceous vegetation density;
- Percentage of the channel with in-channel herbaceous vegetation;
- Evidence of current or recent management, and the likely effects of management; and
- Any other relevant factors.

Classification of habitat suitability was made as follows:

- **Excellent** – optimal habitat with good cover, food sources and other features that would allow water vole populations to thrive throughout the year.
- **Suitable** – habitat that has all the elements required by water vole, certainly in the summer, and probably through most winters.
- **Moderate** – habitat that has some of the features that are suitable for water vole, but with some constraints so that suitability throughout the year is not certain.
- **Unsuitable** – habitat lacking one or more crucial element for use by water voles. This category does not necessarily preclude the habitat being used by water voles, but it would not be able to support a resident population.

2.4 White-clawed crayfish habitat suitability assessment.

Where required instream habitat was assessed for its suitability to support white-clawed crayfish. The suitability of the habitat for white-clawed crayfish was assessed using the following criteria:

- Abundance and distribution of submerged refuges;
- Evidence of poor water quality i.e. sewage fungus;
- River flow velocity;
- Quantities of fine sediment;
- Abundance of potential food sources i.e. macroinvertebrates; and
- Evidence of invasive non-native crayfish species.

2.5 Survey constraints

There were no obvious constraints to undertaking the surveys. Where presence absence surveys were undertaken, the timings were considered suitable for water vole and otter and the surveys were not compromised by poor weather. Surveyors were also able to access the full extent of each watercourse.

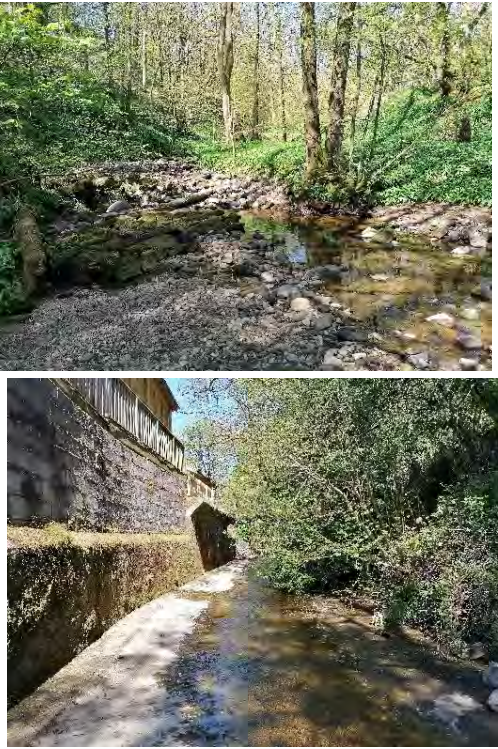
2.6 Biosecurity

All RSK ecologists have undertaken internal training on biosecurity practices, which are in accordance with those described by the Great Britain Non-Native Species Secretariat's (GB NNSS) check-clean-dry policy. Furthermore, they have all completed, as a minimum, modules 1 and 3 of the GB NNSS e-learning modules on biosecurity. In addition to adhering to this procedure, surveyors worked in a downstream direction in flowing watercourses to further minimise risk. All equipment was thoroughly checked, cleaned (and disinfected) and dried before it was used in a different watercourse.

3 RESULTS

Table 2 summarises the results of the surveys at each respective site.

Table 2. Otter and water vole survey results – TR4 Marl Hill

T04: W512 Bashall Brook	
	<p>Eastings and Northings Upstream: X: 369928 Y: 444567 Downstream: X: 370018 Y: 444057</p> <ul style="list-style-type: none"> • Evidence of otter, suitable habitat at W512. <p>Evidence of otter was recorded at W512; four spraints were recorded (<i>Figure 2 – W512</i>). W512 is considered suitable habitat for otter.</p> <p>W512 was a moderately flowing stream with varying flow types and pools. The channel substrate was predominantly comprised of bedrock, boulder, cobble, and gravel. Filamentous algae was occasionally present throughout the surveyed reach. The width of the channel was variable ranging from c. 2.4 - 4.5 m. Similarly, the depth was also variable ranging from c. 0.03 - 0.45 m. Large woody debris and side bars were present throughout the watercourse providing heterogeneous flow and aquatic habitat.</p> <p>The majority of W512 was comprised of steep, wooded, channel sides with bankside herbs.</p> <p>W512 had a section of artificial substrate and vertical embankment with a culvert present immediately upstream of the bridge. Downstream of the bridge a large man-made cascade was present. A fish ladder was adjacent to this obstruction but was blocked by boulders and cobbles at the time of the survey.</p>

T04: W520 Unnamed Watercourse 430 (Upstream reach)



Eastings and Northings

Upstream: X: 371521 Y: 444978

Downstream: X: 371527 Y: 444907

- **No evidence of otter and moderate habitat suitability at W520.**
- **Potential water vole evidence but low habitat suitability.**

No evidence of otter was observed.

Three burrows were recorded (*Figure 2 – W520*). Notwithstanding this, most of the site is considered of low suitability for water voles due to the extensive tree cover throughout the section surveyed and limited food resources.

Despite the burrows being found, in the absence of definitive evidence i.e. latrines, it is considered unlikely that water vole are present at the site.

The watercourse was a shallow, slow-flowing stream with steep earth and rock banks. Abundant tree cover and woody debris was present throughout with ground flora consisting of grass, herbs and *Juncus* sp. (a Rush).

The channel substrate was a mix of boulder, cobble, sand and gravel. The stream was bordered by sheep-grazed pasture. The width of the channel was c. 0.5 m and the water depth was c. 2 cm.

T04: W520 Unnamed Watercourse 430 (Downstream reach)




Eastings and Northings

Upstream: X: 371578 Y: 444453

Downstream: X: 371684 Y: 444111

- **No evidence of otter or water vole.**
- **W520 is unsuitable for water vole, but of low to moderate suitability for otter.**

No evidence of water vole was found during surveys. Due to heavy shading throughout and lack of available foraging resources, the reach was considered unsuitable for water vole.

