Hampshire Water Transfer and Water Recycling Project

Environmental Statement – Appendix 8.9 Freshwater ecology

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1 Introduction

1.1 Overview

1.1.1 This technical report has been prepared by Southern Water Services Limited (the Applicant) in relation to the Hampshire Water Transfer and Water Recycling Project (the Proposed Development). A detailed description of the Proposed Development can be found in Environmental Statement (ES) Chapter 3 Description of the Proposed Development, Volume I (Document reference 6.1, DCO Volume 6) and have informed the scope of this study. The Application Glossary (Document reference 1.7, DCO Volume 1) sets out the abbreviations and definitions used in the DCO application for the Proposed Development.

1.1.2 The Proposed Development comprises the construction, operation and maintenance of the following components*:*

1. Water Recycling Plant (WRP) site and associated pumping stations.
2. Pipelines between Budds Farm Wastewater Treatment Works (WTW) and the WRP site.
3. Pipelines between the WRP site and Bedhampton Springs, connecting to pipelines being delivered by Portsmouth Water between Bedhampton Springs and Havant Thicket Reservoir.
4. Pipeline between the WRP site and Otterbourne Water Supply Works (WSW).
5. Above Ground Plant (AGP) comprising Intermediate Pumping Stations (IPS) and Break Pressure Tanks (BPT) located along the pipeline between the WRP and Otterbourne WSW.

1.1.3 The Proposed Development would also comprise the use of the following infrastructure:

1. Havant Thicket Reservoir (which has been consented separately by Portsmouth Water and is currently under construction) for the storage of recycled water.
2. The existing Eastney Long Sea Outfall (LSO), Eastney Pumping Station, and associated Eastney Transfer Tunnel (TT) for the release of reject water from the WRP site.
3. Pipelines and other related works (which have been consented separately by Portsmouth Water) for the transfer of recycled water and source water between Bedhampton Springs and Havant Thicket Reservoir.

1.1.4 The construction and operation of the Proposed Development would be supported by other temporary and permanent works and will require the demolition, disassembly and/or temporary relocation of a number of small structures.

1.1.5 This report details baseline data for freshwater ecology collected between January 2022 and December 2024 and is one of nine technical reports produced to inform the ecological assessment presented within ES Chapter 8 Terrestrial and freshwater biodiversity, Volume I (Document reference 6.1, DCO Volume 6). The

survey scoping and methodologies used to establish the freshwater ecology baseline are provided in section 2 of this report.

1.2 Objectives

1.2.1 The Proposed Development Environmental Impact Assessment (EIA) Scoping Report (refer to ES Appendix 5.1 EIA Scoping Report, Volume II (Document reference 6.2, DCO Volume 6) identified likely effects on freshwater ecology receptors with additional study being recommended.

1.2.2 To inform the assessment of likely effects on freshwater ecology receptors the following objectives were set:

1. Undertake a desk study to identify any records of freshwater ecological receptors on all watercourses in the Order Limits, including all data within 2km up and down stream of the Order Limits from the last 22 years (2003 to 2024, inclusive).
2. Undertake field surveys to confirm the presence or absence of freshwater ecological receptors within suitable habitat in the Order Limits.
3. Highlight and map areas of key importance to freshwater ecological receptors within the desk study and field survey areas.

1.3 Freshwater ecology

1.3.1 Freshwater ecosystems comprise a range of physical habitat features and biological components. The following components were included in the desk study and field survey as they are potentially sensitive to impacts arising from the Proposed Development:

1. Aquatic habitats
2. Freshwater fish
3. Macrophytes (aquatic plants)
4. Phytobenthos (algae, including diatoms, which grow attached to submerged surfaces)
5. White-clawed crayfish *Austropotamobius pallipes*
6. Aquatic macroinvertebrates

1.4 Legislation, policy and guidance

1.4.1 A framework of international, European, national and local legislation and planning policy guidance exists to protect and conserve wildlife and habitats. Legislation, policy and guidance that are relevant to the freshwater environment and its biodiversity value in England are detailed in the subsections below.

The Environment Act 2021

1.4.2 The Environment Act 2021 [1] makes provision for targets, plans and policies aimed at improving the natural environment, including on biodiversity.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

1.4.3 The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 [2] transposed into English and Welsh law the Water Framework Directive (WFD) 2000/60/EC.

1.4.4 The purpose of the WFD is to establish a framework for the protection of inland surface waters (rivers and lakes), transitional waters (estuaries), coastal waters and groundwater, and for all WFD waterbodies to achieve good ecological status (or good ecological potential for artificial or heavily modified waterbodies), in terms of ecological and chemical quality and water quantity, as appropriate.

1.4.5 The ecological status of a surface water body is classified as being High, Good, Moderate, Poor or Bad, as determined from a number of individual quality elements. The specific measures vary depending on the type of water body but may include:

1. Biological quality elements (e.g. fish, invertebrates and macrophytes)
2. Supporting hydromorphological quality elements (e.g. flow regime, river continuity and substrate of the riverbed)
3. Supporting physico-chemical quality elements (e.g. temperature, oxygenation and nutrient conditions)

1.4.6 The overall ecological status of a water body is determined by whichever of these assessments is the poorer [3]. For example, should a water body be classified as good for chemical and physico-chemical assessments but be classed as moderate for the biological assessment. In this case it would be classed as being of moderate ecological status.

1.4.7 The chemical status of surface waters is classified only as Good or Fail. Chemical quality refers to environmental quality standards for river basin specific pollutants and the priority substances specified under the WFD. These standards specify maximum concentrations for specific water pollutants. The chemical status classification system of the WFD works on a 'one out, all out' basis, so if one such concentration is exceeded, then the water body would not be classed as having a Good status.

Conservation of Habitats and Species Regulations 2017

1.4.8 The Conservation of Habitats and Species Regulations 2017 (as amended) [4] (herein referred to as the 'Habitats Regulations') implement the requirements of the European Union Council Directive 92/43/EEC [5] (herein referred to as the 'Habitats Directive') in England. The Habitats Regulations provide for the designation and protection of important habitats and species as part of the National Site Network (NSN), and they provide the framework of the protection of European Protected Species (EPS). The protection of water dependent NSN sites also forms part of the requirements established under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017.

1.4.9 Under Regulation 43(1) of the Habitats Regulations, it is unlawful to:

1. Deliberately kill, capture, injure or disturb any species protected under this legislation.

2. Deliberately take or destroy the eggs of any species protected under this legislation.
3. Damage or destroy the breeding site or resting place of any species protected under this legislation.

The Wildlife and Countryside Act 1981

1.4.10 Schedules 5 and 8 of the Wildlife and Countryside Act 1981 (as amended) [6] afford protection to endangered fauna and flora (respectively) in the United Kingdom.

1.4.11 Schedule 9 of the Wildlife and Countryside Act 1981 provides a list of Invasive Non-Native Species (INNS) in the United Kingdom. It is an offence to:

1. Plant or otherwise cause to grow in the wild, any plant which is included in Part II of Schedule 9.
2. Release or allow to escape into the wild, any animal which is not normally resident in and is not a regular visitor to the United Kingdom in a wild state, or which is included in Part 1A (non-native animals) and Part 1B (animals no longer normally present) of Schedule 9.

Natural Environment and Rural Communities Act 2006

1.4.12 The Natural Environment and Rural Communities (NERC) Act 2006 [7] places a duty to conserve and enhance biodiversity on public authorities in England. It requires a public authority (including the Secretary of State) to consider what action it can properly take to further the general biodiversity objective, namely the conservation and enhancement of biodiversity through the exercise of its functions. The Act also places a duty on the Secretary of State to maintain lists of species and habitats (Section 41 species and habitats) which are regarded as being of principal importance for both the conservation and enhancement of biodiversity in England .

1.4.13 Specific habitat types can be classified as Habitats of Principal Importance (HPI); (herein referred to as S41 habitats) based on their ecological value as assessed against HPI criteria. Habitats that can be classified as S41 habitats include rivers, ponds, mesotrophic lakes, eutrophic standing waters, aquifer fed naturally fluctuating water bodies, lowland fens and reedbeds.

1.4.14 Freshwater fish Species of Principal Importance (herein referred to as S41 species) include Atlantic salmon *Salmo salar*, brown trout, European eel and river lamprey.

Salmon and Freshwater Fisheries Act 1975

1.4.15 The Salmon and Freshwater Fisheries Act 1975 [8] covers the regulation of fisheries in England and Wales, including the introduction of polluting effluents to waters.

1.4.16 Under this act it is prohibited to cause or knowingly permit to flow, or knowingly permit to be put, into any waters containing fish or into any tributaries of waters containing fish, any liquid or solid matter to such an extent as to cause the waters to be poisonous or injurious to fish or the spawning grounds, spawn or food of fish.

The Eels (England and Wales) Regulations 2009

1.4.17 The Eels (England and Wales) Regulations 2009 [9] came into force in January 2010 granting new powers to the regulators to implement recovery measures to European eel stock in all freshwater and estuarine waters in England and Wales.

1.4.18 These recovery measures include targets for escapement of adult eels relative to escapement under pristine conditions, reducing fishing pressures, improving overall access and habitat quality to reduce the impact of entrainment, provide screening at water intakes and outfalls, and easing passage at obstructions to migration.

National Policy Statement for Water Resources Infrastructure 2025

1.4.19 The National Policy Statement for Water Resources Infrastructure (NPSWRI) 2025 [10] outlines the framework for planning and developing nationally significant water infrastructure projects in England. The statement serves as the primary basis for examination by the Examining Authority (ExA) and decision-making by the Secretary of State.

1.4.20 Section 4.3 outlines 'Biodiversity and Nature Conservation' and sets out the need to consider the full range of potential impacts of the Proposed Development, include appropriate mitigation measures and to clearly set out any likely significant effects on designated sites, protected species, habitats, regional and local sites, irreplaceable habitats and other habitats and species.

2 Methodologies

2.1 Background

2.1.1 This section describes the methodologies used to establish the baseline condition of freshwater ecological receptors within the Zone of Influence (ZoI) of the Proposed Development, namely aquatic habitats, fish, macrophytes, phytobenthos, white-clawed crayfish and aquatic macroinvertebrates.

2.2 Guidance

2.2.1 The following general guidance documents were considered in the design of the freshwater ecology baseline assessment:

1. Guidance on undertaking Ecological Impact Assessments (EcIA) published by the Chartered Institute of Ecology and Environmental Management (CIEEM) [11].
2. Biosecurity guidance for working in aquatic ecosystems published by the GB Non-native Species Secretariat [12].

2.2.2 Survey guidance documents specific to each freshwater ecological receptor are detailed in the sub-sections below.

Aquatic habitats

2.2.3 The following guidance was referred to in the development of the aquatic habitat walkover survey methodology:

1. River Habitat Survey in Britain and Ireland. Field Survey Guidance Manual [13].
2. River Corridor Surveys: Methods and Procedures. Conservation Technical Handbook [14].
3. Restoration of riverine salmon habitats. Fisheries Technical Manual [15].

Fish

2.2.4 Electric fishing surveys were undertaken in accordance with the following best practice guidance:

1. British Standard guidance for the sampling of fish with electricity published by the International Organization for Standardization [16].
2. Guidelines for electric fishing published by the Environment Agency (EA) [17].

Macrophytes

2.2.5 River macrophyte surveys were undertaken in accordance with the following best practice guidance:

1. British Standard guidance for the surveying of aquatic macrophytes in running waters published by the International Organization for Standardization [18].

2. Guidance on assessing river macrophytes for WFD (River LEAFPACS2) published by WFD United Kingdom Technical Advisory Group (WFD-UKTAG) [19].

Phytobenthos

2.2.6 Phytobenthos surveys were undertaken in accordance with the following best practice guidance:

1. Guidance on assessing river phytobenthos for WFD (River DARLEQ3) published by WFD-UKTAG [20].

White-clawed crayfish

2.2.7 White-clawed crayfish surveys were undertaken in accordance with the following guidance documents:

1. The crayfish distribution database for England and Wales [21].
2. Guidance on monitoring white-clawed crayfish published by English Nature (now Natural England (NE)) [22].
3. White-clawed crayfish survey guidance published by CIEEM [23].

Aquatic macroinvertebrates

2.2.8 Macroinvertebrate surveys were undertaken in accordance with the following best practice guidance:

1. British Standard guidance for the surveying of benthic macroinvertebrates in freshwater published by the International Organization for Standardization [24].
2. Guidance for surveying freshwater invertebrates published by NE [25].
3. Guidance for analysing riverine macroinvertebrate samples published by the EA [26].
4. Guidance on the analysis of benthic invertebrate data for WFD classification published by the WFD-UKTAG [27].
5. Monitoring Intermittent Stream index (MIS-index) methodology published by the EA [28].

2.3 Zone of Influence

2.3.1 The ZoI is the area over which ecological features may receive impacts from a development. It covers the Order Limits, and the wider landscape where pathways (ecological or hydrological links) exist for the transfer of impacts away from the works area. The ZoI for each freshwater ecological receptor varies in size depending on the nature of the effects and the sensitivity of the receptor to those effects.

2.3.2 Each ZoI has been determined by:

1. Consideration of the activities during construction and operation associated with the Proposed Development.
2. The scale, duration and timing of the works.

3. Ecological data, including aerial photography and Ordnance Survey (OS) mapping, biological records of protected and notable species and baseline data collected from field survey.

2.3.3 Watercourses can provide a hydrological pathway for impacts arising from the Proposed Development, and impacts can have an effect on freshwater ecological receptors located a considerable distance downstream from the works area.

2.3.4 Given the nature of works (e.g. predominantly non-invasive watercourse crossings), a 500m ZoI from watercourse crossing points is considered appropriate for habitats, macrophytes and phytobenthos. For mobile taxonomic receptors (e.g. fish, macroinvertebrates and white-clawed crayfish), a ZoI of 1km from watercourse crossing points is considered appropriate, although consideration is given to further downstream effects on a case-by-case basis where sensitive receptors might be present outside this ZoI.

2.3.5 These ZoIs are implemented to employ a catchment-based approach to surveys, ensuring that watercourses which may be subject to indirect effects by the Proposed Development are also considered, rather than simply watercourses crossed by the Proposed Development.

2.3.6 The desk study area and field survey area for freshwater ecology are aligned with the ZoI for each freshwater receptor, and ideally surveys were located within 500m upstream or downstream of watercourse crossing points where direct impacts are possible. Where this was not possible, all desk study and field survey data within 2km up and downstream of a watercourse crossing is considered relevant and has been documented, where appropriate, in the baseline descriptions presented in Section 3.

2.3.7 The ZoI, desk study area and field survey area for each freshwater ecological receptor, are summarised in Table 2-1.

Table 2-1 Freshwater ecological receptor Zone of Influence, desk study area and field survey area relative to the Order Limits

Ecological Receptor	ZoI	Desk study area	Field survey area
Freshwater habitats	500m up and downstream of a watercourse crossing.	2km up and downstream of all watercourses in the Order Limits.	Ideally within the ZoI for the given receptor. If surveys are not possible in the ZoI, field survey area is limited to 2km up or downstream of the Order Limits in suitable habitat.
Macrophytes			
Phytobenthos			
Freshwater fish	1km upstream of a watercourse crossing and all suitable habitat with a downstream hydrological connection.		
Freshwater macroinvertebrates			
White-clawed crayfish			

2.4 Desk study

Desk-based scoping

2.4.1 A desk-based scoping exercise was undertaken to identify watercourses and standing water bodies within the ZoI, desk study area and field survey area. OS

mapping and Geographical Information Systems (GIS) were reviewed to identify main rivers, tributaries, significant field drainage and standing water bodies (i.e. lakes and ponds) which are located wholly or partly within 2km of the Order Limits.

Data search

2.4.2 Third-party freshwater ecology monitoring data for the desk study area were obtained from the following sources:

1. Environment Agency Ecology and Fish Data Explorer [29] – freshwater fish (National Fish Populations Database (NFPD)), river macroinvertebrate (BIOSYS database) and river macrophyte monitoring records for 2003 to 2024, inclusive.
2. Environment Agency Catchment Data Explorer [30] – Cycle 3 (2019 to 2022) classification for biological quality elements of WFD water bodies within the desk study area.
3. Hampshire Biodiversity Information Centre (HBIC) [31] – records of protected and notable freshwater species (requested December 2024).
4. Natural England Designated Sites View [32] – identification of freshwater ecological receptors that are included in the citations of Designated Sites located within the desk study area.

2.5 Field survey

Aquatic habitat walkover

2.5.1 This section describes the methodology for assessing watercourse (e.g. river and ditch) habitats. The desk-based scoping did not identify any standing water bodies (e.g. lakes or ponds) within the field survey area that required additional assessment.

Field survey methodology

2.5.2 The purpose of the aquatic habitat walkover survey was to identify and map habitat features of importance to fish and other freshwater receptors that could be sensitive to impacts arising from the Proposed Development.

2.5.3 The habitat walkover surveys were undertaken using a bespoke habitat walkover methodology, which incorporated elements of existing standard methodologies, including River Habitat Survey (RHS) and River Corridor Survey (RCS).

2.5.4 Surveyors covered a minimum watercourse length of 500m at each survey site. Surveys were undertaken from the channel where it was safe to do so and would not disturb sensitive habitat (e.g. fish spawning ground). Where access to the channel was not possible, spot checks were taken at regular intervals from the nearest accessible vantage points along the bank.

2.5.5 Surveyors drew habitat features directly on to high-resolution base maps as they progressed along the survey reach, ultimately building-up a mosaic of the habitat and geomorphological features present.