	<p>No evidence of otter was recorded on W520, however, the watercourse possessed suitable resting sites (exposed tree roots and cavities below large boulders) and commuting potential for otters.</p> <p>The watercourse was a steep sided, shallow flowing stream, shaded throughout with both native deciduous and non-native ever green canopy (<i>rhododendron</i> sp.). The in-channel substrate was comprised of boulder, cobble, and gravel with occasional coarse woody debris.</p> <p>A small section of W520 had artificially reinforced banks, stone walls, and a weir was present in the upstream section.</p> <p>The width of the channel was c. 2.5 m and the water depth was c. 10 cm.</p>
T04: W521 Unnamed Watercourse 431	
	<p>Eastings and Northings Upstream: X: 371727 Y: 445030 Downstream: X: 371737 Y: 444952</p> <ul style="list-style-type: none"> No otter evidence, low habitat suitability at W521. <p>No evidence of otter was recorded at W521 during the surveys (<i>Figure 2 – W521</i>).</p> <p>W521 was predominantly dry with areas of shallow standing water. The width of the channel was c. 0.3 m and the water depth was c. 1 cm, where water was present.</p> <p>The shallow sloping banks were vegetated with grasses and trees with occasional <i>Juncus</i> sp., herbs and scrub. The ditch was bordered by sheep-grazed pasture. The in-channel substrate was comprised of boulder, cobble and gravel.</p>

T04: W523 Unnamed Watercourse 433



Eastings and Northings

Upstream: X: 371960 Y: 445103

Downstream: X: 371975 Y: 445019

- **No evidence of otter at W523, habitat of moderate suitability.**

No evidence of otter was recorded during the surveys (*Figure 2 – W523*).

The watercourse was a shallow, slow flowing stream with no in-channel vegetation. The width of the channel was c. 0.5 m and the water depth was c. 2 cm.

The channel substrate was a mix of boulder, cobble, and gravel with occasional mud. The banks were steep and principally bare earth or grass. The bordering vegetation was comprised of grass, *Juncus* sp., scrub and trees.

T04: W533 Unnamed Watercourse 442



Eastings and Northings

Upstream: X: 370293 Y: 444498

Downstream: X: 370454 Y: 444396

- **No evidence of otter at W533, habitat of low suitability.**

No evidence of otter was recorded during the surveys (*Figure 2 – W533*).

W533 was predominantly dry with occasional standing water and some filamentous algae present. The substrate was boulder, cobble, and gravel. The width of the channel was c. 0.3 m and the water depth was c. 1 cm.

The channel cuts through grazed pasture and follows a line of trees. Bank growth mainly consists of trees, grass and *Juncus* sp. with occasional scrub and herbs (dominated by nettles).

T04: W557 Unnamed Watercourse 463



Eastings and Northings

Upstream: X: 371799 Y: 445413

Downstream: X: 371919 Y: 444809

- **No evidence of otter at W557, habitat of moderate suitability.**

No evidence of otter was recorded during the surveys at W557 (*Figure 2 – W557*).

W557 was a wooded, shallow ditch with intermittent reaches of ponded water or water with no perceivable flow. The substrate consisted of boulder, cobble, and gravel. The width of the channel was c. 0.4 m and the water depth was c. 3 cm where water was present.

Bankside vegetation was comprised mostly of grasses and *Juncus* sp. with areas of bare ground and occasional scrub or tree cover. The stream was bordered by sheep grazed pasture. No in-channel vegetation was observed and there was evidence of trampling and poaching on the banks.

T04: W506 Waddington Brook



Eastings and Northings




Upstream: X: 372043 Y: 447548

Downstream: X: 372137 Y: 446634

- **No evidence of water vole recorded on W506.**
- **Two otter spraints were recorded at the upstream extent of the reach.**
- **Habitat within the survey reach was generally unsuitable for both species.**

No evidence of water vole was recorded on W506. The brook does however provide some suitable foraging and burrowing habitat.

The watercourse was generally, a moderately flowing, shallow brook with a substrate comprised predominantly from boulders, cobble, gravel, silt, and bedrock. Bedrock cascades and pools were

	<p>also frequent. Although variable, the width of the channel was 1 – 3.5 m and the water depth was c. 20 cm.</p> <p>Vegetation on the steep, sheep-grazed banks was comprised of herbs, <i>Juncus</i> sp. and ferns. No in-channel vegetation was recorded.</p>
T04: W506 Waddington Brook (Upstream river Ribble confluence)	
  	<p>Eastings and Northings Upstream: X: 373521 Y: 443840 Downstream: X: 373924 Y: 443617</p> <ul style="list-style-type: none"> • Evidence of otter at W506, some suitable habitat present. • No evidence of water vole, habitat of low suitability. <p>The channel width was c. 1.25 m, and, at the time of survey, the water depth was c. 10 cm, although both of these were variable. The substrate comprised mostly of boulder, cobble, gravel, and sand, with some silt at the downstream end.</p> <p>Sewage fungus was recorded over a large stretch of the reach indicating a water quality issues may be a problem within the watercourse.</p> <p>Evidence of otter was recorded in the form of spraint and footprints (<i>Figure 2 – W506</i>). Habitat was not considered to be of high suitability for otter, but there were sections of woody and anthropogenic debris on the bank which otters may choose to use for refuge.</p> <p>The channel had suitable habitat for white-clawed crayfish, due to the presence of boulders and large cobbles that can serve as potential refuges. The potential water quality issues as indicated by the presence of sewage fungus would reduce the likelihood of white-clawed crayfish being present here. No evidence of crayfish was recorded during the survey and no remains were observed within the otter spraint.</p> <p>No evidence of water vole was recorded during the survey and habitat was largely unsuitable at W506.</p>

T04: W538 Unnamed Watercourse 446



Eastings and Northings

Upstream: X: 371373 Y: 444791

Downstream: X: 371177 Y: 444010

- **No evidence of otter or water vole on W538.**

W538 was largely unsuitable for water vole with no definitive water vole evidence recorded during the survey i.e. latrines.

No evidence of otter was recorded on W538. Although the habitat was regarded as being largely unsuitable for otter with few foraging and resting opportunities at this location, the watercourse could still be used for commuting.

The channel width was c. 2 m and the water depth was c. 5 cm.

The upstream section of W538 was a dry, tree-bordered ditch between cattle-grazed, improved / semi-improved pasture. The substrate was predominantly boulder, cobble, gravel, and clay.

The channel passed under a road into a rhododendron dominated plantation. Areas of shallow ponded water were present within the channel at this location.

W538 passed under another road and entered another cattle-grazed, semi-improved / improved pasture. The bank was poached through trampling.

T04: W537 Unnamed Watercourse 445



Eastings and Northings

Upstream: X: 371255 Y: 444749

Downstream: X: 371200 Y: 444302

- **No evidence of otter or water vole on W537.**
- **Habitat largely unsuitable for both species.**

The channel width was c. 1.0 m, and, at the time of survey, the channel was predominantly dry with some ponded areas with no flow.



No evidence of water vole was found during surveys. Due to heavy shading throughout and a lack of suitable foraging resources, the reach is considered largely unsuitable for water vole. A small section of channel is unshaded providing suitable bankside habitat for water vole (pictured). This is located towards the downstream extent of the survey reach and was dry at the time of the survey.

No evidence of otter was recorded on W537. Due to the lack of available foraging and resting opportunities, the habitat was regarded as being unsuitable for otter.

W537 was a predominantly shaded channel with trees growing along both banks. A short section of the channel entered a meadow where herbs, grass and *Juncus* sp. dominate the banks. The channel was dry with a few sections of ponded water. The substrate was boulder, cobble, and gravel.

T04: W530 Sandy Ford Brook



Eastings and Northings

Upstream: X: 371051 Y: 445379

Downstream: X: 371183 Y: 444306


- **No evidence of otter or water vole at W530.**
- **Habitat generally unsuitable for both species.**

No evidence of otter was found at W530. The habitat was generally unsuitable for otter because, although suitable resting areas were identified (cavities under bankside trees), low flows currently limit aquatic foraging opportunities.

The upper section of W530 was potentially suitable for water vole with lush bankside vegetation present and bankside substrate for burrowing. Small mammal activity was observed in the form of burrows and feeding evidence (pictured) but this was characteristic of bank voles (*Myodes glareolus*).

The channel width ranged from 2 - 5 m and the water depth remained shallow throughout at c. 3 cm.

The upper reaches of the stream bisect pasture and at this point there was little, or no flow observed.

	<p>The gently sloping banks were vegetated with herbs, grasses and <i>Juncus</i> sp.. The in-channel substrate was comprised of boulder, cobble, gravel, silt, and clay.</p> <p>As the watercourse flows downstream, the gently sloping banks are replaced by steep forested banks which have minimal herbaceous vegetation. The substrate was boulder, cobble, and gravel, with frequent coarse woody debris.</p>
T04: W2321 Greg Sike	
	<p>Eastings and Northings</p> <p>Upstream: X: 373964 Y: 443939 Downstream: X: 374095 Y: 443580</p> <ul style="list-style-type: none"> • Evidence of otter present at W2321. • No evidence of water vole and habitat largely unsuitable. • No evidence of white-clawed crayfish but suitable habitat available. <p>The channel width was c. 1 m, and, at the time of survey, the water depth was c. 10 cm, although both of these were variable. The substrate comprised mostly of cobble, gravel, and sand with boulders in some sections. The downstream reach comprised of finer sediment and was composed mostly of sand and silt.</p> <p>No holts, couches or spraint were recorded at W2321. A single otter footprint (pictured) was however recorded in an area of sand adjacent to the watercourse (<i>Figure 2 – W2321</i>). Although the watercourse provides limited opportunities for refuge this evidence suggests that otter could use the watercourse for foraging.</p> <p>As the banks of the watercourse were mostly shallow, heavily shaded and lacking herbaceous vegetation the habitat was assessed to be largely unsuitable for water vole.</p> <p>Certain sections of W231 were assessed to have suitable habitat for white-clawed crayfish due to the presence of refuges in the form of boulders and large cobbles. No evidence of crayfish was recorded during the survey.</p>

T04: W2325 River Ribble



Eastings and Northings

Upstream: X: 374488 Y: 443947

Downstream: X: 374020, Y: 443440

- **Evidence of otter at W2325, suitable habitat present.**
- **No evidence of white-clawed crayfish but suitable habitat present.**
- **No evidence of water vole, habitat of moderate suitability.**

The channel width at W2325 was c. 35 m and, at the time of survey, the water depth was mostly c. 30 - 40 cm. The substrate comprised mainly of boulders, large cobbles, and gravel.

Evidence of otter was present in the form of spraint (Pictured), footprints and a couch (*Figure 2 – W2325*). Several potential otter holts were also recorded beneath tree roots adjacent to the watercourse (Pictured). The reach provides optimal habitat for otters.

The habitat was considered suitable for white-clawed crayfish, with plenty of suitable refuges in the form of boulders and tree roots. No evidence of crayfish was recorded during the survey and no remains were observed within the otter spraint.

Although habitat is largely unsuitable for water vole a densely vegetated area (pictured) is present on the right-hand bank of the watercourse (immediately downstream of the road bridge). This area could provide suitable burrowing and foraging habitat for water vole. As this area is likely to be inundated when the river is in spate, it is not optimal habitat for water voles.

There were several marginal sections where the substrate was comprised of sand and silt and provided either optimal or sub-optimal habitat for lamprey.

T04: RW03-RW05



Eastings and Northings

Upstream: X: 372037 Y: 446276

Downstream: X: 372261 Y: 445877

- **Evidence of otter, suitable habitat present at RW03-RW05.**
- **No evidence of white-clawed crayfish but suitable habitat present.**
- **No evidence of water vole, habitat of moderate suitability.**

Evidence of otter was observed on the river Ribble at RW03-RW05 in the form of spraint and footprints (both pictured). No otter holts or resting areas (couches) were recorded (*Figure 2 – RW03-RW05*). A cavity was present beneath some tree roots at the upstream extent of the reach (left bank) but there was no evidence to suggest it was being used by otters as refuge.

The reach provides optimal habitat for white-clawed crayfish owing to the abundance of suitable refuges. These included coarse substrate (boulders & cobbles), submerged tree roots and soft banks for burrowing. No evidence of crayfish was recorded during the survey and no remains were observed within the otter spraint.

Habitat within the reach was assessed to be of moderate suitability for water voles. The site contains steep banks suitable for burrowing, however certain sections of the reach have bank reinforcements in place which inhibit burrowing.

At the time of survey, the bankside and emergent vegetation was sparse (partly owing to the timings of the survey). A small area of emergent reeds was present downstream of the road bridge (right bank), which could provide foraging habitat for water vole.

T04: RW17



Eastings and Northings

Upstream: X: 372024 Y: 447501

Downstream: X: 372011 Y: 447110

- **Evidence of otter, suitable habitat present at RW17.**
- **No evidence of white-clawed crayfish but suitable habitat present.**
- **No evidence of water vole, habitat of moderate suitability.**

Three otter spraints were observed during the survey and one potential couch was recorded at the base of a tree trunk (*Figure 2 – RW17*). Habitat within the survey extent is suitable for otter but due to the size of the watercourse foraging opportunities could be limited.