2.5.6 The key habitat features recorded during the walkover survey included:

1. Flow type (e.g. glide, run, riffle, cascade, pool or rapid)
2. Estimated flow velocity and water depth
3. Dominant substrate type, as defined using the Wentworth scale (e.g. boulder, cobble, pebble, gravel, sand or silt)
4. Bank features (e.g. bank material, riparian vegetation and extent of shading).
5. Riparian land use
6. Channel geometry (e.g. planform and cross-sectional shape)
7. Fluvial and geomorphological processes (e.g. erosion, presence of depositional features, marginal silts and incised banks)
8. Macrophyte morpho-type and estimated percentage cover per habitat polygon (e.g. emergent linear, emergent broad-leaf, submerged linear, submerged broad-leaf, floating linear or floating broad-leaf)
9. Presence of obstructions to fish passage such (e.g. natural cascades and man-made obstacles)
10. Other key habitat features (e.g. coarse woody debris, rheophilic spawning habitat, fry and juvenile fish refuge area and juvenile lamprey habitat)

2.5.7 The locations of the aquatic habitat walkover survey are given in ES Figure 8.52 Aquatic habitat survey overview, Volume III (Document reference 6.3, DCO Volume 6). The site-specific aquatic habitat survey maps are given in Annex A of this document. Abbreviations and attributes used during the surveys are provided in Annex B of this document.

Programme of surveys

2.5.8 Aquatic habitat walkover surveys were undertaken between June and July 2022. This was considered to be the optimal survey window as flows and turbidity are typically low at this time of year, which improves the visibility of submerged, in-channel features. Additionally, it coincides with the main plant growing season, thus allowing for accurate characterisation of the macrophyte community. Surveys were timed to avoid periods of wet weather and spate flows.

Data analysis

2.5.9 Aquatic habitat walkover survey data were reviewed, and ecological sensitivity bands were assigned to each of the surveyed reaches.

2.5.10 Habitats could either be categorised as ‘High ecological sensitivity’, ‘moderate ecological sensitivity’ or ‘Low ecological sensitivity’. Surveyed reaches could also be categorised as ‘dry channel or temporary watercourse (e.g. intermittent or ephemeral streams)’. The criteria for each sensitivity band are detailed in Table 2-2.

Table 2-2 Aquatic habitat ecological sensitivity banding

Sensitivity	Description
High ecological sensitivity	• Permanently wetted sites supporting High flow and substrate diversity and interaction with riparian areas and the floodplain. • Sites are predominantly natural, semi-natural or provide a resource to support important aquatic flora and fauna species. • Sites contain flow or water quality sensitive species, or those fauna that undertake catchment wide migration. • Sites contain a diverse range of habitat types, macrophyte cover and a low degree of human impact.
Moderate ecological sensitivity	• Permanently wetted sites supporting flow and substrate diversity, characterised by a reduced number of habitat types. • Sites do not necessarily support important aquatic ecology but habitat and community would be diverse and include some flow or water quality sensitive species. • Migratory species may not be present but species undertaking localised movement within the watercourses could be. • Limited macrophyte cover and areas where sedimentation and channelisation are apparent
Low ecological sensitivity	• Permanently wetted sites supporting poor flow and substrate diversity and corresponding low species diversity. • Watercourses in predominantly urban and agricultural settings, affected by habitat modification and/or nutrient enrichment. • May include low quality drainage features, streams or rivers with homogenous habitat types and poor habitat diversity. • Aquatic habitats and species likely to be ubiquitous or typical to the habitat type and of relatively low importance to overall biodiversity value. • Macrophytes generally absent.
Dry channel or temporary watercourse	• Dry or semi-wetted channel that significantly diminishes under low flow conditions. • Likely to be agricultural field drains, drainage ditches or artificial drainage systems.

Fish

Survey scoping

2.5.11 Where the desk study indicated that sufficient existing monitoring data from the EA were not available, fish surveys were undertaken on watercourses within the survey area meeting one or more of the following criteria:

1. Waterbodies likely to host notable or protected fish species and identified as suitable for survey after the aquatic habitat walkover surveys.
2. Waterbodies designated as Freshwater Fish Waters under the WFD.

3. Waterbodies designated as SAC or Site of Special Scientific Interest (SSSI) for fish species or their habitat.

2.5.12 Fish survey site locations are shown in ES Figure 8.53 Freshwater fish survey overview, Volume III (Document reference 6.3, DCO Volume 6).

Field survey methodology

2.5.13 Relevant consents from the EA (by submission of form FR2: Application for authorisation to use fishing instruments other than rod and line in England) were obtained prior to commencement of the fish surveys.

2.5.14 Electric fishing methods were used to sample the fish populations in a defined section of watercourses enclosed with stop nets. Experienced fisheries ecologists completed fully quantitative, electric fishing catch depletion surveys using pulsed direct current (PDC) Electracatch equipment along a survey stretch of 100m long, or at least ten times as long as the width.

2.5.15 Depending on the depth and width of the survey area, surveys were either completed using a wading approach (i.e. equipment powered by a generator and towed on a boat), or by backpack fishing (i.e. completed using a portable battery powered control unit).

2.5.16 A pulse frequency of 40-50 hertz (Hz) was used for all surveys with varying voltages dependent on the conductivity of the water body. A minimum of three fishing passes, known as 'runs', were completed through the survey area to deplete the fish stocks.

2.5.17 All fish species caught within the survey reach were speciated and measured (in mm) from the tip of their snout to the end of the middle caudal fin rays (Fork Length (FL)), before being returned safely to the watercourse.

2.5.18 National Grid References (NGRs) were recorded for the upstream and downstream extents of the survey reach, the type of electric fishing method used, the voltage, hertz and power. Site details were also recorded, including depth, widths, habitat type, riparian zone habitat and substrate composition.

Programme of surveys

2.5.19 Fish surveys were undertaken between 2022 and 2023 in the optimal electric fishing survey window (mid-June to September, inclusive), with late summer (August through to early September) being the preferred time of year as both salmonid and coarse fish eggs will have hatched, and young-of-the-year fish should be of sufficient size to enable identification to species in the field. Undertaking surveys within this window removes the risk of egg stage mortality caused by electrofishing activities.

Macrophytes

Survey scoping

2.5.20 Macrophyte surveys were scoped in for watercourses lacking sufficient existing monitoring data to inform a robust assessment of baseline conditions, as determined by the desk study review of EA monitoring data.

2.5.21 Data gathered during the aquatic habitat walkover surveys were reviewed to determine the suitability of locations within the field survey area for macrophyte surveys.

2.5.22 Survey sites were ideally located within 500m upstream or downstream of the Order Limits but up to 2km depending on habitat suitability, site access constraints, and any health and safety concerns.

2.5.23 Macrophyte survey site locations are shown in ES Figure 8.54 Macrophyte and phytobenthos survey overview, Volume III (Document reference 6.3, DCO Volume 6).

Field survey methodology

2.5.24 A 100m stretch of the watercourse was selected at each survey site. The recording zone covered the river channel up to the height of the bank that would typically be submerged for more than 50% of the year.

2.5.25 All macrophyte taxa present within this zone were recorded. Where it was not possible to identify a macrophyte to species level, it was recorded under its genus or other aggregate taxon level.

2.5.26 Each taxon in the recording zone was assigned a Taxon Cover Value of 1 (less than 0.1%) to 9 (greater than or equal to 75%) based on a visual estimate of its percentage cover in the wetted portion of the river channel only. In addition to macrophytes, the percentage cover of green filamentous algae was also recorded.

2.5.27 Environmental variables including channel width, depth, substrate composition, flow state, and shade cover were recorded.

Programme of surveys

2.5.28 Macrophyte surveys should be undertaken within the peak macrophyte growing season of July to September (inclusive) to best capture species diversity and biomass.

2.5.29 Macrophyte surveys were undertaken once at each survey site, either in September 2022 or September 2023.

Data analysis

2.5.30 The survey data were entered into the LEAFPACS2 Survey Calculator [33] to calculate the following indices:

1. River Macrophyte Nutrient Index (RMNI) – nutrient response index derived from the individual RMNI scores of the taxa recorded in the survey.
2. Number of Taxa (NTAXA) – the recorded number of scoring aquatic plants as listed in WFD-UKTAG guidance [19].
3. Number of Functional Groups (NFG) – a diversity index. Individual taxa are allocated to one of the 24 ‘functional groups’, this index therefore corresponds to the number of functional groups represented by the taxa recorded in the survey.
4. Cover of Filamentous Algae (ALG) – the percentage cover of green filamentous algae over the whole survey reach.

2.5.31 These indices, along with a number of environmental variables (i.e. distance to the river source and slope) were entered into the LEAFPACS2 Class Calculator [33] to produce Ecological Quality Ratios (EQRs) and an indicative WFD status classification.

2.5.32 The EQR is the ratio of the observed conditions at the site to those expected in reference (i.e. High quality or pristine) conditions. The EQR ranges from zero to one, with one indicating that the observed conditions are equal to reference conditions. Where EQR ranges exceed one, this indicates observed conditions exceeding that of reference conditions.

2.5.33 The River LEAFPACS2 class calculator was used to compare the observed and expected values for the individual indices. A final EQR was calculated for each site from the individual index EQRs, which was then converted to an indicative WFD status class.

2.5.34 The EQR status class was introduced as the basis for the UK's macrophyte status classification under the WFD. Although this is not a WFD study, the metric is used here as it is the standard technique for assessing the condition of macrophyte communities.

2.5.35 The EQR status for each survey site is presented in results tables in Section 3. For ease of viewing, the results are coloured in accordance with status class, as shown in Table 2-3.

Table 2-3 Ecological Quality Ratios status class boundaries for macrophytes

Status class	Final EQR
High	≥0.8
Good	≥0.6
Moderate	≥0.4
Poor	≥0.2
Bad	<0.2

Phytobenthos

Survey scoping

2.5.36 Phytobenthos surveys were scoped-in for watercourses lacking sufficient existing monitoring data to inform a robust assessment of baseline conditions, as determined by the desk study review of EA monitoring data.

2.5.37 Data gathered during the aquatic habitat walkover surveys were reviewed to determine the suitability of locations within the field survey area for phytobenthos surveys.

2.5.38 Survey sites were ideally located within 500m upstream or downstream of the Order Limits but up to 2km depending on habitat suitability, site access constraints, and any health and safety concerns.

2.5.39 Where the field survey area encompassed a number of watercourses considered to be of low ecological sensitivity or field drains located within very close proximity to one another, a single site deemed most suitable for phytobenthos sampling was selected to represent the area.

2.5.40 Phytobenthos survey site locations are shown in ES Figure 8.54 Macrophyte and phytobenthos survey overview, Volume III (Document reference 6.3, DCO Volume 6).

Field survey methodology

2.5.41 Phytobenthos (diatom) samples were collected from watercourses by brushing or scraping submerged cobbles or small boulders with a clean toothbrush. Where no cobbles or small boulders were present, the submerged macrophyte stems were sampled instead.

2.5.42 Samples were collected from mid-stream where possible to ensure that substrata were submerged for at least four weeks prior to sampling (based on the professional judgement of the surveyor).

2.5.43 Diatom samples were preserved immediately upon collection with Lugol's iodine (adding approximately 5-10% by volume) and sent to an approved laboratory for diatom identification by light microscopy.

Programme of surveys

2.5.44 Samples were collected between 2022 and 2023. In accordance with best practice guidance, sampling was undertaken in spring (March to May) and autumn (September to November) of both years.

Data analysis

2.5.45 The Diatoms for Assessing River and Lake Ecological Quality tool (DARLEQ3) was used to calculate the Trophic Diatom Index (TDI5LM) from the light microscopy results.

2.5.46 The TDI5LM is used to detect the impact of nutrient enrichment at a site. Diatom taxa are each assigned a score from 1 (nutrient sensitive) to 5 (nutrient tolerant) and the computed TDI5 scores range from 0 (Very Low nutrients) to 100 (Very High nutrients).

2.5.47 The TDI5LM EQR is calculated based on observed data and predicted reference values, resulting in an overall EQR representing an ecological status class of either High, Good, Moderate, Poor or Bad. The EQR scale ranges from 0 (bad ecological status) to 1 (high ecological status). TDI5LM status class was introduced as the basis for the UK's phytobenthos status classification under the WFD. Although this is not a WFD study, the metric is used here as it is the standard technique for assessing the condition of phytobenthic communities.

2.5.48 The EQR status class boundaries are shown in Table 2-4. The EQR status for each survey site is presented in results tables in Section 3. For ease of viewing, the results are coloured in accordance with status class, as shown in Table 2-4.

Table 2-4 Ecological Quality Ratios status class boundaries for phytobenthos

TDI5LM EQR status class	Threshold
High (H)	≥ 1,00
Good (G)	≥ 0.75
Moderate (M)	≥ 0.50

TDI5LM EQR status class	Threshold
Poor (P)	≥ 0.25
Bad (B)	< 0.25

White-clawed crayfish

Survey scoping

2.5.49 Data gathered during the aquatic habitat walkover surveys and desk study were reviewed to determine the suitability of watercourses within the field survey area for white-clawed crayfish surveys.

2.5.50 Watercourse sites were scoped-out where any of the following applied:

1. The best available information indicated there are no white-clawed crayfish remaining in the sub-catchment (although allowances were made for the possibility of small relict populations remaining in headwater streams, even where the species has been lost from the main river but there have not been any recent surveys to check status).
2. The watercourse (plus 250m buffer) is dry during any period of the year.
3. There are confirmed records of non-native crayfish within 1km of a watercourse (note this can include records of non-native crayfish in angling ponds and fish farms where there is an inflow or outflow that offers a potential route for escape and other surveys indicate that there have been no white-clawed crayfish present within that water body in the past five years.
4. There are records of non-native crayfish up to 5km both upstream and downstream on the same watercourse and there are grounds to expect that there is a continuous population of non-native crayfish between them.
5. Water quality is currently classified as poor (as determined by the General Quality Assessment (GQA) monitoring process or WFD equivalent).
6. Water quality has been poor within the past ten years and there are no populations of white-clawed crayfish in connected tributaries within 2km.
7. Water chemistry is unsuitable due to mean pH of 6.5 or less and/or calcium concentration is less than 5mg/l.
8. Aquatic habitat walkover survey results indicate that there is no suitable habitat for white-clawed crayfish (e.g. channel is a highly modified open culvert with walls of mortared stone, intact brick or sheet piling present, channel bed with no refuge potential for crayfish; note, however, that banks of un-mortared stone re-vetting and damaged brick or concrete can be a very favourable habitat even if there is only small substrate such as sand or gravel present).
9. There has been an incident of crayfish plague within the past five years and surveys determined that there is no known or potential surviving relict population in the watercourse or connected tributaries within 2km.
10. Specific surveys for crayfish have been carried out within the past three years in the watercourse at more than one site, at least one of which is within 2km of the Order Limits, and no crayfish were found.

2.5.51 The requirement to survey standing water bodies such as farm ponds, quarries and other wholly enclosed standing waterbodies was also considered. Site

selection considered the location, permanence, water quality, degree of isolation from other water bodies, and desk study data for both white-clawed and non-native crayfish species in the local area. For all standing water bodies scoped out, a rationale for this decision was recorded making reference to the criteria listed above.

2.5.52 For any sites that were not scoped-out, survey sites were ideally located within 1km of the Order Limits but up to 2km depending on site access constraints and any health and safety concerns.

2.5.53 White-clawed crayfish survey site locations are shown in ES Figure 8.55 White-clawed crayfish survey overview, Volume III (Document reference 6.3, DCO Volume 6).

Field survey methodology

2.5.54 The field survey was undertaken in two stages, as detailed in Table 2-5.

Table 2-5 White-clawed crayfish survey methodology

Survey stage	Description
Habitats appraisal	• Undertaken at all of the sites scoped-in for survey. A 100m to 200m length of watercourse was covered by surveyors at each site. • White-clawed crayfish habitat features were added to base maps as surveyors progressed along the survey reach. • Particular attention was given to sites where conditions were not suitable for a subsequent manual survey. For example, where ample, loose, 'searchable' potential refuge was not present, or where clear, shallow water less than 0.5m deep with extensive lengths (greater than 100m) that could be safely accessed from the bank was not present. • Where subsequent manual search was not possible, the habitat appraisal survey included a search of debris and undercut banks by kicking and netting.
Manual search	• A standardised manual survey of five habitat patches of ten refuges was undertaken where there was potential for a relatively abundant population of white-clawed crayfish and abundant suitable habitat to search. • Where conditions were considered sub-optimal for manual search, the actual number of stones searched were two to three times higher than for the standardised search method to improve the likelihood of detecting white-clawed crayfish. • Where the status of white-clawed crayfish was unknown, the survey effort applied was double the minimum, with more patches searched in one area. In addition, survey effort was extended to double effort where conditions were optimal, but white-clawed crayfish were not detected in the first session. • Where there was enough habitat to carry out a manual survey, but the quality of the habitat was considered sub-optimal, a trapping session was added.

2.5.55 If the habitats appraisal and manual search had indicated the potential for white-clawed crayfish to be present at a site, but neither method had produced positive results for white-clawed crayfish, the survey would have progressed to the trapping stage. Trapping involves placing mesh traps in areas of suitable habitat and leaving them overnight in an attempt to capture white-clawed crayfish. However, following the habitats appraisal and manual search, none of the survey sites were deemed suitable to support white-clawed crayfish. Therefore, none of the surveys progressed to the trapping stage.

2.5.56 The survey approach described above was supplemented with environmental DNA (eDNA) surveys. A water sample was collected from each survey site. Samples were filtered on site and the retained filtrate was sent to a certified laboratory for analysis. The sample was analysed to detect the presence of the following species:

1. White-clawed crayfish
2. Signal crayfish *Pacifastacus leniusculus*
3. Crayfish plague *Aphanomyces astaci*

Programme of surveys

2.5.57 The optimal period for undertaking white-clawed crayfish survey is July to September, after the breeding season. Whilst intensive manual surveys on sites with high densities of crayfish may detect presence at most times of year, nil catches outside the optimal survey season are considered invalid.