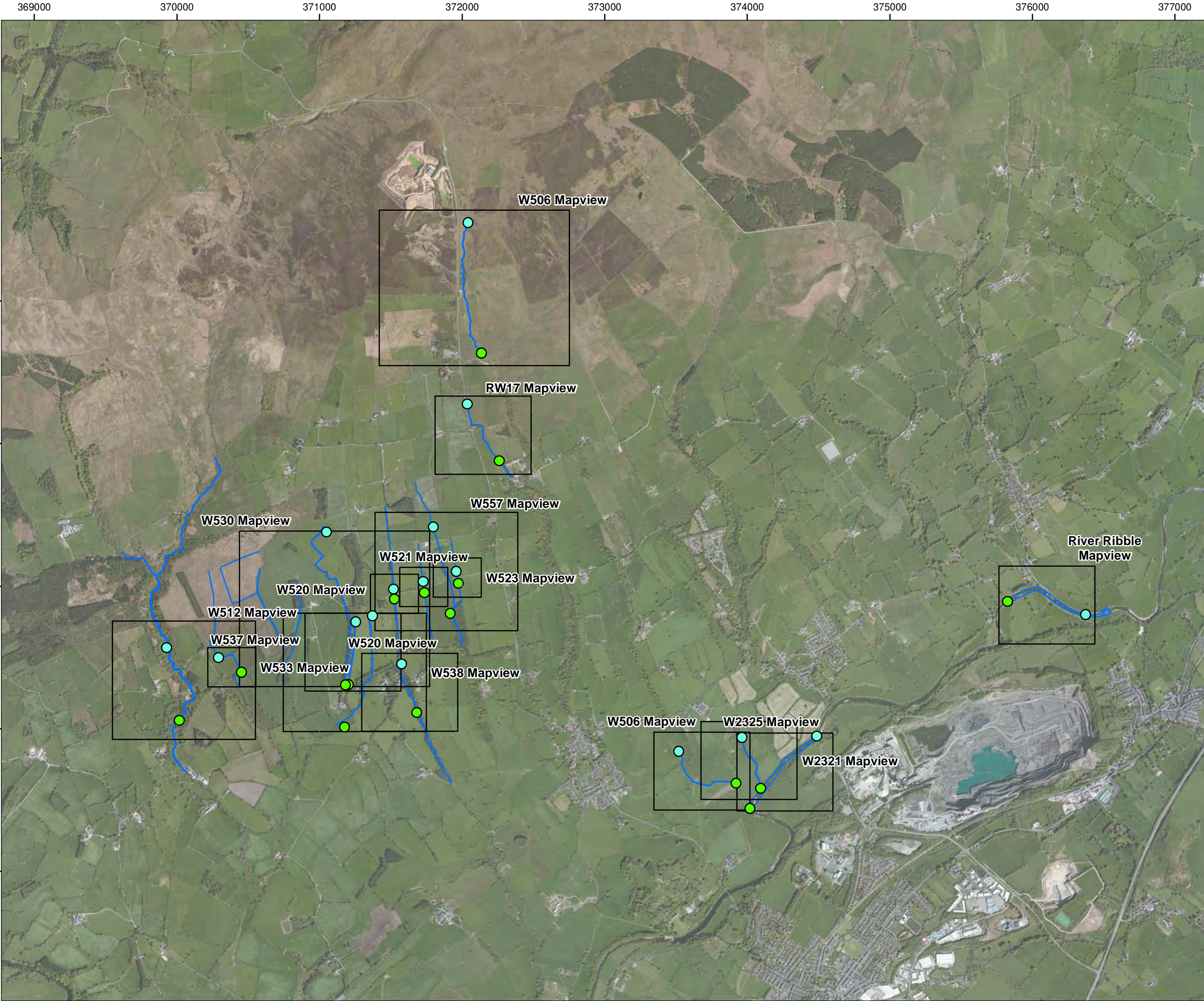
The reach provides optimal habitat for white-clawed crayfish owing to the abundance of suitable refuges. These included coarse substrate (boulders & cobbles) and coarse woody debris. No evidence of crayfish was recorded during the survey and no remains were observed within the otter spraint.

Habitat was largely unsuitable for water vole as large sections of the channel were shaded by tree cover, inhibiting the growth of low-lying herbaceous plants. Bank substrate was also primarily large boulders and therefore often unsuitable for burrowing.

Upstream of the main confluence on the reach the watercourse flows adjacent to an area of open grassland for approximately 100 m (pictured). The left-hand bank is reasonably steep at this point and is comprised of earth making it suitable for burrowing. *Juncus* sp. is abundant in this location, which does provide potential foraging habitat.

At this location with the watercourse averages just 0.4 m in width and 0.15 m in water depth. No areas of deep open water (which water vole could use to evade predation) were recorded adjacent to the suitable burrowing habitat.

4 APPENDICES – SURVEY MAPS



- Legend:
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
 - Map View

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

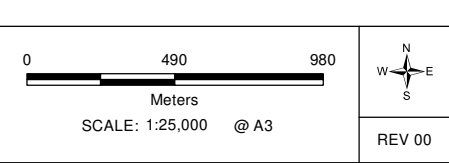


00	17/02/2021	2480524	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



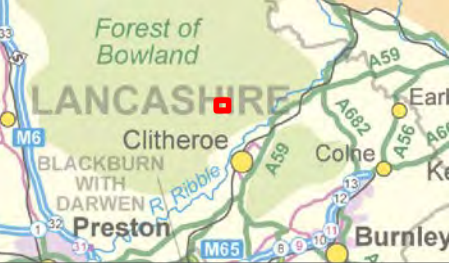
TITLE: Figure 1:
Otter and Water Vole Survey
Overview Map - Marl Hill (TR4)





- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
 - Otter Evidence**
 - Otter Spraint
 - Potential Water Vole Evidence**
 - Burrow
 - Feeding Signs

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

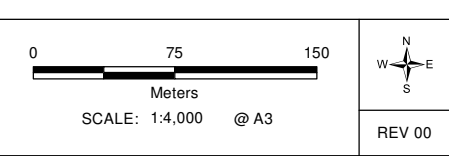


00	17/02/2021	W506	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



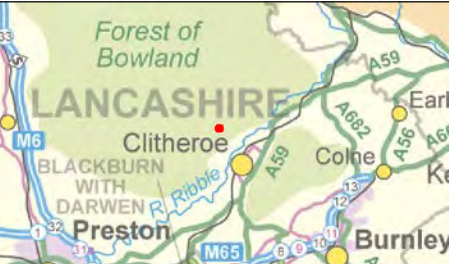
TITLE: Figure 2:
Otter and Water Vole Survey Results
Marl Hill (TR4) - Watercourse W506





- Legend:
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W521	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
No Otter or Water Vole Survey Results
Marl Hill (TR4) - Watercourse W521

02040MetersSCALE: 1:1,000 @ A3

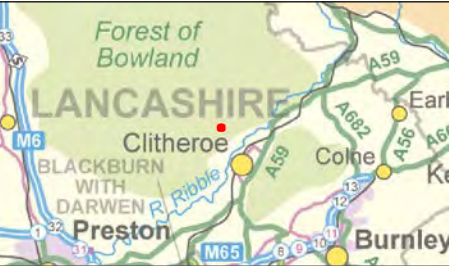
NWSE

REV 00



- Legend:
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

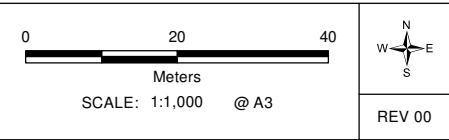


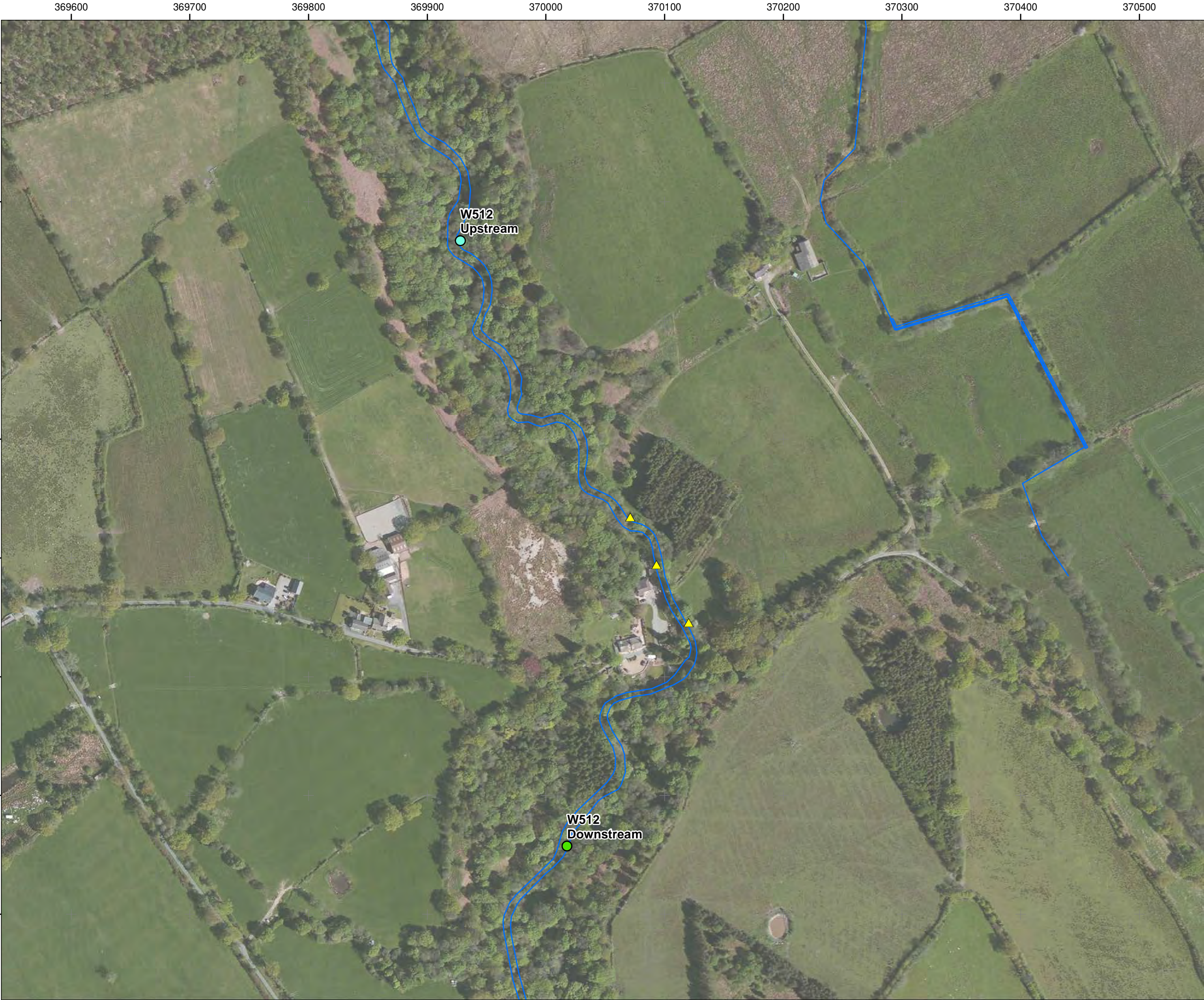
00	17/02/2021	W523	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
No Otter or Water Vole Survey Results
Marl Hill (TR4) - Watercourse W523





Legend:

- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Otter Evidence

- Otter Spraint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W512	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse W512

050100

Meters

SCALE: 1:3,000 @ A3

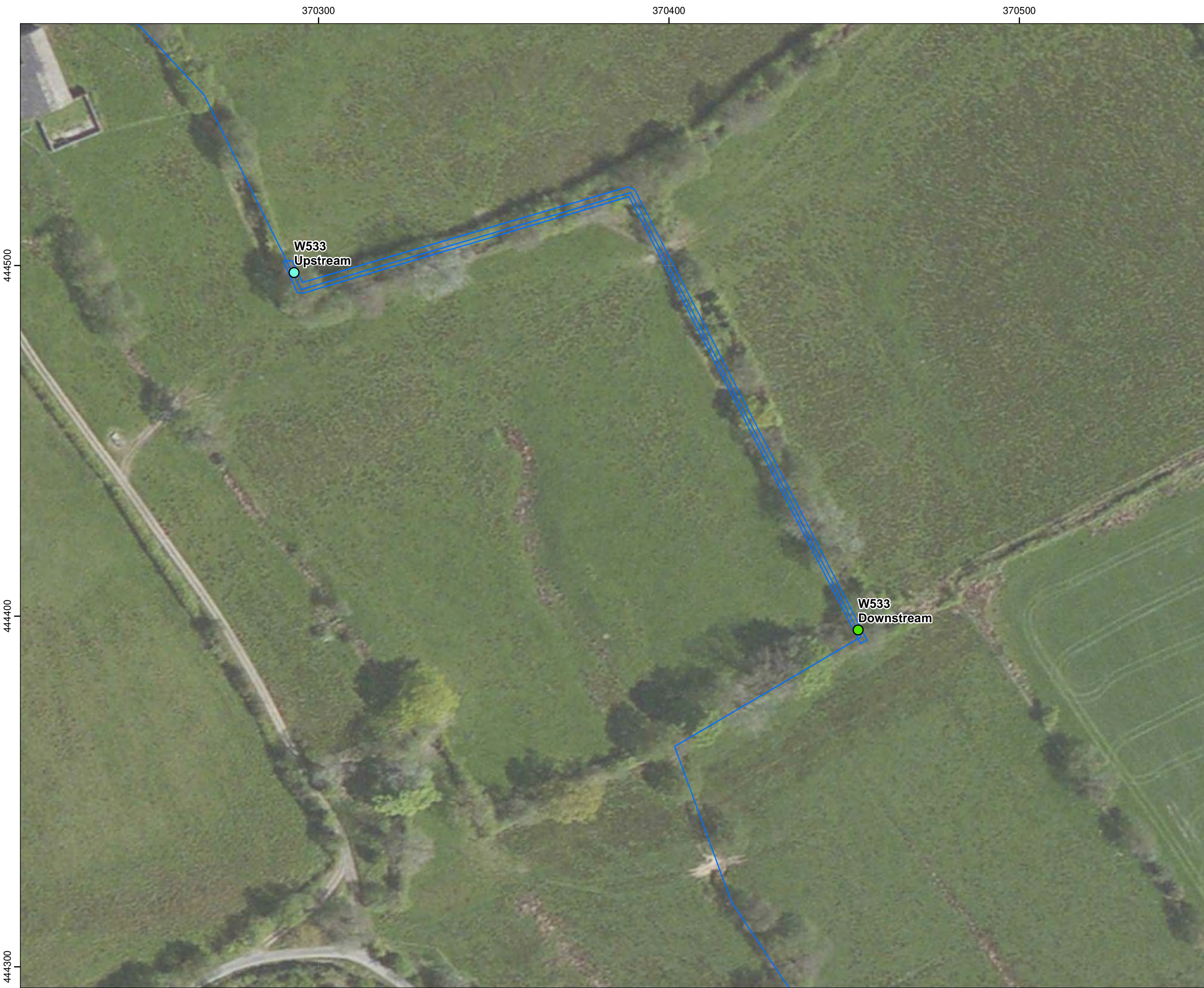
N

W

E

S


REV 00



Legend:


- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W533	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



EXPERTS IN ECOLOGY

TITLE: Figure 2:
No Otter or Water Vole Survey Results
Marl Hill (TR4) - Watercourse W533

02040

Meters

SCALE: 1:1,000 @ A3

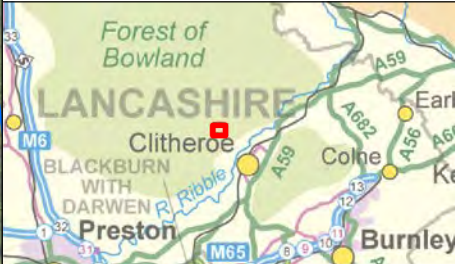
N
W
E
S

REV 00



- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
- Potential Water Vole Evidence**
- Burrow
 - Feeding Signs

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

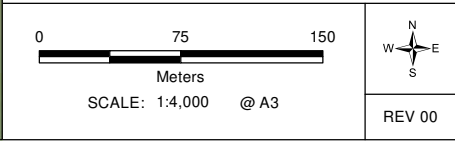


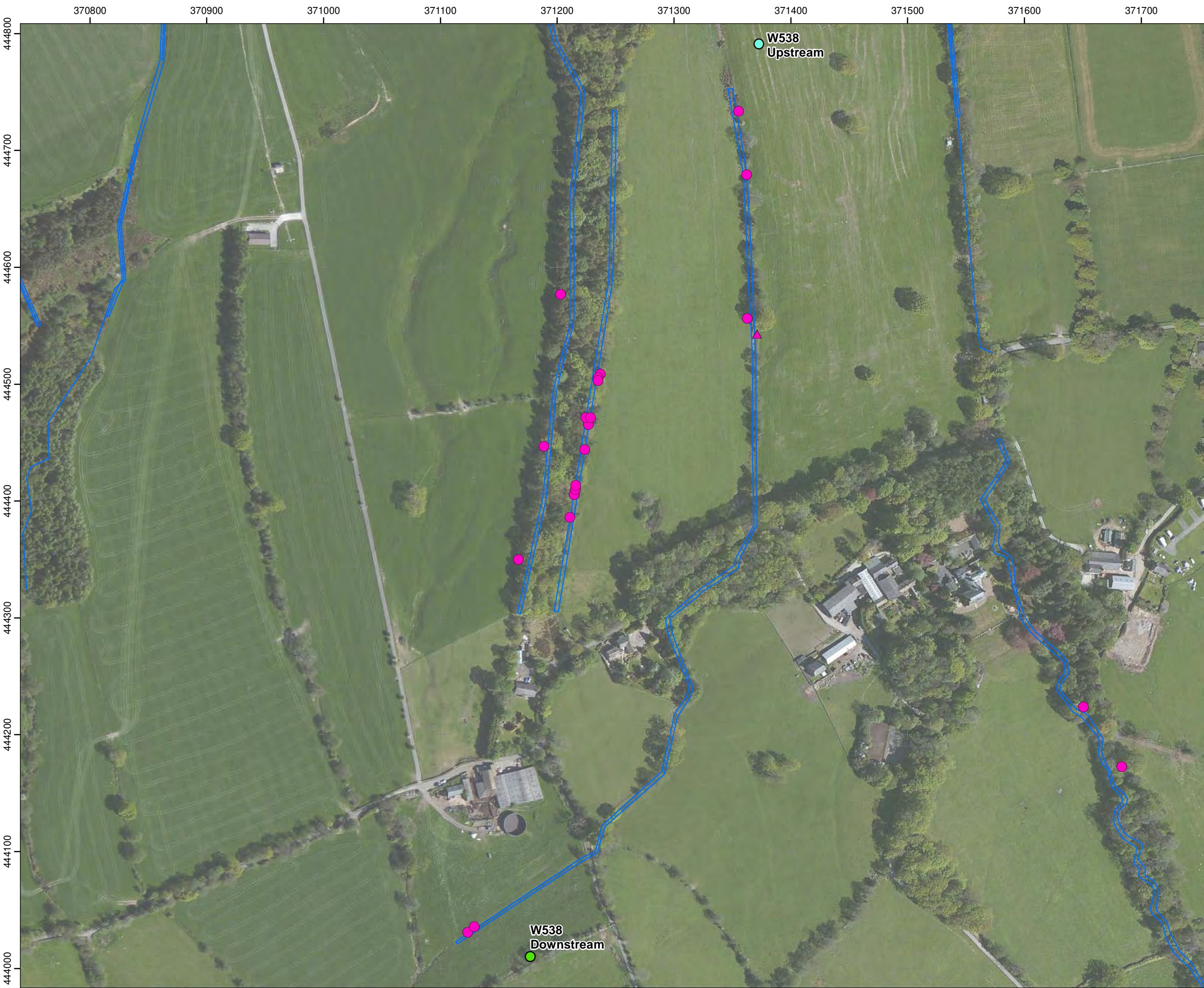
00	17/02/2021	W530	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Water Vole Survey Results
Marl Hill (TR4) - Watercourse W530





Legend:

- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Potential Water Vole Evidence

- Burrow
- Feeding Signs

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

00	17/02/2021	W538	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics

TITLE: Figure 2:
Water Vole Survey Results
Marl Hill (TR4) - Watercourse W538

050100

Meters

SCALE: 1:3,000 @ A3

N
W
E
S

REV 00



Legend:

- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Otter Evidence

- Otter Couch
- Otter Spraint
- Otter Footprint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	River Ribble	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