2.5.58 Habitats appraisal and manual search stages were undertaken in September 2022, within the optimal survey window. None of the surveys progressed to the trapping stage as white-clawed crayfish presence was not detected by the manual search.

2.5.59 Samples for eDNA analysis were also collected in September 2022.

Aquatic macroinvertebrates

Survey scoping

2.5.60 Macroinvertebrate surveys were scoped-in for watercourses lacking sufficient existing monitoring data to inform a robust assessment of baseline conditions, as determined by the desk study review of EA monitoring data.

2.5.61 Data gathered during the aquatic habitat walkover surveys were reviewed to determine the suitability of locations within the field survey area for macroinvertebrate surveys.

2.5.62 Survey sites were ideally located within 1km upstream or downstream of the Order Limits but up to 2km depending on habitat suitability, site access constraints, and any health and safety concerns.

2.5.63 The following considerations were also factored into the selection of macroinvertebrate survey sites:

1. As far as possible, survey sites were selected to coincide with existing EA monitoring sites within the field survey area.

2. Where the field survey area encompassed a number of watercourses considered to be of low ecological sensitivity or field drains located within very close proximity to one another, a single site deemed most suitable for macroinvertebrate sampling was selected to represent the area.

2.5.64 Macroinvertebrate survey site locations are shown on maps provided in ES Figure 8.56 Aquatic macroinvertebrate survey overview, Volume III (Document reference 6.3, DCO Volume 6).

Field survey methodology

2.5.65 Macroinvertebrate samples were collected following the standard approach used by UK regulatory agencies: a three-minute kick-sweep technique using a pond-net, supplemented by hand searching. All available habitats at the survey site were sampled in proportion to their occurrence, including sweeps through vegetation patches and between the roots of overhanging trees.

2.5.66 Macroinvertebrate samples were also collected at a number of sites using the Monitoring Intermittent Stream (MIS) methodology devised for temporary (e.g. intermittent or ephemeral) watercourses. The methodology was as described above with the addition of splashing water onto any areas covered by very shallow water (i.e. too shallow to use the kick-sweep technique) and collecting any macroinvertebrates that were washed out.

2.5.67 Measurements of the environmental variables required for input into the River Invertebrate Prediction and Classification System (RIVPACS) predictive models were also taken, including depth, width, slope and substrate composition.

2.5.68 Macroinvertebrate samples were preserved on site using industrial denatured alcohol and transferred to a laboratory where they were sorted and identified by an experienced macroinvertebrate taxonomist using industry standard keys.

2.5.69 Samples were identified as far as possible to WFD species level (TL5) using industry standard keys. Abundance was recorded for each of the taxa identified.

Programme of surveys

2.5.70 Samples were initially collected between 2022 and 2023. In accordance with best practice guidance, sampling was undertaken in spring (March to May) and autumn (September to November) of both years.

2.5.71 For watercourses identified as potentially being temporary during the aquatic habitat walkover surveys or the initial macroinvertebrate surveys, samples were collected in spring and autumn of 2024 only.

Data analysis

2.5.72 The following biotic indices were calculated using the macroinvertebrate abundance data:

1. Whalley-Hawkes-Paisley-Trigg Average Score Per Taxon (WHPT-ASPT) – indicative of the general ecological condition or degradation of watercourses [27].

2. WHPT Number of Taxa (WHPT-NTAXA) – the number of taxa that score within the WHPT system [27].
3. Lotic-invertebrate Index for Flow Evaluation (LIFE) – indicative of the overall flow preference of the macroinvertebrate communities [34].
4. Proportion of Sediment-sensitive Invertebrates (PSI) – indicative of pressure on macroinvertebrate communities due to fine sediment deposition [35].

2.5.73 The RIVPACS model was used to contextualise WHPT, LIFE and PSI scores. The model uses physical habitat data to derive expected (i.e. reference) scores. Dividing the observed score by the expected score (O/E ratio) produces an EQR, which provides an indication of how much the macroinvertebrate community deviates from reference conditions.

2.5.74 For WHPT-APST and WHPT-NTAXA, spring and autumn EQRs were averaged in RICT to produce a single annual EQR for each metric. Annual mean EQRs were then equated to a status class based on the boundaries shown in Table 2-6.

2.5.75 These classes are designed to reflect the degree to which biological communities have been degraded as a result of human activity. WHPT EQR status class was introduced as the basis for the UK's river invertebrate status classification under the WFD. Although this is not a WFD study, the metric is used here as it is the standard technique for assessing the condition of macroinvertebrate communities.

2.5.76 The WHPT EQR status for each survey site is presented in results tables in Section 3. For ease of viewing, the results are coloured in accordance with status class, as shown in Table 2-6.

Table 2-6 Ecological Quality Ratios status class boundaries for macroinvertebrates

WHPT EQR status class	WHPT-NTAXA EQR	WHPT-ASPT EQR	Status description
High (H)	≥ 0.80	≥ 0.97	Near natural conditions.
Good (G)	≥ 0.68	≥ 0.86	Slight change from natural conditions as a result of human activity.
Moderate (M)	≥ 0.56	≥ 0.72	Moderate change from natural conditions as a result of human activity.
Poor (P)	≥ 0.47	≥ 0.53	Major change from natural conditions as a result of human activity.
Bad (B)	< 0.47	< 0.53	Severe change from natural conditions as a result of human activity.

2.5.77 There are currently no WFD-related class boundaries for LIFE EQRs, but a threshold of 0.94 is used to indicate the presence of flow-stressed macroinvertebrate communities. A LIFE score of less than 0.94 may indicate that flow is a possible pressure acting on an ecological community at a site [36].

2.5.78 The average LIFE EQR for each survey site was categorised as 'above (A)' or 'below (B)' the 0.94 threshold and the results were coloured accordingly, as shown in Table 2-7.

Table 2-7 Lotic-invertebrate Index for Flow Evaluation Ecological Quality Ratios class and description

LIFE EQR class	LIFE EQR	Description
Above (A)	≥ 0.94	Macroinvertebrate community at site is unlikely to be stressed by low flow conditions.
Below (B)	≤ 0.93	Macroinvertebrate community at site may be stressed by low flow conditions.

2.5.79 PSI values range from 0 (entirely silted) to 100 (entirely silt free). PSI scores are not yet included in the determination of WFD status but a PSI EQR below the threshold of 0.70 is indicative of fine sediment pressure [37].

2.5.80 The average PSI EQR for each survey site was categorised as 'above' or 'below' the 0.70 threshold and the results were coloured accordingly, as shown in Table 2-8.

Table 2-8 Proportion of Sediment-sensitive Invertebrates Ecological Quality Ratios class and description

PSI EQR class	PSI EQR	Description
Above (A)	≥ 0.70	Macroinvertebrate community at site is unlikely to be stressed by fine sediment deposition.
Below (B)	≤ 0.69	Macroinvertebrate community at site may be stressed by fine sediment deposition.

2.5.81 The following biotic indices were calculated for the survey sites that were sampled using the methodology devised for temporary watercourses:

1. Drought Effect of Habitat Loss on Invertebrates (DEHLI) – indicative of the ecological effects of drought development and recovery on riverine invertebrate communities. Scores range from 1 to 10, with 1 indicating likely significant effects associated with the advanced stages of drought and ten indicating no evidence of an ecological drought effect [38].
2. Monitoring Intermittent Streams (MIS) index – used to assess invertebrate responses to environmental changes in temporary (e.g. ephemeral or intermittent) stream types, spanning flowing, ponded and drying states. Lower scores are associated with the presence of semi-aquatic and terrestrial macroinvertebrate species and an absence or low occurrence of lotic (High flow) taxa. Higher scores are indicative of a greater proportion of lotic taxa in the sample [28].

2.6 Assumptions and limitations

2.6.1 It was not possible to complete surveys at all the scoped-in sites, either due to land access constraints, health and safety concerns, or unsuitable weather or hydrological conditions. Specific details are provided for affected surveys in the sub-sections below.

2.6.2 Despite these limitations, sufficient spatial data coverage was achieved between the desk study and field survey for each aquatic ecological receptor to allow for a robust assessment of baseline conditions within the ZoI.

Aquatic habitats

2.6.3 The aquatic habitat walkover surveys were undertaken between June and July 2022 following a period of unseasonably dry weather for the Hampshire region. There was a notable deficit in rainfall between January and August 2022 [39]. Additionally, July 2022 was the driest on record since 1935, experiencing just 56% (46.3mm) of the average July rainfall [40]. Drought was officially declared across Hampshire on 12 August 2022, following a meeting of the National Drought Group [41]. Consequently, a number of the minor watercourses that were recorded as 'dry' during the 2022 survey period may not necessarily be classified as 'dry' or 'temporary' in a normal non-drought year.

2.6.4 As a result of 2022 drought conditions, additional data was gathered on any watercourse recorded as 'dry' and watercourses were revised in 2023 or 2024 if there was any doubt as to the status of flow conditions. Additional data recorded included: substrate type and composition, channel geometry, bank features, geomorphological processes and barriers to fish passage.

Fish

2.6.5 Due to a very hot and dry conditions throughout summer 2022, the EA only licensed surveys between late August and October in 2022. Surveys were therefore initiated later in 2022 that usual. Any surveys not completed were rescheduled and completed in 2023 within the optimal survey window.

2.6.6 Site RSK9 located within the Hermitage Stream catchment was reduced to 30m in length due to trees blocking the channel. A more suitable alternative survey site could not be identified elsewhere on the watercourse.

2.6.7 Survey of Site RSK7 located on the Wallington River was scheduled for August 2022 but was aborted due to high water temperatures. Re-visits were scheduled for October 2022 but they were also cancelled due to access being refused. Survey of Site 26477 in the River Wallington Catchment (upstream of Boarhunt Bridge) was also cancelled due to high water temperatures. The survey was not rescheduled as recent EA fish monitoring data were available for the site.

2.6.8 A fish survey was attempted in August 2022 at Site RSK5 on the River Meon but was aborted due to high water temperatures. A field survey in 2023 could not be undertaken due to land access refusal.

2.6.9 Site 38950 Leyland's Farm located within the Bow Lake catchment was predominantly dry with a series of stagnant pools at the time of survey (August 2022). The pools were heavily silted, with poor water clarity. The effectiveness of surveyors to net and remove fish from the watercourse was therefore reduced. Despite this, the survey was considered to have provided a representative sample of the fish community present.

Macrophytes

2.6.10 One survey site in the River Wallington catchment (survey site Wallington_28) could not be surveyed as access was restricted due to dense bankside vegetation along the full extent of the survey site.

2.6.11 Five survey sites in the Hermitage Stream catchment (Hermitage_08, Hermitage_09, Hermitage_10, Hermitage_11 and Hemitage_14) and one site in the River Hamble catchment (Hamble_26) were dry at the time of survey. All macrophyte species present were recorded but due to the dry conditions, the surveys were not LEAFPACS2 compliant.

2.6.12 Despite these limitations, macrophyte survey spatial coverage of the field survey area is considered sufficient to undertake a robust assessment of baseline conditions.

Aquatic macroinvertebrates

2.6.13 Due to access limitations, it was not possible to undertake macroinvertebrate surveys at one site in the River Itchen catchment (Site R10), three sites in the River Hamble catchment (Sites 79525, R7 and R1) and one site in the River Wallington catchment (Site 44280) in spring 2022. These sites were added to the survey programme from autumn 2022 to account for changes to the Order Limits.

2.6.14 It was not possible for surveyors to access survey site 83160 in the River Meon catchment in autumn 2022 and spring 2023. Land access was also restricted to Site 42048 in the River Itchen catchment in autumn 2023.

2.6.15 In all cases, a minimum of one spring and one autumn sample was collected from each survey site located on a permanent watercourse, which is considered sufficient to assess baseline macroinvertebrate conditions.

3 Results

3.1 Overview

3.1.1 In order to provide an assessment of the likely significance of the Proposed Development on freshwater ecology, it is necessary to identify and understand the receptors and their respective baseline conditions in the Order Limits. This provides a reference point against which potential changes can be assessed.

3.1.2 The spatial scope (the area which may be impacted) for the freshwater ecology assessment is defined by hydrological catchments that intersect the Proposed Development. The South East River Basin Management Plan (RBMP) defines river water body catchments based on surface hydrological catchments with an area of greater than 5km^2, and these hydrological catchments have been used to describe the freshwater ecology receptors associated with the Proposed Development in this appendix. Surface waters include rivers, canals, lakes, reservoirs, and estuarine and coastal waters and water-dependent habitats, including designated sites (e.g. SAC, SPA, SSSI).

3.1.3 The Proposed Development crosses a number of river catchments, including lowland, low gradient systems such as the Hermitage Stream, River Wallington and River Hamble, which drain into Langstone Harbour, Portsmouth Harbour and Southampton Water, respectively. The Proposed Development is also within the catchments of the River Itchen and the River Meon, both of which are highly sensitive chalk river systems.

3.1.4 The baseline assessment for each water body catchment in the Order Limits is given in the following sections to gain a broad understanding of the ecological conditions within the full ZoI, based on both the desk study and field study data collected.

3.1.5 The surface water bodies are described from east to west from the WRP site to Otterbourne WSW and are given in ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6). Detailed survey results for freshwater ecological receptors in all watercourses surveyed are given in the annexes to this document as follows:

1. Habitat survey results are illustrated on maps in Annex A and aquatic habitat survey data is provided in Annex B.
2. Fish survey data are provided in Annex C.
3. Macrophyte survey data are provided in Annex D.
4. Phytobenthos survey data are provided in Annex E.
5. White-clawed crayfish survey data are provided in Annex F.
6. Macroinvertebrate survey data are provided in Annex G.

3.2 Riders Lane Stream

3.2.1 The location of Riders Lane Stream within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.2.2 Riders Lane Stream is the main tributary of Hermitage Stream and drains the area that would be occupied by Havant Thicket Reservoir. The headwaters of Riders Lane Stream rise as two main sub-tributary arms from a series of rivulets in the woodlands of Havant Thicket (left arm) and from Hammond Hands Copse to the east of Leigh Park Lake in Staunton Country Park (right arm).

3.2.3 The left arm sub-tributaries are temporary watercourses which were completely dry at the time of habitat walkover survey in July 2022 and would be mainly under the footprint of the Havant Thicket Reservoir when constructed.

3.2.4 The two main arms of these headwater sub-tributaries join just north of Middle Park Way, flowing south and west through Great Copse to Dunsbury Way, then south and east via Riders Lane and Purbrook Way to the confluence of Hermitage Stream at Corhampton Crescent. A large culvert is present beneath Middle Park Way Road.

3.2.5 Riders Lane Stream is not monitored by the EA and is mostly included within the Hermitage Stream WFD water body catchment (GB107042016370). The WFD classification for Hermitage Stream is given in section 3.3.

3.2.6 The upper portions of Riders Lane Stream are temporary watercourses and considered a S41 habitat, important for the maintenance of intermittent headwater habitat. Riders Lane Stream within the Order Limits is also being considered as a S41 habitat as a precautionary approach to assigning value, on the basis that the watercourse has the potential to support a species assemblage of the adjacent S41 habitat.

3.2.7 There are no watercourse crossings proposed within Riders Lane Stream catchment, but the watercourse will receive compensatory flows from Havant Thicket Reservoir during operation.

Aquatic habitat walkover

3.2.8 Two habitat walkover surveys were undertaken in Riders Lane Stream in 2022: AW26 and AW27, details of which are provided in Annex A and Annex B.

3.2.9 The river reach defined as AW26 on the right arm sub-tributaries is a short approximately 850m reach which rises to the north of Staunton Country Park and flows south, through the ancient semi-natural woodland of Great Copse and the suburb of Leigh Park, before its confluence with Hermitage Stream. At the time of survey, the watercourse was largely dry or ponded at the upstream extents and a large culvert was observed beneath Middle Park Way Road.

3.2.10 Immediate land use was predominantly broadleaf woodland, with the wider area predominantly urban (residential housing) and highway. Instream habitats were principally areas of no perceptible flow, however some areas of slow flowing run and glide (0.05-0.15m/s) were observed in the downstream reaches. Dense tree cover was present along the riverbanks throughout most of the reach and, as such,

instream vegetation was largely absent. Substrate was predominantly cobble, with gravel and silt and woody debris frequently recorded in the river channel.

3.2.11 AW27 on the on the left arm sub-tributary is a short approximately 500m reach upstream of AW27 and was completely dry at the time of survey, with no functional aquatic habitat observed.

Fish

Desk study

3.2.12 There were no EA fish monitoring sites located on Riders Lane Stream. Fish monitoring data are available from the NFPD for the nearby lake of Staunton Country Park; however, hydrological connectivity to Riders Lane Stream is not certain so this data is not considered valid. There were several records of fish survey data for the Hermitage Stream, which is immediately downstream of Riders Lane Stream, with direct hydrological connectivity. This data is therefore considered relevant to act as a suitable proxy for fish species potentially present within Riders Lane Stream.

3.2.13 On Hermitage Stream, a 100m single-catch survey was undertaken at Ramsdale Avenue (Nevilles Park, Site ID 43141; NGR SU 69937 08621) in 2012. This survey only recorded two species: bullhead *Cottus gobio* (Annex II species) (n=38) and European eel *Anguilla anguilla* (S41) (n=3). Three 100m single-catch surveys were undertaken further downstream at Bentworth Close (within Leigh Park, Site ID 28323; NGR SU 7079 0779) in 2007, 2012 and 2021. Bullhead (Annex II species) and European eel (S41) were also recorded at this site, as well as three-spined stickleback *Gasterosteus aculeatus*.

3.2.14 Barncroft Way (Site ID 43142; NGR SU 71232 07107), located approximately 500m downstream of the confluence with Riders Lane Stream was also surveyed in 2012 and 2021 by a 100m single-catch survey. These surveys also only recorded bullhead (Annex II species), European eel (S41) and three-spined stickleback, with bullhead (Annex II species) the more abundant species, but still only observed in low density.

3.2.15 Detailed fish survey results are provided in Annex C.

Field survey

3.2.16 One three-run catch-depletion survey was undertaken for the Proposed Development on Riders Lane Stream in October 2022 at a location below the confluence of the two headwater sub-tributaries, within Staunton Country Park (Site RSK8; NGR SU 7175 0865).

3.2.17 Three species were recorded in this survey, namely bullhead (Annex II species), European eel (S41) and three-spined stickleback. The total number of fish captured was 177, equating to a density of 48.72 individuals per 100m² of watercourse.

Macrophytes

Desk study

3.2.18 The EA's BIOSYS database returned records of a single macrophyte survey in Riders Lane Stream from 2012, immediately upstream of its confluence with Hermitage Stream. The INNS Himalayan balsam *Impatiens glandulifera* was recorded at the site.

3.2.19 The HBIC data search returned no records of protected or notable macrophyte species within the study area for Riders Lane Stream; however, several records of INNS parrot's feather *Myriophyllum aquaticum* were recorded in the nearby Havant Thicket area in 2006.

Field survey

3.2.20 Macrophyte surveys were undertaken in 2022 at two sites within the Riders Lane Stream catchment for the Proposed Development.

3.2.21 A total of 13 LEAFPACS2 scoring taxa and ten additional taxa were recorded across the two surveyed sites. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-1.

3.2.22 Both sites were found to have low diversity and species richness, with NTAXA EQR ranging from -0.008 to 0.16. RMNI EQR scores ranged from 0.60 to 0.64. Filamentous algae cover was high at 37.5%. The ALG EQR for both sites was 0.2. The indicative status class for macrophytes in Riders Lane Stream was 'Poor'.

Table 3-1 Riders Lane Stream macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final score	
	RMNI	NTA XA	NFG	ALG	RMNI	NTA XA	NFG	ALG	EQR	Status class
Hermitage_13 (left-arm sub-trib)	7.26	2	2	37.5	0.64	0.16	0.44	0.20	0.34	Poor
Hermitage_15 (below confluence)	7.33	1	1	37.5	0.60	0.008	0.22	0.20	0.30	Poor

Phytobenthos

3.2.23 Two sites were surveyed for phytobenthos for the Proposed Development on Riders Lane Stream between 2022 and 2023. A summary of these surveys is given in Table 3-2, along with the relevant indices. Species lists are provided in Annex E to this document.

Table 3-2 Riders Lane Stream phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
R8	Riders Lane Stream right arm headwater sub-trib	SU 58647 07929	Southern Water/EA	2010 to 2023 (6)	51.08 - 75.57 (69.62)	0.47 - 0.95 (0.59)	M – H (M)
81177	Riders Lane Stream above confluence with Hermitage Stream	SU 62130 08750	EA	2005 (2)	63.65 - 77.47 (70.56)	0.44 - 0.72 (0.58)	M – G (G)

White-clawed crayfish

3.2.24 The desk study did not identify any white-clawed crayfish records for the Riders Lane Stream catchment within the last ten years.

3.2.25 One white-clawed crayfish survey was attempted in Riders Lane Stream for the purposes of the Proposed Development, namely WCC_13 at NGR SU 71392 09063.

3.2.26 At the time of survey, conditions were unsuitable for this species (dry) and therefore considered absent. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.2.27 The desk study did not identify any EA macroinvertebrate survey data collected between 2003 and 2024 for Riders Lane Stream within 2km of the Order Limits.

3.2.28 Standard macroinvertebrate surveys were undertaken for the Proposed Development at two sites on Riders Lane Stream between 2022 and 2023. One of the survey sites was located to coincide with a historical EA monitoring site (Site 81177), immediately upstream of the confluence with Hermitage Stream. The second survey site (Site R8) was located further upstream.

3.2.29 Macroinvertebrate sampling was undertaken at both sites in spring and autumn of 2022 and 2023. Survey details and the biotic indices derived from the survey results are presented in Table 3-3. Full taxa lists are provided in Annex G.

3.2.30 No protected or notable species of macroinvertebrates were identified in samples collected from Riders Lane Stream between 2022 and 2023.

3.2.31 The INNS Jenkins' spire snail *Potamopyrgus antipodarum* was identified in samples collected from Riders Lane Stream between 2022 and 2023.

3.2.32 One additional site (WCX1) was surveyed within the Riders Lane Stream catchment in spring 2024 using the sampling protocol adapted specifically for temporary watercourses. The DEHLI score for this site was calculated as 3.86 and the MIS-index score was calculated as 0.29. No species of conservation importance were identified in the sample. The dominant species were either

generalists (e.g. occur across a wide range of running-water and standing-water habitats) or associated with lotic environments (e.g. primarily associated with run and glide habitats), rather than species associated with temporary watercourses.

Table 3-3 Riders Lane Stream macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
81177	Southern Water	Riders Lane Stream	SU 71040 07520	2022 to 2023 (4)	6.75 - 7.40 (7.09)	1.00 - 1.09 (1.05)	A – A (A)	23.53 - 50.00 (40.26)	0.60 - 1.13 (0.95)	B – A (A)	3.71 - 4.18 (3.93)	0.73 - 0.78 (0.75)	M – M (M)	5 - 11 (8)	0.19 - 0.42 (0.31)	B – B (B)
R8	Southern Water	Riders Lane Stream	SU 71760 08683	2022 to 2023 (3)	6.00 - 6.33 (6.22)	0.87 - 0.92 (0.89)	B – B (B)	8.33 - 10.00 (9.17)	0.15 - 0.21 (0.18)	B – B (B)	3.39 - 3.63 (3.48)	0.60 - 0.61 (0.60)	P – P (P)	7 - 9 (8)	0.23 - 0.30 (0.25)	B – B (B)

3.3 Hermitage Stream

3.3.1 The location of the Hermitage Stream catchment within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.3.2 The stream rises near Horndean, and its catchment is predominantly urban and constrained by artificial infrastructure as it flows from Horndean through Havant. The main tributary of the Hermitage Stream is Riders Lane Stream, which drains the area that would be occupied by Havant Thicket Reservoir. Hermitage Stream flows into Langstone Harbour approximately 180m south of the WRP site.

3.3.3 The Hermitage Stream WFD water body (GB107042016370) is monitored by the EA at one monitoring point above the tidal limit, namely 'B2150 Havant-New Road' and is classified as a heavily modified water body[1]. The water body is of 'Moderate' ecological potential overall[2] based on its Moderate classification for invertebrates, phosphate, pH and mitigation measures, and a Poor classification for fish according to its WFD water body status.

3.3.4 Four watercourse crossings are proposed within the Hermitage Stream catchment, as detailed in Table 3-4. The Hermitage Stream would also be impacted by compensatory flows from Havant thicket Reservoir during operation.

Table 3-4 Hermitage Stream watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_B2_001	Mill Lane Tributary	Main River Tributary of Hermitage Stream	Trenchless
COMP_WCX_C_001	Unnamed ditch	Ordinary Watercourse Located within Budds Farm complex Not hydrologically connected to Hermitage Stream	Temporary construction compound C1, as shown on ES Figure 1.1 Location of the Proposed Development and Order Limits, Volume III (Document reference 6.3, DCO Volume 6).
OPT1_WCX_C_003	Hermitage Stream	Main River Located within tidal reach	Trenchless
COMP_WCX_C_006	Hermitage Stream	Main River Located within tidal reach	SuDS construction at WRP site

[1] Where the hydromorphology of a surface water body has been significantly altered because of anthropogenic activities, the WFD determines that it can be designated as an Artificial or Heavily Modified Water Body. An alternative environmental objective 'Good' ecological potential applies in these cases.

[2] The ecological status of surface waters under the WFD is recorded on a scale of 'High', 'Good', 'Moderate', 'Poor' and 'Bad'. The overall environmental objective of reaching Good ecological status applies.

Aquatic habitat walkover

3.3.5 One habitat walkover survey was undertaken in Hermitage Stream in 2022, namely AW25, details of which are provided in Annex A and Annex B.

3.3.6 The river reach defined as AW25 is a short approximately 580m reach within the large housing developments of Waterlooville and Leigh Park. The survey described a river reach that was notably heavily modified, with several outfalls documented throughout the reach and wooden step weirs observed at the downstream extent. Adjacent land use was predominantly residential housing, though a strip of amenity grassland and riparian vegetation was maintained immediately adjacent to the surveyed river reach.

3.3.7 Dominant substrate types were gravel, cobble and silt, with some areas of artificial concrete recorded in the vicinity of the large road bridges for Purbrook Way and Middle Park Way. Water depths range from 0.1-0.4m and the normal operation velocity for the watercourse was estimated to be 0.05-0.3m/s. In stream habitat was mostly glide (0.05-0.2m depth) and shallow run (0.05-0.2m depth) with occasional riffle also present.

3.3.8 Grey water was observed discharging from a number of the outfalls in the habitat walkover survey area and dense algae was also observed throughout the river reach indicating nutrient enrichment.

Fish

Desk study

3.3.9 On Hermitage Stream, a 100m single-catch survey was undertaken by the EA at Ramsdale Avenue (Nevilles Park, Site ID 43141; NGR SU 69937 08621) in 2012. This survey only recorded two species: bullhead (Annex II species) (n=38) and European eel (S41 species; n=3). Three 100m single-catch surveys were undertaken further downstream at Bentworth Close (within Leigh Park, Site ID 28323; NGR SU 7079 0779.) in 2007, 2012 and 2021. Bullhead (Annex II species) and European eel (S41 species) were also recorded at this site, as well as three-spined stickleback.

3.3.10 Barncroft Way (Site ID 43142; NGR SU 71232 07107), located approximately 500m downstream of the confluence with Riders Lane Stream, was also surveyed in 2012 and 2021 by a 100m single-catch survey. These surveys also only recorded bullhead (Annex II species), European eel (S41 species) and three-spined stickleback, with bullhead the more abundant species, but still only observed in low density.

Field survey

3.3.11 Two fish surveys were undertaken for the purposes of the Proposed Development in the Hermitage Stream catchment in 2022: one at the EA monitoring site at Bentworth Close and one at Site RSK9 located on Bidbury Mead Stream, a tributary of the Hermitage Stream at NGR SU 7025 0623 (Site RSK9).

3.3.12 The four-run catch-depletion survey completed at 28323 Bentworth Close on 20 July 2022 recorded three species, namely bullhead (Annex II species), European

eel (S41 species) and three-spined stickleback. The total number of fish captured was 41, equating to a density of 17.57 individuals per 100m² of watercourse.

3.3.13 The three-run catch-depletion survey at site RSK9 on 20 July 2022 recorded only one species, European eel (S41) at an abundance of six individuals, equating to a density of 16.67 individuals per 100m² of watercourse.

3.3.14 Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.3.15 Macrophyte survey data were available from the EA BIOSYS database at a single location in the Hermitage Stream catchment. The EA Site 81176 is located in close proximity to the confluence with Riders Lane Stream, adjacent to Corhampton Crescent. The INNS Himalayan balsam was recorded in 2012.

Field survey

3.3.16 One macrophyte survey was undertaken for the Proposed Development within the Hermitage Stream catchment. A total of 13 LEAFPACS2 scoring taxa and ten additional taxa were recorded. Species lists are provided in Annex D.

3.3.17 The indices derived from LEAFPACS2 are presented in Table 3-5. The survey site was found to have low diversity and species richness, with an NTAXA EQR of 0.31. The RMNI EQR was 0.55. Algae cover was high across all sites, with a percentage cover of 87.5%. The ALG EQR was 0.04. The indicative WFD classifications for macrophytes in the Hermitage Stream field survey area was 'Poor'.

3.3.18 Himalayan balsam was the only INNS identified within the field survey area.

Table 3-5 Hermitage Stream catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final Score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	Status class
Hermitage Stream (Hermitage_03)	7.71	3	2	87.5	0.55	0.31	0.42	0.04	0.26	Poor

Phytobenthos

3.3.19 Within the 2km desk study area in the Hermitage Stream catchment, no historical phytobenthos sample sites were made available through the EA Ecology and Fish Data Explorer between 2003 and 2024.

3.3.20 Two sites were surveyed in the Hermitage Stream catchment for the Proposed Development between 2022 and 2023. The survey details are summarised in Table 3-6 along with the relevant indices. Species lists are provided in Annex E.

Table 3-6 Hermitage Stream catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
81176	Hermitage Stream	SU 62377 08272	Southern Water	2022 to 2023 (4)	57.18 - 87.22 (72.63)	0.26 - 0.88 (0.56)	P – H (G)
89621	Brookside Road Stream	SU 70151 06415	Southern Water	2022 to 2023 (4)	68.53 - 81.99 (74.12)	0.33 - 0.58 (0.48)	P – M (M)

White-clawed crayfish

Desk study

3.3.21 The desk study did not identify any recent white-clawed crayfish records for Hermitage Stream catchment.

Field survey

3.3.22 One white-clawed crayfish survey was undertaken in the Hermitage Stream catchment for the purposes of the Proposed Development, namely WCC_12 at Bidbury Mead Stream in the lower catchment (NGR SU 66639 09720).

3.3.23 The manual survey indicated a small gravel-bed stream within dense woodland habitat, with a small amount of surface flow present causing localised ponds 1-2cm deep. Multiple channels with small culverts were present.

3.3.24 The site was not suitable for manual search techniques. An eDNA sample was collected, although only from one area that was deep enough. It was noted that if the flow were to increase, searchable habitats would exist.

3.3.25 No white-clawed crayfish presence was identified through habitat assessments or eDNA sampling. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.3.26 Macroinvertebrate survey data collected between 2003 and 2024 were available for three EA monitoring sites in the Hermitage Stream catchment within the desk study area.

3.3.27 Standard macroinvertebrate surveys were undertaken for the Proposed Development between 2022 and 2023. One survey site was located on Hermitage Stream (Site 81176) and the other was located on a tributary, Brookside Road Stream (Site 89621). Both survey sites were selected to coincide with EA monitoring sites.

3.3.28 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-7. Full taxa lists are provided in Annex G.

3.3.29 No protected or designated species were recorded in the Hermitage Stream catchment. Two INNS, Jenkins' spire snail and a species of planarian flatworm *Planaria torva*, were identified in samples collected by the EA.

Table 3-7 Hermitage Stream catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
89621	Southern Water/EA	Brookside Road Stream	SU 70151 06415	2003 to 2023 (5)	6.94 - 9.25 (8.01)	1.01 - 1.34 (1.17)	A – A (A)	45.00 - 100.00 (63.24)	0.95 - 2.11 (1.41)	A – A (A)	4.00 - 5.03 (4.64)	0.81 - 0.95 (0.9)	M – G (G)	4 - 21 (9)	0.16 - 0.81 (0.36)	B - H (B)
89622	EA	Brookside Road Stream	SU 70320 06120	2003 (1)	6.00	0.87	B	28.00	0.58	B	3.78	0.71	P	13	0.50	P
81176	Southern Water/EA	Hermitage Stream	SU 71040 07520	2003 to 2023 (17)	5.60 - 7.00 (6.42)	0.82 - 1.00 (0.93)	B – A (B)	8.33 - 57.14 (30.65)	0.17 - 1.14 (0.65)	B – B (B)	3.48 - 4.69 (4.02)	0.62 - 0.85 (0.73)	P – M (M)	8 - 26 (19)	0.28 - 0.91 (0.66)	B - H (M)

3.4 River Wallington

3.4.1 The location of the Wallington River catchment within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.4.2 The Wallington River is formed downstream of the Upper Wallington and Potwell Tributary catchments, rising to both the north and south of Waterlooville and Denmead, where it flows roughly south-south-west for approximately 13km before discharge to Portsmouth Harbour. The catchment is predominantly rural with limited urban areas in the south of the catchment on the outskirts of Fareham. Land use is mainly mixed farming with large areas of arable land close to the channel in the lower catchment. The principal tributaries flow south from near North Boarhunt.

3.4.3 The channel's planform is sinuous and appears largely unchanged since the 1856 OS. It has a well-developed riparian corridor of scrubby vegetation and trees, and there is a small weir located in the surveyed reach.

3.4.4 The Wallington below Southwick Tributary WFD water body (GB107042016360) is monitored by the EA at one monitoring point, namely "*River Wallington at Newmans Bridge*" and is of 'Moderate' ecological status due to point source pollution from private sewage treatment and sewage discharge, and diffuse pollution from poor soil management.

3.4.5 Three watercourse crossings are proposed within the River Wallington catchment, as detailed in Table 3-8.

Table 3-8 River Wallington watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_F_001	Unnamed ditch along Chalk Lane	Ordinary Watercourse Dry, terrestrialised field drain	Open cut
OPT1_WCX_F_002	Unnamed ditch southeast of Crockerhill	Ordinary Watercourse Dry, terrestrialised field drain	Open cut
OPT1_WCX_F_004	River Wallington	Main River	Trenchless

Aquatic habitat walkover

3.4.6 One habitat walkover survey was undertaken on the River Wallington, namely AW20, details of which are given in Annex A and Annex B.

3.4.7 The river reach defined as AW20 covers approximately 2.3km reach of the River Wallington. The river channel averages 5-10m in width and depths range from 0.25-1.5m. Adjacent land use upstream of the M27 is predominantly mixed pasture and arable farmland. normal operationvelocity for the watercourse was estimated to be 0.1-0.3m/s and instream habitat was mostly glide (0.3-1m in depth) and shallow run (0.1-0.4m) with occasional pools and riffle also present. Dominant substrate types were gravel, cobble and silt.