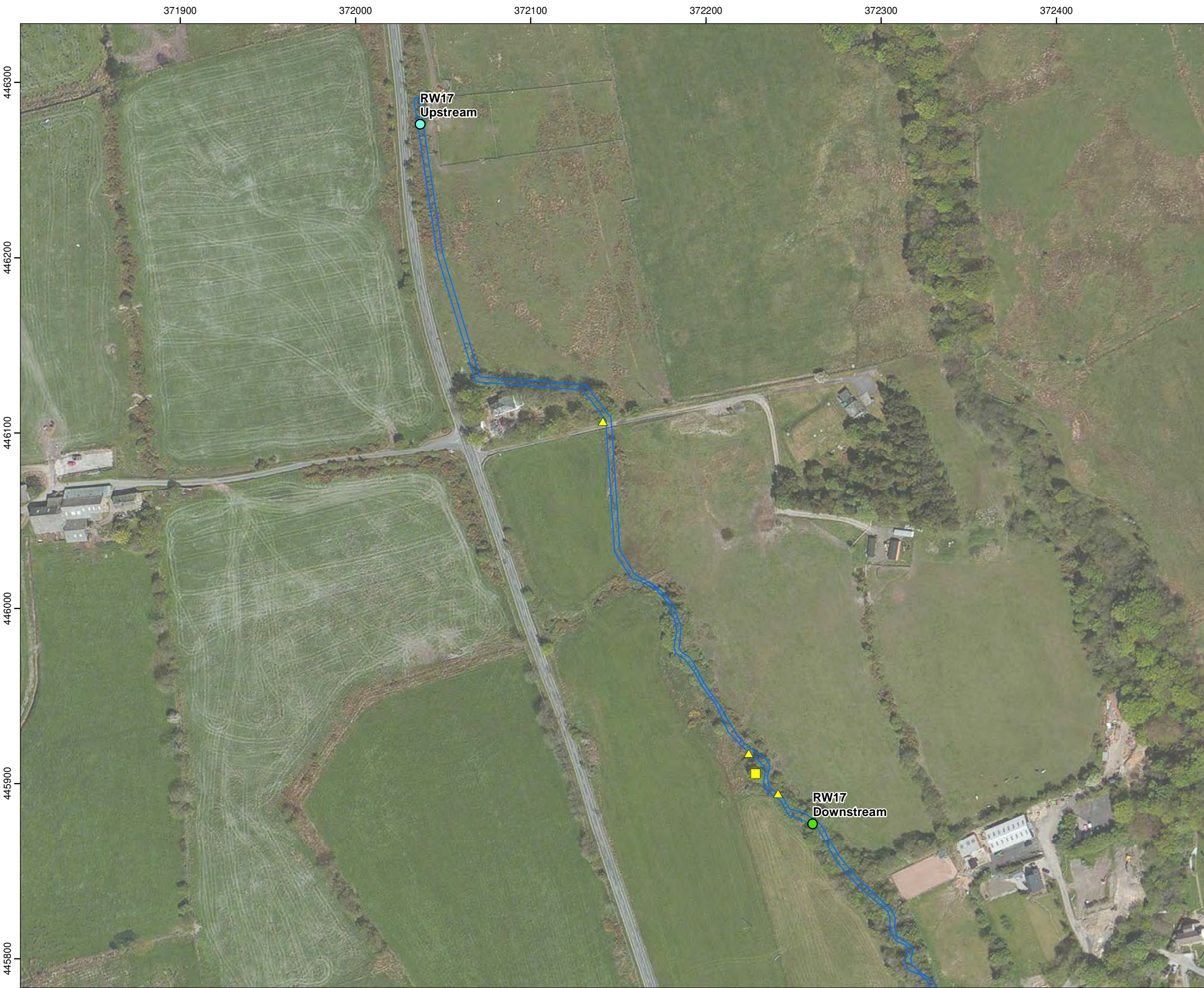
HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse River Ribb

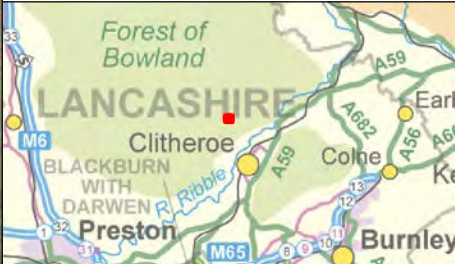
0 40 80
Meters
SCALE: 1:2,000 @ A3

REV 00



- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
- Otter Evidence**
- Otter Couch
 - Otter Spraint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	RW17	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse RW17

04080

Meters

SCALE: 1:2,000 @ A3

N

W

E

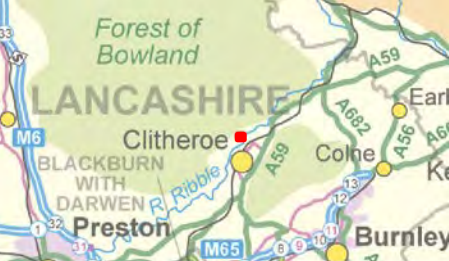
S

REV 00



- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
- Otter Evidence**
- Otter Holt
 - Otter Spraint
 - Otter Footprint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

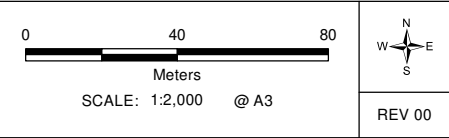


00	17/02/2021	W2321	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse W2321

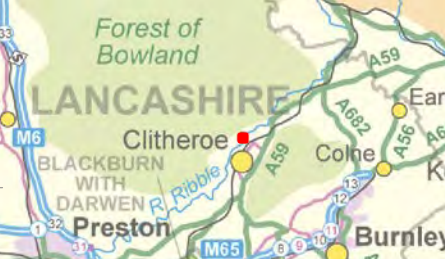




- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent

- Otter Evidence**
- Otter Holt
 - Otter Couch
 - Otter Spraint
 - Otter Footprint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W2325	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse W2325