3.4.8 Throughout the reach, the riverbanks were bordered by young and mature broadleaved trees, providing plenty of dappled shade, and as a result coarse woody debris was frequently recorded instream. Where shading was less dense, instream vegetation growth was recorded, with some areas notably 'choked' with emergent vegetation.

3.4.9 An EA gauging weir with eel pass was noted in the reach, upstream of the M27 motorway indicating possible passage for this species.

Fish

Desk study

3.4.10 The desk study returned multiple records of EA (NFPD) fish surveys throughout the River Wallington catchment, from three monitoring sites namely, Whitedell Farm, (NGR SU 58843 08826) Spurling Farm (NGR SU 58693 07831) and Wallington Village (NGR SU 58700 07100).

3.4.11 The following species were recorded through a fully quantitative catch depletion methodology at Whitedell Farm over ten surveys between 2001 and 2024:

1. Fish species of conservation concern:
   a. Brown/sea trout *Salmo trutta* (S41 species)
   b. Bullhead (Annex II species)
   c. European eel (S41 species)
2. Common fish assemblage species:
   a. Three-spined stickleback
   b. Chub *Squalius cephalus,*
   c. Dace *Leuciscus leuciscus*,
   d. Gudgeon *Gobio gobio*,
   e. Minnow *Phoxinus phoxinus*,
   f. Perch *Perca fluviatilis*,
   g. Roach *Rutilus rutilus*,
   h. Rudd *Scardinius erythrophthalmus,*
   i. Stone loach *Barbatula barbatula*.

3.4.12 The EA monitoring sites of Wallington Village and Spurlings Farm have only been surveyed once each in 2001 and 2007, respectively, with only one additional species (flounder *Platichthys flesus*) present in the Wallington Village survey.

Field survey

3.4.13 Two fish surveys were undertaken for the purposes of the Proposed Development in the Hermitage Stream catchment between 2022 and 2023: Site 26499 Spurlings Farm located at the EA monitoring site on the Wallington River at NGR SU 5861 0797 and Site 26477 upstream of Boarhunt Bridge located at the EA monitoring site on the Wallington River at NGR SU 6080 0922.

3.4.14 The three-run catch-depletion survey at 26499 Spurlings Farm on 6 September 2023 recorded five species, namely:

1. Fish species of conservation concern:
    a. Brown/sea trout (S41 species)
    b. Bullhead (Annex II species)
    c. European eel (S41 species)
2. Common fish assemblage species:
    a. Minnow
    b. Stone loach

3.4.15 The total number of fish captured was 459, equating to a density of 92.73 individuals per 100m² of watercourse.

3.4.16 A field survey was attempted on 2 August 2022 upstream of Boarhunt Bridge (Site 26477) but was aborted due to high water temperatures. Recent (25 August 2021) fish survey data were available from the EA for the site. The EA recorded ten species.

1. Fish species of conservation concern:
    a. Brown/sea trout (S41 species)
    b. Bullhead (Annex II species)
    c. European eel (S41 species)
2. Common fish assemblage species:
    a. Common bream *Abramis brama*
    b. Dace
    c. Gudgeon
    d. Minnow
    e. Perch
    f. Roach
    g. Stone loach

3.4.17 The minor species were sub-sampled therefore abundance and minimum density of major species only has been included. The total number of major species captured was 89 fish, equating to a minimum density of 19.46 individuals per 100m² of watercourse.

3.4.18 Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.4.19 Analysis of EA BIOSYS data returned results for several monitoring sites within the River Wallington catchment. No species of conservation importance were identified; however, several records of INNS Himalayan balsam and least duckweed *Lemna minuta* were identified.

3.4.20 Historical HBIC data collected between 1997 and 2014 also returned records of INNS Himalayan balsam at multiple locations throughout the catchment.

Field survey

3.4.21 A total of 13 LEAFPACS2 scoring taxa and 14 additional taxa were recorded across three survey sites in the Wallington River catchment. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-9.

3.4.22 All sites in the River Wallington field survey area were found to have low diversity and species richness, with NTAXA EQRs ranging from 0.16 to 0.34. All sites were scored moderately for nutrient enrichment, with RMNI EQRs ranging from 0.56 to 0.77.

3.4.23 Green filamentous algae cover was recorded at all three survey sites, ranging from a percentage cover of 7.5% to 62.5%, and respective ALG EQR ranging from 0.16 to 0.60.

3.4.24 The indicative WFD status classifications for macrophytes in the River Wallington field survey area ranged from 'Poor' to 'Moderate'. Site Wallington_17 was the only site to achieve a 'Poor' classification.

3.4.25 Himalayan balsam was the only INNS identified within the field survey area and was found across all Wallington River sites.

Table 3-9 River Wallington catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	Status class
Wallington River (Wallington_14)	7.91	4	3	7.5	0.67	0.34	0.52	0.60	0.56	Moderate
Wallington River (Wallington_17)	7.72	3	3	62.5	0.77	0.21	0.52	0.12	0.35	Poor
Tributary of Wallington River (Wallington_29)	7.68	2	2	7.5	0.56	0.16	0.44	0.60	0.42	Moderate

Phytobenthos

3.4.26 The EA monitored phytobenthos at seven sites within the River Wallington catchment between 2003 and 2024. Four sites were surveyed between 2022 and 2023 for the Proposed Development.

3.4.27 A summary of the EA and Proposed Development survey data are presented in Table 3-10. Full species lists are provided in Annex E.

Table 3-10 River Wallington catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
42879	River Wallington (above Southwick)	SU 62130 08750	EA	2005 (2)	63.65 - 77.47 (70.56)	0.44 - 0.72 (0.58)	M – G (G)
42824	Trib of River Wallington	SU 60281 09361	Southern Water	2022 to 2023 (4)	68.53 - 81.99 (74.12)	0.33 - 0.58 (0.48)	P – M (M)
42017	Wallington River	SU 58647 07929	Southern Water/EA	2010 to 2023 (6)	51.08 - 75.57 (69.62)	0.47 - 0.95 (0.59)	M – H (M)
44280	River Wallington	SU 64970 07600	Southern Water/EA	2005 - 2023 (4)	63.02 - 80.05 (72.57)	0.38 - 0.7 (0.52)	P - G (M)
101021	River Wallington	SU 64312 08403	EA	2014 (2)	69.73 - 81.07 (75.4)	0.35 - 0.55 (0.45)	P - M (M)
101046	River Wallington	SU 61706 08803	EA	2007 to 2012 (6)	68.2 - 91.75 (77.49)	0.16 - 0.63 (0.45)	B - G (M)
148263	River Wallington	SU 61835 08809	EA	2007 to 2012 (7)	61.44 - 85.48 (74.07)	0.3 - 0.8 (0.54)	P - H (M)
154464	River Wallington	SU 62027 08787	EA	2009 (1)	93.53	0.12	B

White-clawed crayfish

Desk study

3.4.28 The desk study did not identify any white-clawed crayfish records for the River Wallington catchment.

3.4.29 The desk study did return two records of the INNS signal crayfish from 2011 within the River Wallington catchment, although one of these records is outside of the desk study area, at Southwick Park Lake.

Field survey

3.4.30 Two white-clawed crayfish surveys were undertaken in the Wallington catchment for the purposes of the Proposed Development, namely WCC_10 on the River Wallington at NGR SU 60142 13809 and WCC_11 on a tributary of the River Wallington at NGR SU 62175 12095.

3.4.31 At WCC_10 the manual search indicated a meandering tree-lined stretch of river, with grazing in most places, encroaching onto the river. The water was too turbid to see the substrate and the habitat was a sequence of pools and riffles. Conditions were unsuitable to conduct a manual search (turbid). Only one eDNA sample was taken due to the homogeneity of the river.

3.4.32 At WCC_11, the site was similar to WCC_10 although impounded by an EA gauging weir at the downstream extent. On the left bank horses were present grazing, on the right bank a mixture of arable farming and rough grazing was present. The water was turbid with a riffle habitat. Large amounts of woody debris were also located within the channel.

3.4.33 White-clawed crayfish was noted absent in both sites in the Wallington catchment through habitat assessments and eDNA sampling. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.4.34 Macroinvertebrate survey data collected between 2003 and 2024 were available for 20 EA monitoring sites in the River Wallington catchment within the desk study area.

3.4.35 Standard macroinvertebrate surveys were undertaken for the Proposed Development at four sites in the River Wallington catchment between 2022 and 2023. Two of the survey sites were selected to coincide with EA monitoring sites: Site 44280 on the Potwell Tributary and Site 42017 on the River Wallington below Southwick. The two new survey sites were located on an unnamed tributary of the Potwell Tributary (Site R9) and an unnamed tributary of the River Wallington below Southwick (Site 42824).

3.4.36 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-11. Full taxa lists are provided in Annex G.

3.4.37 The Nationally Scarce purple dun mayfly *Paraleptophlebia cincta* was recorded by the EA in samples from two monitoring sites in the River Wallingford catchment in 2010 (Site 42017 and Site 152936).

3.4.38 Three INNS were recorded in the River Wallington catchment between 2005 and 2023, including Jenkins' spire snail, an amphipod shrimp *Crangonyx pseudogracilis/floridanus* and the brown planarian flatworm *Girardia tigrine*.

Table 3-11 River Wallington catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
152936	EA	River Wallington (below Southwick)	SU 58593 07058	2009 to 2010 (2)	7.00 - 7.33 (7.17)	1.06 - 1.13 (1.09)	A – A (A)	50.00 - 53.85 (51.93)	1.37 - 1.60 (1.49)	A – A (A)	5.40 - 5.83 (5.62)	1.08 - 1.23 (1.15)	H - H (H)	26 - 28 (27)	0.96 - 1.06 (1.01)	H – H (H)
152569	EA	River Wallington (below Southwick)	SU 58628 07081	2006 (1)	6.52	1.02	A	36.00	1.15	A	4.74	1.01	H	28	1.04	H
42017	EA/Southern Water	River Wallington (below Southwick)	SU 58647 07929	1997 to 2023 (12)	6.29 - 7.58 (6.85)	0.93 - 1.09 (1.00)	B – A (A)	20.00 - 64.10 (42.74)	0.48 - 1.33 (0.95)	B – A (A)	4.49 - 5.93 (5.26)	0.84 - 1.08 (0.96)	M - H (G)	9 - 34 (26)	0.30 - 1.16 (0.87)	B – H (H)
152568	EA	River Wallington (below Southwick)	SU 58671 07106	2006 (1)	6.48	1.00	A	35.19	1.03	A	4.82	1.00	H	30	1.10	H
152558	EA	River Wallington (below Southwick)	SU 58699 07771	2006 (1)	6.63	1.02	A	35.71	1.05	A	5.14	1.07	H	30	1.10	H
152567	EA	River Wallington (below Southwick)	SU 58715 07130	2006 (1)	6.74	1.04	A	43.94	1.29	A	5.21	1.09	H	36	1.32	H
152565	EA	River Wallington (below Southwick)	SU 58718 07725	2006 (1)	6.74	1.04	A	41.43	1.26	A	5.19	1.09	H	38	1.40	H
152566	EA	River Wallington (below Southwick)	SU 58724 07677	2006 (1)	6.68	1.03	A	41.27	1.25	A	5.28	1.11	H	32	1.18	H
152937	EA	River Wallington (below Southwick)	SU 58775 07433	2009 to 2010 (2)	6.74 - 7.04 (6.89)	1.02 - 1.03 (1.03)	A – A (A)	44.44 - 50.00 (47.22)	1.15 - 1.16 (1.15)	A – A (A)	5.07 - 5.62 (5.35)	1.00 - 1.05 (1.02)	H - H (H)	28 - 31 (30)	1.01 - 1.08 (1.04)	H – H (H)
42824	Southern Water	Tributary of River Wallington (below Southwick)	SU 60281 09361	2022 to 2023 (4)	6.80 - 8.06 (7.39)	1.00 - 1.15 (1.07)	A – A (A)	11.11 - 70.97 (45.35)	0.26 - 1.43 (0.95)	B – A (A)	4.79 - 6.51 (5.54)	0.88 - 1.13 (0.99)	G - H (H)	7 - 20 (14)	0.24 - 0.69 (0.48)	B – G (P)
101046	EA	River Wallington (below Southwick)	SU 61706 08803	2007 (1)	6.60	0.97	B	39.66	0.93	A	5.14	1.01	H	33	1.25	H
148263	EA	River Wallington (below Southwick)	SU 61835 08809	2007 (1)	6.89	1.01	A	46.43	1.09	A	5.30	1.04	H	31	1.17	H

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
42879	EA	Upper River Wallington	SU 62130 08750	1995 to 2019 (38)	6.00 - 7.44 (6.85)	0.88 - 1.07 (0.99)	B – A (B)	18.42 - 59.70 (45.00)	0.43 - 1.24 (0.97)	B – A (A)	4.41 - 6.17 (5.38)	0.85 - 1.12 (1.01)	M - H (H)	22 - 45 (31)	0.81 - 1.66 (1.16)	H – H (H)
R9	Southern Water	Unnamed tributary of Potwell Tributary	SU 62377 08272	2022 to 2023 (4)	7.38 - 8.08 (7.84)	1.02 - 1.10 (1.08)	A – A (A)	42.11 - 78.95 (65.68)	0.69 - 1.26 (1.06)	B – A (A)	5.47 - 5.95 (5.67)	0.90 - 0.94 (0.92)	G - G (G)	11 - 15 (13)	0.63 - 0.74 (0.68)	M – G (M)
151513	EA	Potwell Tributary	SU 62682 08382	2008 (1)	6.97	1.00	A	50.00	1.01	A	5.22	0.94	G	33	1.18	H
101021	EA	Potwell Tributary	SU 64312 08403	2008 (1)	6.88	0.98	B	50.00	1.01	A	5.15	0.92	G	30	1.12	H
44280	EA/Southern Water	Potwell Tributary	SU 64970 07600	1995 to 2014 (33)	6.00 - 7.33 (6.79)	0.87 - 1.04 (0.97)	B – A (B)	30.00 - 59.46 (43.81)	0.59 - 1.19 (0.90)	B – A (A)	3.71 - 5.33 (4.54)	0.68 - 0.92 (0.81)	P - G (M)	12 - 24 (18)	0.43 - 0.85 (0.65)	B – H (M)
202285	EA	Potwell Tributary	SU 65216 08974	2021 to 2022 (4)	6.39 - 7.17 (6.76)	0.91 - 1.02 (0.97)	B – A (B)	33.33 - 63.27 (46.52)	0.68 - 1.29 (1.00)	B – A (A)	4.94 - 5.84 (5.21)	0.89 - 1.06 (0.97)	G - H (G)	21 - 27 (24)	0.80 - 1.02 (0.92)	G – H (H)
84518	EA	Potwell Tributary	SU 66620 07640	2003 to 2012 (18)	5.00 - 6.64 (5.91)	0.69 - 0.90 (0.8)	B – B (B)	12.50 - 33.33 (20.21)	0.22 - 0.54 (0.34)	B – B (B)	2.74 - 4.17 (3.67)	0.45 - 0.69 (0.59)	B - P (P)	11 - 21 (15)	0.44 - 0.84 (0.61)	B – H (M)
149989	EA	Unnamed tributary of Potwell Tributary	SU 66726 08570	2007 (1)	5.80	0.83	B	14.71	0.30	B	4.25	0.78	M	14	0.52	P
149990	EA	Unnamed tributary of Potwell Tributary	SU 66760 08430	2007 (1)	6.00	0.86	B	17.14	0.34	B	3.96	0.71	P	14	0.52	P
149991	EA	Unnamed tributary of Potwell Tributary	SU 66999 08539	2007 (1)	5.00	0.71	B	11.11	0.22	B	3.11	0.56	B	7	0.26	B

3.5 River Meon

3.5.1 The location of the River Meon catchment within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.5.2 The River Meon rises from chalk springs on the South Downs to the south of the small village of East Meon, where it flows north for a short distance before diverting north-west, through the village of West Meon and Warford. It flows roughly due south thereafter, through the South Downs National Park (SDNP) for approximately 34km, under the A32 before flowing through the marshes and wet meadows of the Titchfield Haven SSSI and discharging into the Solent at Hill Head.

3.5.3 The River Meon is a chalk stream and therefore considered a S41 habitat. The whole river is designated as a county Site of Importance for Nature Conservation (SINC) and is considered a Compensatory SAC for its chalk stream vegetation and Atlantic salmon features.

3.5.4 The catchment is relatively narrow (2-4km wide) for most of its area. There are very few tributaries on the main channel south of West Meon and the chalk nature of the catchments means that many tributary valleys are seasonally active (winterbournes).

3.5.5 The River Meon WFD water body (GB107042016640) is monitored by the EA at the 'R. Meon Wickham' monitoring site and is of 'Moderate' ecological potential due to groundwater abstraction (water industry) adversely affecting flows – the hydrological regime does not support Good. Most biological quality elements are at 'High' or 'Good' status with the exception of fish ('Moderate' status – reason for not achieving 'Good' is not stated).