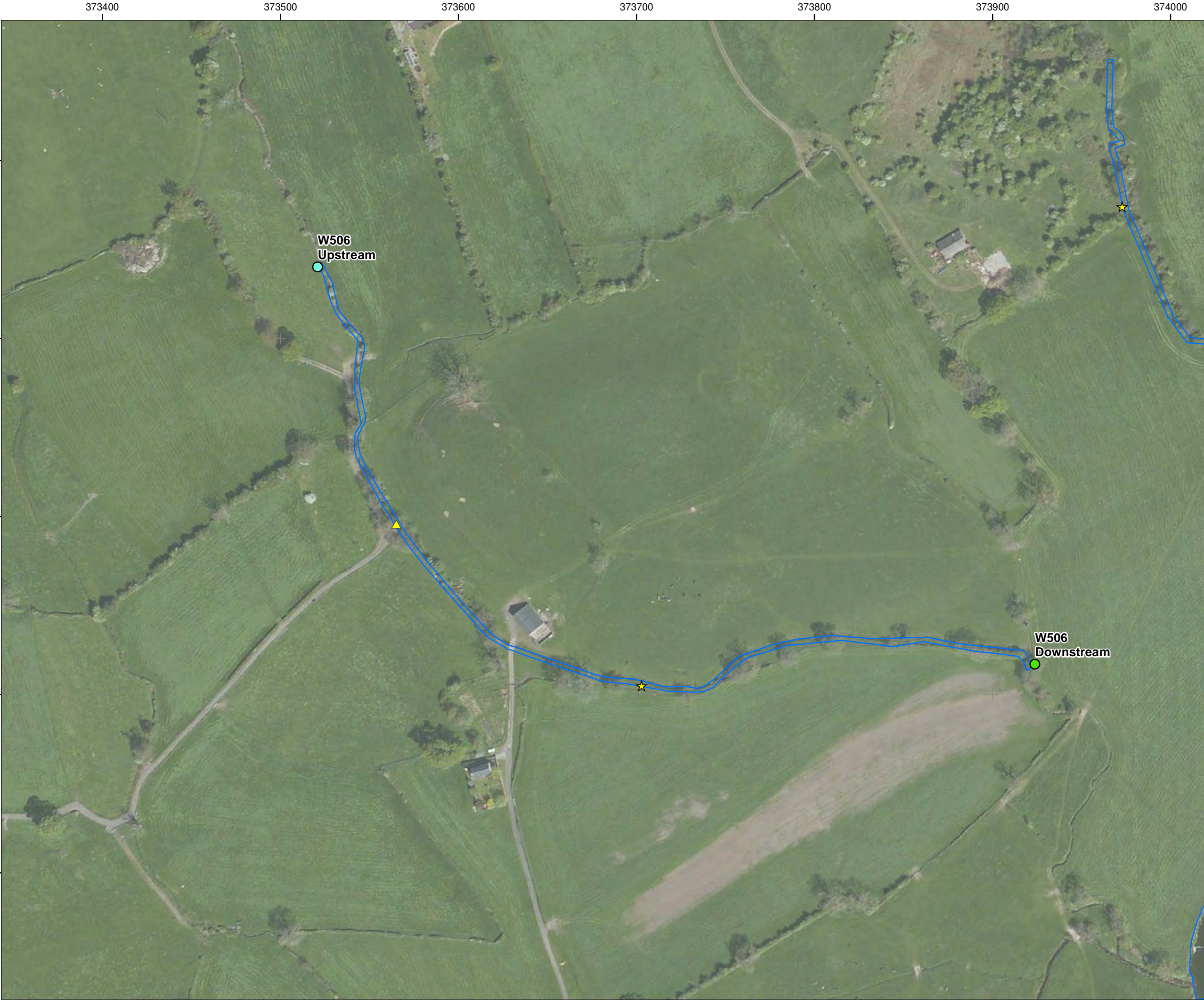
04080

Meters

SCALE: 1:2,000 @ A3

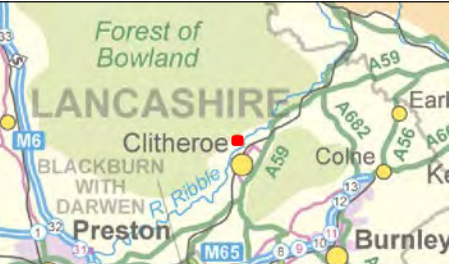
N
W
E
S

REV 00



- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
- Otter Evidence**
- Otter Spraint
 - Otter Footprint

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

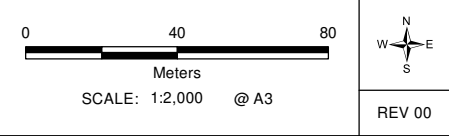


00	17/02/2021	W506	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Otter Survey Results
Marl Hill (TR4) - Watercourse W506





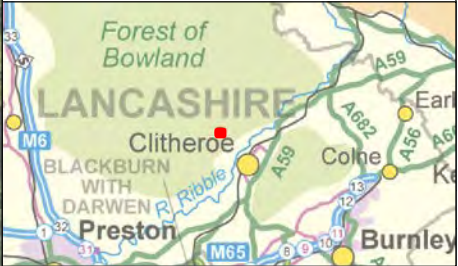
Legend:

- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Potential Water Vole Evidence


- Burrow
- Feeding Signs

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W537	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



RSK
biocensus
EXPERTS IN ECOLOGY

TITLE: Figure 2:
Water Vole Survey Results
Marl Hill (TR4) - Watercourse W537

04080

Meters

SCALE: 1:2,000 @ A3

W

N

E

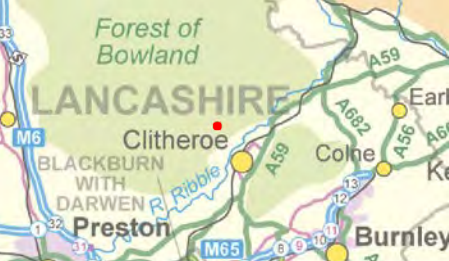
S

REV 00



- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
 - Potential Water Vole Evidence
 - Burrow

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

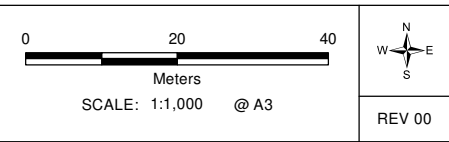


00	17/02/2021	W520	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



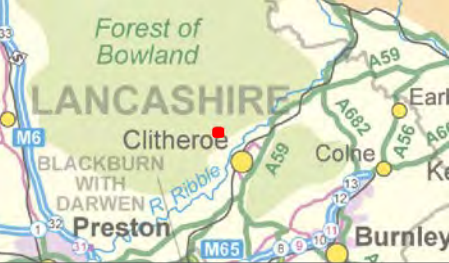
TITLE: Figure 2:
Water Vole Survey Results
Marl Hill (TR4) - Watercourse W520





- Legend:**
- Waterbody
 - Upstream Survey Extent
 - Downstream Survey Extent
- Potential Water Vole Evidence**
- Burrow

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter



00	17/02/2021	W520	RG	SP	BF
Rev	Date	Description	Drn	Chk	App

HARP Aquatics



TITLE: Figure 2:
Water Vole Survey Results
Marl Hill (TR4) - Watercourse W520

04080

Meters

SCALE: 1:2,000 @ A3

N
W
E
S

REV 00



Legend:

- Waterbody
- Upstream Survey Extent
- Downstream Survey Extent

Potential Water Vole Evidence

- Burrow

Coordinate System: British National Grid
Projection: Transverse Mercator
Datum: OSGB 1936
Units: Meter

00	17/02/2021	W557	RG	SP	BF
Rev	Date	Description	Drn	Chk	App
HARP Aquatics					
TITLE: Figure 2: No Otter or Water Vole Survey Results Marl Hill (TR4) - Watercourse W557					
0 50 100 Meters SCALE: 1:3,000 @ A3			 REV 00		



T: +44 (0) 1235 753000

E: enquiry@ricardo.com

W: ee.ricardo.com