3.5.6 Eight watercourse crossings are proposed within the River Meon catchment, as detailed in Table 3-12.

Table 3-12 Meon catchment watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
COMA_WCX_G_001	Unnamed ditch	Ordinary Watercourse Field drain	Temporary construction compound G-1 and G-2
OPT1_WCX_G_003	River Meon	Main River	Trenchless
OPT1_WCX_G_004	Unnamed tributary of the River Meon	Main River Hydrologically connected to the River Meon	Trenchless
OPT1_WCX_G_005	Unnamed tributary of the River Meon	Main River Hydrologically connected to the River Meon	Trenchless

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
ALTE_WCX_G_006	Unnamed watercourse	Ordinary Watercourse Linear drainage channel	Open cut, alternative to G_008
OPT1_WCX_G_008	Unnamed watercourse	Ordinary Watercourse Linear drainage channel	Open cut
OPT1_WCX_G_010	River Meon	Main River	Trenchless
OPT1_WCX_G_011	Unnamed tributary of the River Meon	Ordinary Watercourse Hydrologically connected to the River Meon	Trenchless

Aquatic habitat walkover

3.5.7 One habitat walkover survey was undertaken on the River Meon in 2022, namely AW33 downstream of the Order Limits.

3.5.8 The river reach defined as AW33 is a short approximately 1.8km reach of the main river. The normal operation average flow velocity was estimated to be 0.15-0.5m/s and dominant substrate types were cobble, gravel and sand with some marginal silt deposits considered suitable for juvenile lamprey species. The surrounding land use was predominantly greenfield and a strip of woodland is maintained along the riverbanks, providing dappled shade. In more open areas, dense stands of the INNS Himalayan balsam were observed.

3.5.9 Instream habitat was diverse and comprised predominantly of run and glide throughout the reach, with the occasional riffle; considered to be suitable salmonid fry habitat.

3.5.10 Detailed habitat survey results are given in Annex A and Annex B.

Fish

Desk study

3.5.11 EA NFPD fish data are available from six monitoring sites in the River Meon desk study area, dating between 2001 and 2023. All surveys were completed utilising a 100m single run methodology.

3.5.12 Mislingford Beat, is located at NGR SU 58548 13883 adjacent to Bishops Wood. Northfield Farm (NGR SU 58049 12309) and Wickham Gardens (NGR SU 57358 11376) are located upstream and downstream of the Order Limits, with the most recent data from 2017.

3.5.13 St Clair's Farm (NGR SU 60568 15462) and Holywell (NGR SU 59536 14415) are located in the upper reaches of the desk study area to the north of Soberton Heath, where they are bordered by several areas of designated ancient woodland.

3.5.14 The following species were recorded in the desk study area of the River Meon between 2001 and 2023:

1. Fish species of conservation importance: Brown/sea trout (S41 species), bullhead (Annex II species), European eel (S41 species), brook lamprey *Lampetra planeri* (Annex II and S41 species), Atlantic salmon (Annex II and S41 species; recorded at Wickham Gardens only in 2011).
2. Common fish assemblage species: Chub, three-spined stickleback, minnow, grayling *Thymallus thymallus*.

Field survey

3.5.15 One fish survey was undertaken for the purposes of the Proposed Development in the Meon catchment in October 2022: a three-run catch-depletion survey near the EA monitoring site at 4274 Northfields Farm (actual location at NGR SU 5806 1237).

3.5.16 Five fish species were recorded, namely:

1. Fish species of conservation importance: Brown/sea trout (S41 species), bullhead (Annex II species), European eel (S41 species)
2. Common fish assemblage species: Minnow, chub

3.5.17 The total number of fish captured was 189, equating to a density of 47.93 individuals per 100m² of watercourse. Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.5.18 Macrophyte survey data were available from the EA BIOSYS database at several locations throughout the River Meon catchment. No species of conservation importance were identified in the records. The INNS Himalayan balsam, American snapdragon *Antirrhinum majus* and least duckweed have been recorded.

3.5.19 Several macrophyte INNS were identified in HBIC data, including orange balsam *Impatiens capensis*, Canadian pondweed *Elodea canadensis* and New Zealand pigmyweed *Crassula helmsii*.

Field survey

3.5.20 A total of ten LEAFPACS2 scoring taxa and 11 additional taxa were recorded across two survey sites on the River Meon. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-13.

3.5.21 Both survey sites on the River Meon were found to have low diversity and species richness, with an NTAXA EQR of 0.42 and four scoring taxa observed. RMNI EQRs were high, at 0.92 and 0.94 for Meon_09 and Meon_05, respectively. The ALG

was low across the field survey area. Filamentous green algae cover for both sites was 3.8%, resulting in an ALG EQR of 0.75.

3.5.22 The indicative WFD status classifications for macrophytes in the River Meon field survey area was 'Good' for both Meon_05 and Meon_09.

3.5.23 Himalayan balsam was the only INNS identified within the field survey area and was found at both Meon_05 and Meon_09.

Table 3-13 River Meon catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	Status class
River Meon (Meon_05)	7.06	4	3	3.8	0.94	0.42	0.58	0.75	0.76	Good
River Meon (Meon_09)	7.10	4	3	3.8	0.91	0.42	0.58	0.75	0.75	Good

Phytobenthos

3.5.24 Phytobenthos survey data collected between 2003 and 2024 were available for two EA monitoring sites the River Meon catchment.

3.5.25 Phytobenthos surveys were undertaken at two sites in the River Meon catchment for the Proposed Development, an unnamed tributary of the River Meon and the River Meon.

3.5.26 A summary of the EA survey data, along with the recently surveyed sites as part of this investigation have been presented below in Table 3-14 along with the relevant indices. Full species lists are provided in Annex E.

Table 3-14 River Meon catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
83159	River Meon	SU 56570 10654	EA	2008 (1)	69.62	0.59	M
83160	River Meon	SU 56490 10639	Southern Water/EA	2008 to 2023 (3)	62.15 - 69.77 (67.09)	0.61 - 0.76 (0.66)	G
R11	Tributary of River Meon	SU 57125 11146	Southern Water	2022 to 2023 (2)	56.41 - 64.38 (60.39)	0.66 - 0.81 (0.74)	G – H (H)

White-clawed crayfish

Desk study

3.5.27 The desk study did not identify any recent white-clawed crayfish records for the River Wallington catchment. A catchment-wide study from 1997 indicated the absence of white-clawed crayfish in the River Meon catchment [42].

3.5.28 HBIC returned a single record of the INNS signal crayfish from 2011, although this record is outside of the study area, south of the M27 motorway at the EA Site 107950 Behind Silver Springs.

Field survey

3.5.29 Two white-clawed crayfish surveys were undertaken in the Meon catchment for the purposes of the Proposed Development, namely WCC_08 at NGR SU 56022 10173 and WCC_09 at NGR SU 58902 14103.

3.5.30 WCC_08 is a treelined section of the River Meon with natural pool-riffle sequence; abundant INNS Himalayan balsam was identified. The habitat assessment indicated good crayfish habitat throughout, particularly the roots of alder trees. The eDNA sample was collected from three locations: the side of the managed water, the riffle section and the pool section.

3.5.31 No white-clawed crayfish presence was identified at WCC_08 through manual search or eDNA sampling. For WCC_09, there was no access to the watercourse at the time of survey. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.5.32 Macroinvertebrate survey data collected between 2003 and 2024 were available for three EA monitoring sites in the River Meon catchment within the desk study area.

3.5.33 Standard macroinvertebrate surveys were undertaken at two sites in the River Meon catchment between 2022 and 2023 for the Proposed Development. One of the survey sites was located on the River Meon (Site 83160) and the other on an unnamed tributary of the River Meon (Site R11).

3.5.34 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-15. Full taxa lists are provided in Annex G.

3.5.35 Six Nationally Scarce species were identified in records for the River Meon catchment, including a riffle beetle *Riolus subviolaceus*, two species of caddisfly *Allotrichia pallicornis* and *Notidobia ciliaris*, the purple dun mayfly, a ram's horn snail *Gyraulus laevis* and the blue-winged olive mayfly *Baetis atrebatinus*. Two Nationally Notable species were identified, a trumpet-net caddisfly *Tinodes unicolor* and banded general soldier fly *Stratiomys potamida*. One Nationally Rare species was identified, a mayfly *Caenis pseudorivulorum*.

3.5.36 The southern damselfly *Coenagrion mercuriale* is a cited feature of the River Meon Compensatory SAC; however, the species was not recorded during surveys undertaken for the Proposed Development and no existing records were identified. Three INNS were recorded in the River Meon catchment between 2003 and 2023,

including Jenkins' spire snail, an amphipod shrimp *Crangonyx pseudogracilis/floridanus* and the brown planarian flatworm.

3.5.37 One site (WCX10) was surveyed within the River Meon catchment in spring 2024 using the methodology devised for temporary watercourses. The DEHLI score for this site was calculated as 5.29 and the MIS-index score was calculated as 6.90. No species of conservation importance were identified in the sample. The dominant species was the amphipod shrimp *Gammarus pulex*, which is associated with lotic environments rather than temporary watercourses.

Table 3-15 River Meon catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
R11	Southern Water	Unnamed tributary of River Meon	SU 56490 10639	2022 to 2023 (2)	6.50 - 7.75 (7.13)	0.95 - 1.12 (1.03)	B – A (A)	13.33 - 29.41 (21.37)	0.30 - 0.63 (0.47)	B – B (B)	4.64 - 5.67 (5.15)	0.87 - 1.07 (0.97)	G – H (G)	11 - 13 (12)	0.39 - 0.49 (0.44)	B – P (B)
83160	Southern Water	River Meon	SU 56582 10663	2022 to 2023 (2)	7.25 - 8.10 (7.68)	1.06 - 1.17 (1.12)	A – A (A)	36.84 - 80.00 (58.42)	0.87 - 1.73 (1.30)	A – A (A)	5.48 - 5.63 (5.56)	1.04 - 1.06 (1.05)	H – H (H)	10 - 12 (11)	0.36 - 0.43 (0.39)	B – B (B)
152818	EA	River Meon	SU 57156 11280	2005 (1)	6.57	0.95	A	32.56	0.70	A	4.73	0.90	G	26	0.86	H
152817	EA	River Meon	SU 57312 11411	2005 (1)	6.47	0.93	B	38.71	0.84	A	4.38	0.83	M	19	0.63	M
83417	EA	River Meon	SU 58430 13840	2003 to 2022 (31)	7.18 - 8.42 (7.63)	1.04 - 1.20 (1.1)	A – A (A)	54.32 - 80.77 (65.3)	1.13 - 1.67 (1.40)	A – A (A)	5.54 - 6.95 (6.2)	1.04 - 1.28 (1.16)	H – H (H)	21 - 44 (30)	0.72 - 1.50 (1.03)	G – H (H)

3.6 South East coastal catchment (below Moors Stream)

3.6.1 The location of the South East (SE) coastal catchment (below Moors Stream) within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.6.2 After the Proposed Development leaves the River Meon catchment, it crosses an area of onshore coastal catchment south of Waltham Chase and Shirrell Heath that drains to Southampton Water. The north and eastern parts of the coastal catchment are mostly rural with notable areas of woodland south of Shedfield. South of the M27 motorway the catchment is mostly urban. In the north and eastern parts of the catchment, the Proposed Development crosses Curbridge Creek and Shawford's Lake Stream. Curbridge Creek, (Ordinary Watercourse), rises immediately above the Order Limits near A334 Winchester Road and drains a large area of the eastern catchment. Shawford's Lake (Ordinary Watercourse) drains a large area of the coastal catchment and joins the Main River Hamble at Curbridge.

3.6.3 Valley floors in the SE coastal catchment are constrained in extent by steep topography. Planforms on many of the small watercourses are meandering, most notably in the northern and eastern areas of the catchment.

3.6.4 Five watercourse crossings are proposed within the South East coastal catchment, as detailed in Table 3-16.

Table 3-16 South East coastal catchment (below Moors Stream) watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_H_001	Curbridge Creek	Ordinary Watercourse Tributary of the River Hamble	Open cut
OPT1_WCX_J_001	Unnamed ditch	Ordinary Watercourse Ditch Upstream of Shawford's Lake Stream	Open cut
OPT1_WCX_J_002	Upstream drain west of Little Bull Lane	Ordinary Watercourse Upstream of Shawford's Lake Stream	Open cut
OPT1_WCX_J_004	Upstream tributary of Shawford's Lake stream	Ordinary Watercourse Upstream of Shawford's Lake Stream	Open cut
OPT1_WCX_J_005	Upstream tributary of Shawford's Lake stream	Ordinary Watercourse Upstream of Shawford's Lake Stream	Open cut

Aquatic habitat walkover

3.6.5 One habitat walkover survey was undertaken on Curbridge Creek in the SE coastal catchment (below Moors Stream) in 2022, namely AW34.

3.6.6 The watercourse defined as AW34 is a short approximately 1.6km reach of an upper tributary of Curbridge Creek. At the time of the survey, the watercourse was largely dry in the upper reaches and overgrown with herbaceous plants and tall grasses. Downstream of the road culvert for Pricketts Hill, the watercourse was wetted, though no perceptible flow was observed. The river reach is bordered by agricultural farmland, hedgerow and low-lying herbaceous plants and grasses, with some broad-leafed tree cover. Where visible, the substrate was comprised of clay, cobble and gravel.

3.6.7 Two habitat walkover surveys were undertaken on Shawford's Lake Stream in the SE coastal catchment (below Moors Stream), namely AW9 and AW35.

3.6.8 The river reach AW9 is located near the headwaters of the short (approximately 5km) tributary of Shawfords Lake. The watercourse rises to the west of the B2177 (Winchester Road), where it flows roughly south-west, through Meon Valley Golf and Country Club, before its confluence with the Main River Hamble to the east of the village of Curbridge.

3.6.9 At the time of the survey, the watercourse was observed to be dry or comprised of isolated pools or reaches of no perceptible flow. The river reach, through the Meon Valley Golf and Country Club was heavily modified, with boarded riverbanks impeding the growth of emergent marginal plants. Where wetted, river depths were 0.1-0.25m and the dominant substrates were cobble, gravel and silt.

3.6.10 The river reach defined as AW35 is a short approximately 300m reach of Shawford's Lake Stream - a small tributary that discharges into the Main River Hamble. The watercourse is a small drainage ditch, bordered by broad leafed trees and low-lying herbaceous plants and grasses. The watercourse was dry at the time of survey.

3.6.11 Detailed habitat survey results and maps are given in Annex A and Annex B.

Fish

Desk study

3.6.12 There are currently no EA monitoring sites for fish on Curbridge Creek or Shawford's Lane Stream, but NFPD data from 6275 Barn Farm (NGR SU 53148 11964) and 42263 Biddenfield Lane (NGR SU 55556 12564) on the downstream Shedfield Stream is available from 2002 to 2012 and considered a suitable proxy of potential presence, given the hydrological connection.

3.6.13 The 100m single catch surveys identified the following fish species in this tributary in this timeframe: European eel (S41 species), brown/sea trout (S41 species), brook lamprey (Annex II and S41 species), bullhead (Annex II species).

Field survey

3.6.14 One fish survey was undertaken on Shawford's Lake Stream for the purposes of the Proposed Development, at Site RSK4 (NGR SU 5529 1414).

3.6.15 The three-run catch-depletion survey at Site RSK4 on 5 August 2022 recorded only one species, three-spined stickleback with an abundance of 394 individuals,

equating to a density of 383.77 individuals per 100m² of watercourse. Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.6.16 No existing macrophyte records were available from either the EA or HBIC for the SE coastal catchment.

Field survey

3.6.17 Two macrophyte surveys were undertaken within the SE coastal catchment for the Proposed Development. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-17.

Table 3-17 South East coastal catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	Status class
Shawfords Lake Stream (Hamble_22)	7.34	2	1	0	0.50	0.10	0.23	1.00	0.36	Poor
Curbridge Creek (Hamble_23)	0	0	0	0	-	-	-	-	-	Unclassifiable

Phytobenthos

3.6.18 Within the 2km desk study area in the SE coastal catchment, no historical phytobenthos monitoring sites were available through the EA Ecology and Fish Data Explorer between 2003 and 2023.

3.6.19 Three sites were surveyed in the SE Coastal catchment for the Proposed Development between 2022 and 2023.

3.6.20 The survey details are summarised in Table 3-18 along with the relevant indices. Full species lists are provided in Annex E.

Table 3-18 South East coastal catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
R1	Unnamed Tributary of Curbridge Creek	SU 57315 13230	Southern Water	2023 (2)	67.09 - 82.06 (74.58)	0.32 - 0.59 (0.46)	P - M (M)
R7	Curbridge Creek	SU 57162 13634	Southern Water	2022 to 2023 (3)	64.96 - 78.45 (70.87)	0.39 - 0.64 (0.53)	P - G (M)
EA79720	Shawfords Lake (stream)	SU 55740 14290	Southern Water	2022 to 2023 (4)	56.1 - 74.27 (68.74)	0.48 - 0.82 (0.59)	M – H (G)

White-clawed crayfish

Desk study

3.6.21 No records for white-clawed crayfish were found for, or within 2km of the watercourses in the SE coastal catchment in the desk study data.

Field survey

3.6.22 One white-clawed crayfish survey was attempted in the SE coastal catchment (below Moors Stream) catchment for the purposes of the Proposed Development, namely WCC_07 in the upstream extents of Shawford's Lake Stream (NGR SU 55894 14414).

3.6.23 The conditions at this survey location indicated a dry survey reach, unsuitable for habitat assessment or manual search. Thus, no white-clawed crayfish presence was identified through habitat assessments or eDNA sampling. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.6.24 Macroinvertebrate survey data collected between 2003 and 2024 were available for one EA monitoring site in the SE coastal catchment within the desk study area.

3.6.25 Standard macroinvertebrate surveys were undertaken at three sites in the SE coastal catchment between 2022 and 2023 for the Proposed Development. One of the survey sites was located on a tributary of Curbridge Creek (Site R1), one site was located on Curbridge Creek (Site R7), and one site was located on Shawfords Lake Ditch (Site 79720).

3.6.26 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-19. Full taxa lists are provided in Annex G.

3.6.27 No macroinvertebrate species of conservation importance were identified in the samples from the SE coastal catchment. The INNS Jenkins' spire snail was identified in samples collected from the SE coastal catchment between 2022 and 2023.

Five watercourse sites within the SE coastal catchment were surveyed using the temporary watercourses methodology in 2024. The DEHLI and the MIS-index scores are presented in Table 3-20. No species of conservation importance were identified in any of the samples. The dominant species across all sampling sites was the amphipod shrimp *Gammarus pulex*, which is associated with lotic environments rather than temporary watercourses.

Table 3-19 South East coastal catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
79720	Southern Water	Shawfords Lake Ditch	SU 55740 14290	2022 to 2023 (4)	6.00 - 7.38 (6.8)	0.87 - 1.04 (0.97)	B – A (B)	18.18 - 58.33 (32.17)	0.40 - 1.18 (0.66)	B – A (B)	2.35 - 4.53 (3.86)	0.08 - 0.35 (0.26)	B – M (P)	2 - 9 (7)	0.08 - 0.35 (0.26)	B – B (B)
41883	EA	Tributary of Shawfords Lake	SU 56270 14870	2007 (1)	5.13	0.71	B	6.38	0.11	B	3.19	0.72	B	18	0.72	G
R7	Southern Water	Curbridge Creek	SU 57162 13634	2022 to 2023 (4)	6.80 - 7.60 (7.18)	0.93 - 1.04 (0.98)	B – A (B)	16.67 - 41.67 (29.17)	0.27 - 0.65 (0.46)	B – B (B)	4.37 - 5.98 (4.98)	0.36 - 0.46 (0.41)	M – G (M)	7 - 10 (9)	0.36 - 0.46 (0.41)	B – B (B)
R1	Southern Water	Tributary of Curbridge Creek	SU 57315 13230	2023 (2)	6.50 - 7.33 (6.92)	0.88 - 1.01 (0.94)	B – A (B)	20.00 - 30.00 (25)	0.32 - 0.53 (0.42)	B – B (B)	3.58 - 3.78 (3.68)	0.20 - 0.24 (0.22)	P – P (P)	5 - 6 (6)	0.20 - 0.24 (0.22)	B – B (B)

Table 3-20 South East coastal catchment temporary watercourses macroinvertebrate survey details and biotic indices

Site ID	Watercourse	NGR	Spring survey date	Spring DEHLI score	Spring MIS-index score	Autumn survey date	Autumn DEHLI score	Autumn MIS-index score
WCX6	Old Mill Dam Stream	SU 70406 06263	20 May2024	3.25	N/A	05/09/2024	3.50	-2.46
WCX11	Tributary of the River Hamble	SU 57032 12898	21May2024	4.75	8.60	No autumn survey – land access refused		
WCX12	Drain upstream of Shawfords Lake	SU 56051 14243	No spring survey – land access refused			No autumn survey – land access refused		
WCX13	Drain upstream of Shawfords Lake (south of Little Bull Lake)	SU 55918 14447	20May2024	4.71	9.83	05/09/2024	5.11	4.55
WCX14	Drain upstream of Shawfords Lake (west of Little Bull Lake)	SU 55799 14580	20May2024	3.83	2.00	No autumn survey – scoped-out following spring survey		

3.7 Moors Stream

3.7.1 The location of Moors Stream within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.7.2 Moors Stream is a short (2-3km) tributary stream that rises from a number of springs located on the southern slopes of the South Downs, from within the Moors Bishop's Waltham SSSI, south of Bishop's Waltham, and from a number of watercourses that collectively drain the area east of Waltham Chase. Downstream of Bishop's Waltham Moors Stream flows in a relatively steep sided confined valley dominated by mixed farming (grazing and arable). Moors Stream flows into the River Hamble.

3.7.3 The headwater area south of Bishop's Waltham known as 'The Moors' is formed by a number of channels in a marsh environment. The Moors area is an area of semi-natural woodland, fen, grassland and open water designated as a SSSI and is of national importance for its unusual habitat. Headwater channel areas near Swanmore and Waltham Chase appear to have been straightened associated with urban development. The valley floor is narrow but widens towards the confluence with the River Hamble.

3.7.4 Moors Stream WFD water body (GB107042016260) is monitored by the EA at the 'Moors Stream' monitoring site and is of 'Good' ecological status. The majority of the biological quality elements are at 'Good' or 'High' status with the exception of the hydrological regime which does not support Good due to groundwater abstraction (water industry).

3.7.5 No watercourse crossings are currently proposed for the Moors Stream catchment.

Aquatic habitat walkover

3.7.6 No aquatic habitat walkover surveys were undertaken within the Moors Stream catchment for the purposes of the Proposed Development as no watercourse crossings are expected in this catchment.

Fish

Desk study

3.7.7 Historical EA NFPD data was available from one monitoring site at Moors Stream, namely at Lock's Farm, located at NGR SU 55259 16412. Data is available from 2002, where a single run survey identified a single species, brown/sea trout (S41 species) (n = 96).

Field study

3.7.8 No additional fish surveys were undertaken on Moors Stream for the purposes of the Proposed Development as no watercourse crossings are expected in this catchment.

Macrophytes

Desk study

3.7.9 Analysis of EA BIOSYS data returned a single record for macrophyte survey within the Moors Stream catchment from 2013. No INNS or species of conservation interest were recorded.

3.7.10 Macrophyte records were available from HBIC for the catchment, which included the Nationally Scarce fen pondweed *Potamogeton coloratus* and S41 species flat-sedge *Blysmus compressus*. The INNS Himalayan balsam was also identified in the HBIC records.

Field survey

3.7.11 No macrophyte surveys were undertaken within the Moors Stream catchment for the Proposed Development.

Phytobenthos

3.7.12 Within the 2km desk study area in the Moors Stream catchment, data were available for two EA phytobenthos monitoring sites, surveyed between 2003 and 2024.

3.7.13 No phytobenthos surveys were undertaken within the Moors Stream catchment for the Proposed Development.

3.7.14 A summary of the EA survey data is presented below in Table 3-21 along with the relevant indices.

Table 3-21 Moors Stream catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
42933	Moors Stream	SU 54325 16003	EA	2004 (1)	87.66	0.32	P
43196	Moors Stream	SU 54160 15984	EA	2003 to 2010 (6)	65.78 - 86.18 (72.77)	0.34 - 0.84 (0.67)	P – H (G)

White-clawed crayfish

3.7.15 No records for white-clawed crayfish were found for, or within 2km of Moors Stream in the desk study data.

3.7.16 No additional white-clawed crayfish surveys were undertaken in Moors Stream for the purposes of the Proposed Development.

Macroinvertebrates

3.7.17 Macroinvertebrate survey data collected between 2003 and 2024 were available for one EA monitoring site in the Moors Stream catchment within the desk study area.

3.7.18 No macroinvertebrate surveys were undertaken within the Moors Stream catchment for the Proposed Development.

3.7.19 Survey details and biotic indices calculated from the EA monitoring data are summarised in Table 3-22.

3.7.20 Four Nationally Scarce macroinvertebrate species were identified in EA monitoring records for the Moors Stream catchment, including a riffle beetle *Riolus subviolaceus*, two caddisfly *Potamophylax rotundipennis* and *Allotrichia pallicornis*, and a stonefly *Amphinemura standfussi*. One Nationally Notable species of trumpet-net caddisfly *Tinodes unicolor* was also recorded. The INNS Jenkins' spire snail and the amphipod shrimp *Crangonyx pseudogracilis/floridanus* were also identified.

Table 3-22 Moors Stream catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
42933	EA	Moors Stream	SU 54325 16003	2003 to 2023 (21)	7.21 - 8.15 (7.65)	1.06 - 1.20 (1.12)	A – A (A)	50.00 - 78.72 (66.78)	1.20 - 1.84 (1.48)	A – A (A)	5.61 - 6.63 (6.01)	1.05 - 1.32 (1.16)	H – H (H)	14 – 28 (22)	0.54 - 1.07 (0.84)	P – H (H)

3.8 Main River Hamble

3.8.1 The location of the River Hamble catchment within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.8.2 The River Hamble rises to the north of Bishops Waltham, on the outskirts of the SDNP, and is distinct from the Upper Hamble below its confluence from Moors Stream. Several small tributaries meet their confluence south of Botley, after which the river becomes tidal and navigable for approximately 10km, before discharge into Southampton Water and the Solent. The catchment is mainly rural with the main urban areas located in the south of the catchment. Land use is mixed farming and there are notable areas of riparian habitat along the valley floor.

3.8.3 There are several short ordinary watercourses that drain the wider catchment and in the upper catchment the floodplain is crossed by Park Lug, which is the boundary of the medieval deer park.

3.8.4 Downstream of the Order Limits, the reach south of Botley is within the Solent Maritime SAC, designated for its Annex I habitats spartina swards *Spartinion maritimae* and Atlantic salt meadows *Glauco-Puccinellietalia maritimae* and Annex II species Desmoulin's whorl snail *Vertigo moulinsiana*. The River Hamble also falls within the Solent and Southampton Water SPA and Ramsar site at this location.

3.8.5 The Main River Hamble WFD water body (GB107042016250) is monitored by the EA at the 'R.Hamble Durley' monitoring site and is of 'Moderate' ecological status overall. Most biological and physico-chemical quality elements are at 'High' or 'Good' status with the exception of fish and phosphate (both 'Moderate' status – reason for not achieving 'Good' for fish is physical modifications (barriers (ecological continuity)).

3.8.6 One watercourse crossings is proposed within the Main River Hamble catchment, as detailed in Table 3-23.

Table 3-23 Main River Hamble catchment watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_K_002	River Hamble	Main River Located upstream of its confluence with Moors Stream	Trenchless

Aquatic habitat walkover

3.8.7 One habitat walkover survey was undertaken on the River Hamble in 2022, namely AW6. Site AW6 surveyed a reach of the river that spanned the River Hamble in both the Upper Hamble and Main River Hamble water body catchments, above and below the confluence with Moors Stream respectively.

3.8.8 The river reach AW6 covers approximately 3.5km of a tributary of the Main River Hamble and a short reach of the River Hamble itself, which spanned both the Main River Hamble and Upper Hamble water body catchments.

3.8.9 The watercourse rises from a small lake to the north-west of Bishops Waltham and flows roughly south-east for approximately 2km beneath Winters Hill Road, before its confluence with the Main River Hamble to the south of Tangier Farm. The tributary was mostly dry at the time of survey or ponded with little to no perceptible flow observed or limited to isolated pools. Heavy poaching was observed on the reach, downstream of Tangier Lane.

3.8.10 Detailed habitat survey results and maps are provided in Annex A and Annex B.

Fish

Desk study

3.8.11 Historical fish data is available from the EA NFPD at several locations on the Main River Hamble within the 2km study area. The EA monitoring site at 63063 Treefield (NGR SU 54065 15896), was surveyed in 2016 only, but more recent survey data are available for 4278 Durley Mill (NGR SU 52500 15100) and 6272 Frog Mill (NGR SU 52337 14964), both of which are located near Borley Green. Surveys at these sites were undertaken between 2001 and 2021 utilising a single run methodology.

3.8.12 The following fish species were identified in the Main River Hamble from desk study data:

1. Fish species of conservation concern:
    a. Brown/sea trout (S41 species)
    b. Bullhead (Annex II species)
    c. European eel (S41 species)
    d. Brook lamprey (Annex II and S41 species)
2. Common fish assemblage species:
    a. Minnow
    b. Grayling
    c. Three-spined stickleback
    d. Roach
    e. Chub
    f. Dace

Field survey

3.8.13 No additional fish surveys were undertaken on the Main River Hamble for the purposes of the Proposed Development.

Macrophytes

Desk study

3.8.14 No existing macrophyte records were available from the EA for the Main River Hamble catchment.

3.8.15 Data from the HBIC provided several records of the INNS Himalayan balsam from 2008 to 2018 at several locations throughout the catchment, within the 2km study area. The HBIC also provided records of stream water-crowfoot in the upper reaches of Moors Stream.

Field survey

3.8.16 One macrophyte survey was undertaken within the Main River Hamble catchment for the Proposed Development. A total of five LEAFPACS2 scoring taxa were recorded. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-24.

Table 3-24 Main River Hamble catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	Status class
River Hamble (Hamble_01)	7.18	5	5	7.5	0.80	0.62	1.04	0.60	0.67	Good

Phytobenthos

3.8.17 No phytobenthos data were available from the EA for monitoring sites located within the Main River Hamble catchment.

3.8.18 One phytobenthos survey was undertaken within the Main River Hamble catchment for the Proposed Development.

3.8.19 A summary of survey details and biotic indices are presented below in Table 3-25. Species lists are provided in Annex E.

Table 3-25 Main River Hamble catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
EA43139	Main River Hamble	SU 53900 15750	Southern Water	2022 to 2023 (3)	54.89 - 58.05 (56.74)	0.86 - 0.92 (0.88)	H

White-clawed crayfish

Desk study

3.8.20 No historical records of white-clawed crayfish were found for the River Hamble within the desk study area.

Field survey

3.8.21 One white-clawed crayfish survey was undertaken in the Main River Hamble catchment for the purposes of the Proposed Development, namely WCC_06 (NGR SU 54061 15904).

3.8.22 Site WCC_06 is a meandering section of the River Hamble with natural pool-riffle sections. The bordering land uses on both banks were woodland and grassland, set aside for conservation. The substrate within the survey stretch consisted of mainly gravel, with areas of silt deposition.

3.8.23 No white-clawed crayfish presence was identified at WCC_06 through habitat assessment, manual search or eDNA sampling. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.8.24 Macroinvertebrate survey data collected between 2003 and 2024 were available for two EA monitoring sites in the Main River Hamble catchment within the desk study area.

3.8.25 Standard macroinvertebrate surveys were undertaken at two sites in the Main River Hamble catchment in 2022 and 2023 for the Proposed Development. Both survey sites were located on the main stem of the River Hamble (Sites 43139 and 44349). Sites were located to coincide with historical EA monitoring sites.

3.8.26 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-26. Full taxa lists are provided in Annex G.

3.8.1 One Nationally Scarce species, the long-horned soldier fly *Vanoyia tenuicornis*, and one Nationally Notable species, the diving beetle *Nebrioporus depressus*, were identified in the EA macroinvertebrate records for the catchment.

3.8.2 Two INNS were identified in the macroinvertebrate species records for the Main River Hamble catchment: Jenkins' spire snail and an amphipod shrimp *Crangonyx pseudogracilis/floridanus*.

Table 3-26 Main River Hamble catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class
43174	EA	River Hamble	SU 52510 15140	2003 to 2010 (9)	6.80 - 7.27 (7.05)	0.98 - 1.06 (1.03)	B – A (A)	40.00 - 63.04 (51.94)	0.83 - 1.47 (1.14)	A - A (A)	4.93 - 5.76 (5.29)	0.93 - 1.08 (1.02)	G – H (H)	20 – 41 (30)	0.75 - 1.54 (1.12)	G – H (H)
43139	Southern Water	River Hamble	SU 53900 15750	2022 to 2023 (4)	7.00 - 7.38 (7.2)	1.08 - 1.14 (1.1)	A – A (A)	42.86 - 52.63 (47.09)	1.18 - 1.60 (1.36)	A – A (A)	4.34 - 5.56 (5.08)	0.92 - 1.18 (1.04)	G – H (H)	5 – 18 (13)	0.2 - 0.71 (0.49)	B – G (P)
43296	EA	River Hamble	SU 54130 16000	2008 to 2022 (13)	6.00 - 7.35 (6.72)	0.87 - 1.05 (0.97)	B – A (B)	13.04 - 58.14 (36.45)	0.30 - 1.25 (0.78)	B – A (A)	5.61 - 6.63 (6.01)	1.05 - 1.32 (1.16)	H – H (H)	14 – 28 (22)	0.54 - 1.07 (0.84)	P – H (H)
44349	Southern Water	River Hamble	SU 54133 15950	2022 to 2023 (4)	7.33 - 8.20 (7.67)	1.06 - 1.21 (1.13)	A – A (A)	59.26 - 75.00 (67.86)	1.42 - 1.86 (1.60)	A – A (A)	4.73 - 5.98 (5.33)	0.94 - 1.19 (1.03)	G – H (H)	6 – 19 (13)	0.24 - 0.74 (0.49)	B – G (P)

3.9 Upper Hamble

3.9.1 The location of the Upper Hamble within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.9.2 The Upper Hamble drains an area upstream of the confluence of the River Hamble and Moors Stream. There are two primary watercourses: the eastern branch (Main River) drains the ridge of high ground above Bishop's Waltham and there are two lakes which appear to impound the channel in Bishop's Waltham. The western channel (Ordinary Watercourse) flows to the south of Bishop's Waltham from Wintershill before its confluence with the Main River Hamble to the south of Tangier Farm. This channel is also impounded by a lake it its upper course.

3.9.3 In the upper part of the catchment there is a large area of urban development associated with Bishop's Waltham. The rest of the catchment is mainly rural with mixed farming land use – mainly arable below Bishop's Waltham and grazing in headwater areas.

3.9.4 The Upper Hamble WFD water body (GB107042016280) is monitored by the EA at the 'R.Hamble U/S Brooklands Farm' monitoring site and is of 'Moderate' ecological status overall. Fish status and phosphate status are both Moderate, and the dissolved oxygen status is Poor. Water body pressures are a result of diffuse pollution from riparian or in-river activities (including bankside erosion) associated with agriculture. Physical modifications also affect fish (barriers, land-use (improved grassland)).

3.9.5 Two watercourse crossings are proposed within the Upper Hamble catchment, as detailed in Table 3-27.

Table 3-27 Upper Hamble catchment watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_K_008	Wintershill Tributary	Ordinary Watercourse Tributary of the River Hamble Watercourse culverted under minor road at crossing point	Not a true watercourse crossing but indicates where the Order Limits extend over an existing watercourse
OPT1_WCX_K_001	Unnamed drain under existing access road at Winters Hill	Ordinary Watercourse Potentially hydrologically connected to the River Hamble	Open cut

Aquatic habitat walkover

3.9.6 One habitat walkover survey was undertaken on the River Hamble in 2022, namely AW6.

3.9.7 Site AW6 surveyed a reach of the river that spanned the River Hamble in both the Upper Hamble and Main River Hamble water body catchments, above and below the confluence with Moors Stream respectively.

3.9.8 The river reach AW6 covers approximately 3.5km of a tributary of the Main River Hamble and a short reach of the River Hamble itself, which spanned both the Main River Hamble and Upper Hamble water body catchments.

3.9.9 The watercourse rises from a small lake to the north-west of Bishops Waltham and flows roughly south-east for approximately 2km beneath Winters Hill Road, before its confluence with the Main River Hamble to the south of Tangier Farm. The tributary was mostly dry at the time of survey or ponded with little to no perceptible flow observed or limited to isolated pools. Heavy poaching was observed on the reach, downstream of Tangier Lane.

3.9.10 Detailed habitat survey results and maps are provided in Annex A and Annex B.

Fish

Desk study

3.9.11 Historical fish data is available from the EA NFPD at several locations on the Upper Hamble within the 2km desk study area. Single-catch data is available from Site 30221 Thickets Farm (NGR SU 54890 17040) in 2008 and 2016, and from single semi-quantitative electric fishing surveys at Site 30223 Tangier Farm (NGR SU 53900 17300) in 2008, 2013 and more recently in 2021.

3.9.12 The following fish species have been identified in the Upper Hamble in the desk study data:

1. Fish species of conservation concern: Brown/sea trout (S41 species), bullhead (Annex II species), European eel (S41 species), brook lamprey (Annex II and S41 species).
2. Common fish assemblage species: Three-spined stickleback.

Field survey

3.9.13 The EA monitoring site at Tangier Farm was surveyed in on 4 August 2022 for the Proposed Development. A three-run catch-depletion survey was completed and recorded the presence of four species, namely:

1. Fish species of conservation concern: Brown/sea trout (S41), bullhead (Annex II species), lamprey sp. (Annex II species and S41)
2. Common fish assemblage species: Three-spined stickleback.
3. The total number of fish captured was 99, equating to an estimated density of 75.2 individuals per 100m² of watercourse. Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.9.14 No EA macrophyte monitoring data were available for the period 2003 to 2024 for the Upper Hamble catchment within the desk study area.

3.9.15 The HBIC data search returned several records of the INNS Himalayan balsam in the upper reaches of a tributary near Winters Hill Road in 2009 and 2018. In addition, the INNS New Zealand pigmyweed was recorded in 2017.

Field survey

3.9.16 Macrophyte surveys were undertaken at three sites within the Upper Hamble catchment between 2022 and 2023 for the Proposed Development. Species lists are provided in Annex D. The indices derived from LEAFPACS2 are presented in Table 3-28.

Table 3-28 Upper Hamble catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final Score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	WFD Class
Hamble_6,7, 8,9,10	7.53	2	2	7.5	0.63	0.16	0.44	0.60	0.48	Moderate
Hamble_18	7.79	5	4	7.5	0.49	0.70	0.90	0.60	0.49	Moderate
Hamble_28	Data currently unavailable									Good

Phytobenthos

3.9.17 No phytobenthos data were available from the EA for monitoring sites located within the Upper Hamble catchment.

3.9.18 Two phytobenthos surveys were undertaken on Wintershill Tributary within the Upper Hamble catchment for the Proposed Development.

3.9.19 A summary of survey details and biotic indices are presented below in Table 3-29. Species lists are provided in Annex E.

Table 3-29 Upper Hamble catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
EA82198	Wintershill Tributary	SU 54258 16810	Southern Water	2022 to 2023 (4)	54.78 - 71.65 (62.17)	0.6 - 0.96 (0.8)	M - H (H)
EA79525	Wintershill Tributary	SU 53546 18061	Southern Water	2022 to 2023 (3)	61.85 - 65.06 (63.95)	0.6 - 0.65 (0.62)	M - G (G)

White-clawed crayfish

Desk study

3.9.20 No historical records of white-clawed crayfish were identified for the Upper Hamble catchment within the desk study area.

Field survey

3.9.21 One white-clawed crayfish survey was attempted in the Upper Hamble catchment for the purposes of the Proposed Development, namely WCC_05 (NGR SU 54165 17130).

3.9.22 The habitat at WCC_05 was indicated as unsuitable for white-clawed crayfish and no manual search or eDNA sampling was possible. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.9.23 Macroinvertebrate survey data collected between 2003 and 2024 were available for five EA monitoring site in the Upper Hamble catchment within the desk study area.

3.9.24 Standard macroinvertebrate surveys were undertaken at two sites on in the Upper Hamble catchment between 2022 and 2023 for the Proposed Development. Both survey sites were located on the Wintershill Tributary of the Upper Hamble (Sites 79525 and 82198). Site 82198 was located to coincide with one of the EA monitoring sites.

3.9.25 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-30. Full taxa lists are provided in Annex G.

3.9.26 Five Nationally Scare species were identified between EA macroinvertebrate monitoring data and Proposed Development survey results, including a true fly

Dixa maculata, two caddisfly *Potamophylax rotundipennis* and *Limnephilus bipunctatus*, red-legged moss beetle *Hydraena rufipes*, and nut orb mussel *Sphaerium rivicola*.

3.9.27 The INNS Jenkins' spire snail was identified in samples collected from the Upper Hamble catchment between 2022 and 2023.

3.9.28 One site (WCX16) was surveyed within the Upper Hamble catchment in spring 2024 using the methodology devised for temporary watercourses. The DEHLI score for this site was calculated as 3.25 and the MIS-index score was calculated as 0.00. No species of conservation importance were identified in the sample. The dominant species in the sample was water hoglouse *Asellus aquaticus*, a generalist species. A species of pronged-gilled mayfly *Habrophlebia fusca* was also relatively abundant. The species is associated with pools and marginal areas (lentic areas).

Table 3-30 Upper Hamble catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
82199	EA	Upper Hamble	SU 54268 16806	2003 to 2010 (7)	6.59 - 7.83 (7.23)	0.95 - 1.10 (1.03)	A – A (A)	37.21 - 71.74 (55.5)	0.81 - 1.40 (1.14)	A – A (A)	5.06 - 5.73 (5.39)	0.89 - 1.05 (0.98)	G – H (H)	22 - 28 (24)	0.83 - 1.07 (0.93)	H – H (H)
152830	EA	Upper Hamble	SU 55438 17779	2009 to 2010 (3)	5.38 - 5.80 (5.56)	0.77 - 0.81 (0.78)	B – B (B)	14.29 - 21.74 (17.06)	0.28 - 0.41 (0.33)	B – B (B)	3.91 - 4.67 (4.26)	0.68 - 0.81 (0.75)	P – M (M)	13 - 19 (16)	0.50 - 0.75 (0.61)	P – G (M)
81918	EA	Upper Hamble	SU 55160 17550	2009 to 2010 (2)	5.45 - 5.63 (5.54)	0.81 - 0.84 (0.82)	B – B (B)	3.7 - 5.26 (4.48)	0.09 - 0.13 (0.11)	B – B (B)	3.30 - 3.43 (3.37)	0.64 - 0.66 (0.65)	P – P (P)	10 - 13 (12)	0.38 - 0.49 (0.44)	B – P (B)
79196	EA	Upper Hamble	SU 55100 17350	2009 to 2010 (2)	5.67 - 6.08 (5.88)	0.77 - 0.83 (0.80)	B – B (B)	10.71 - 11.11 (10.91)	0.17 - 0.18 (0.17)	B – B (B)	3.98 - 4.19 (4.09)	0.63 - 0.66 (0.64)	P – P (P)	5 - 17 (11)	0.25 - 0.84 (0.55)	B – H (P)
79525	Southern Water	Wintershill Trib	SU 53546 18061	2022 to 2023 (3)	6.00 - 6.40 (6.18)	0.86 - 0.90 (0.88)	B – B (B)	16.67	0.32	B	3.00 - 3.84 (3.44)	0.55 - 0.67 (0.62)	B – P (P)	7 - 8 (7)	0.29 - 0.35 (0.31)	B – B (B)
82198	Southern Water/EA	Wintershill Trib	SU 54258 16810	2003 to 2023 (11)	6.64 - 7.56 (7.14)	0.94 - 1.07 (1.02)	B – A (A)	13.33 - 69.44 (47.94)	0.26 - 1.38 (1.00)	B – A (A)	3.20 - 5.67 (4.79)	0.57 - 1.01 (0.88)	B – H (G)	4 - 28 (17)	0.16 - 1.09 (0.66)	B – H (M)

3.10 Horton Heath Stream

3.10.1 The location of Horton Heath Stream within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.10.2 Horton Heath Stream rises at Lower Upham and flows in a generally southerly direction before joining the Main River Hamble catchment. The channel is a Main River within the Order Limits and as far north as Alma Lane. There are several tributaries that join the Main River, typically draining southern and eastern areas of the catchment. Although the valley floor is mainly rural with notable areas of riparian woodland in the southern part of the catchment near the confluence with the River Hamble, there are significant areas of developed (urban) land use in parts of the catchments. These include Lower Upham, Durley Street, Durley, Boorley Green, Horton Heath and Fair Oak.

3.10.3 Floodplain is mainly farmland, and the channel appears to have been artificially straightened especially between Lower Upham, where the watercourses rise, and Horton Heath. Downstream of Horton Heath the floodplain is very narrow as it is constrained by steep topography. As the channel flows around Boorley Green and downstream to the confluence with the Main River Hamble catchment, it changes to a well-developed meandering planform set within an area of riparian woodland.

3.10.4 The Horton Heath Stream WFD water body (GB107042016270) is monitored by the EA at the 'Ford Lake' monitoring site and is designated as a heavily modified water body of 'Good' ecological potential overall. With the exception of the water body's fish status (Moderate), all ecological classification items are at Good or High status. The Moderate classification for fish is due to suspect data (no sector being responsible).

3.10.5 Four watercourse crossings are proposed within the Horton Heath catchment, as detailed in Table 3-31.

Table 3-31 Horton Heath Stream watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_K_003	Unnamed ditch	Ordinary Watercourse Roadside ditch	Open cut
OPT1_WCX_K_005	Unnamed drain upstream of Horton Heath Stream east of Alma Lane	Ordinary Watercourse Upstream of Horton Heath Stream	Open cut
OPT1_WCX_K_006	Unnamed drain upstream of the Horton Heath Stream east of Scivier's Lane	Ordinary Watercourse Upstream of Horton Heath Stream	Open cut
OPT1_WCX_K_007	Unnamed ditch	Ordinary Watercourse Ditch Upstream of Horton Heath Stream	Open cut

Aquatic habitat walkover

3.10.6 Two habitat walkover surveys were undertaken on Horton Heath Stream in 2022, namely AW5 and AW40.

3.10.7 The river reach defined as AW5 is an approximately 700m reach of Horton Heath Stream. The watercourse was largely inaccessible, due to dense overgrown vegetation. Where observations were possible to the west of Alma Lane, the watercourse was observed to be dry at the time of survey and substrate comprised of silt and clay. The watercourse surveyed at AW5 is classified as an agricultural field drain and is therefore classified as a 'dry channel or temporary watercourse', likely drying frequently under low flow conditions.

3.10.8 The river reach defined as AW40 is an approximately 1.5km reach of a tributary of Horton Heath Stream. The watercourse is a small drainage ditch, bordered by arable farmland and pasture. The water levels within the watercourse were notably low at the time of survey with little to no perceptible flow or dry riverbed. River substrate was dominated by silt, with interspersed gravel substrate and, where wetted, water depths of 0.05-0.1m were recorded. The INNS floating pennywort *Hydrocotyle ranunculoides* was observed where the watercourse flows though several ponds near Scivier's Lane.

3.10.9 Detailed habitat survey results and maps are provided in Annex A and Annex B.

Fish

Desk study

3.10.10 There are no current or historical EA fish monitoring sites on Horton Heath Stream within the 2km desk study area.

3.10.11 In the absence of any relevant data, it was decided to increase the desk study area to include data from Site 6273 Cockpit Farm (NGR SU 50289 17491) and Site 43541 Holme Farm (NGR SU 50056 17179) as a proxy for the defined desk study, located approximately 3km downstream of the Order Limits. Data from four surveys is available from these sites in 2002, 2012, 2016 and 2024. The following fish species were recorded as present in Horton Heath Stream in the (extended) desk study data:

1. Fish species of conservation concern: Brown/sea trout (S41 species), bullhead (Annex II species), European eel (S41 species)
2. Common fish assemblage species: Minnow

Field survey

3.10.12 No additional fish surveys were undertaken on Horton Heath Stream for the purposes of the Proposed Development.

Macrophytes

Desk study

3.10.13 No macrophyte survey data were available for this watercourse (EA BIOSYS), however the HBIC data search returned records of tubular water-dropwort *Oenanthe fistulosa* from 1998 and 2002.

Phytobenthos

3.10.14 Within the 2km desk study area, a total of six historical phytobenthos sample sites were made available through the EA catchment data explorer between 2003 and 2023.

3.10.15 Two phytobenthos surveys were undertaken within the Moors Stream catchment for the Proposed Development between 2022 and 2023.

3.10.16 A summary of survey details and biotic indices are presented below in Table 3-32. Species lists are provided in Annex E.

Table 3-32 Horton Heath Stream catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
EA79516	Horton Heath Stream	SU 51940 19150	Southern Water	2022 to 2023 (4)	38.89 - 47.78 (43.41)	1.08 - 1.26 (1.17)	H
R6	Unnamed Tributary of Horton Heath Stream	SU 52252 18953	Southern Water	2022 to 2023 (3)	55.36 - 58.95 (57.25)	0.96 - 1.05 (1.00)	H

White-clawed crayfish

3.10.17 No historical records of white-clawed crayfish were found for the Horton Heath Stream catchment within the desk study area.

3.10.18 No additional white-clawed crayfish surveys or sampling were undertaken in the Horton Heath catchment for the purposes of the Proposed Development.

Macroinvertebrates

3.10.19 Macroinvertebrate survey data collected between 2003 and 2024 were available for one EA monitoring site in the Horton Heath Stream catchment within the desk study area.

3.10.20 Standard macroinvertebrate surveys were undertaken at two sites on in the Horton Heath Stream catchment between 2022 and 2023 for the Proposed Development. One site was located on Horton Heath Stream and was selected to coincide with a historical EA monitoring site (Site 79516). The other site was located on a tributary of Horton Heath Stream (Site R6).

3.10.21 Survey details and biotic indices calculated from both the EA monitoring data and Proposed Development survey data are summarised in Table 3-33. Full taxa lists are provided in Annex G.

3.10.22 No macroinvertebrate species of conservation importance were identified in the macroinvertebrate samples from Horton Heath Stream catchment. The INNS *Crangonyx pseudogracilis*, a species of amphipod shrimp was identified in samples collected from the Horton Heath Stream catchment between 2022 and 2023.

3.10.1 Two sites (Sites WCX17 and WCX18) within the Horton Heath Stream catchment were surveyed in spring 2024 using the methodology devised for temporary watercourses. Site WCX17 was located on Horton Heath Stream, the DEHLI score for this site was calculated as 3.14 and the MIS-index score was calculated as 0.89. Site WCX18 was located on a tributary of Horton Heath Stream, the DEHLI score for this site was calculated as 2.83 and the MIS-index score was calculated as 0.00. No species of conservation importance were identified in samples from either site. The dominant species were either generalists (e.g. occur across a wide range of running-water and standing-water habitats) or associated with lotic environments (e.g. primarily associated with run and glide habitats), rather than species associated with temporary watercourses.

Table 3-33 Horton Heath Stream catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
98921	EA	Horton Heath Stream	SU 52310 19510	2004 (1)	5.00	0.67	B	7.89	0.13	B	4.00	0.65	P	18	0.77	G
79516	Southern Water	Horton Heath Stream	SU 51940 19150	2022 to 2023 (4)	5.00 – 6.00 (5.67)	0.71 - 0.87 (0.81)	B – B (B)	0.00	0.00	B	1.80 - 3.80 (3.29)	0.32 - 0.72 (0.61)	B – M (P)	2 - 4 (3)	0.08 - 0.16 (0.11)	B – B (B)
R6	Southern Water	Trib of Horton Heath Stream	SU 52252 18953	2022 to 2023 (4)	6.43 – 7.00 (6.77)	0.90 – 1.00 (0.96)	B – A (B)	12.50 - 14.29 (13.1)	0.24 - 0.28 (0.26)	B – B (B)	2.90 - 3.90 (3.47)	0.54 - 0.72 (0.62)	B – M (P)	3 - 9 (6)	0.13 - 0.37 (0.23)	B – B (B)

3.11 Bow Lake

3.11.1 The location of Bow Lake within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.11.2 Bow Lake is a left bank tributary of the River Itchen draining the south-western slopes of the South Downs. The catchment is primarily rural and characterised by large areas of arable farming. There are some relatively small areas of urban development in the south of the catchment near Colden Common and Stoke Common. There are several large ponds and lakes in the south of the catchment, the largest of which (Fisher's Pond) impounds a tributary valley. Bow Lake flows through Hampshire Carp Hatcheries before it's confluence with the main River Itchen at Bishopstoke, adjacent to the ancient and semi-natural woodland at Breach Sling Copse.

3.11.3 The channel appears to have been artificially straightened over much of its course and there are several notable impoundments (small lakes) in the catchment. Upstream of Fisher's Pond the wider catchment is characterised by a series of narrow temporary watercourses. The catchment is farmed and there is little riparian structure or riparian woodland.

3.11.4 Downstream of the Proposed Development, Bow Lake transitions from a drain or ditch into a stream as the sinuosity increases and the channel widens. It discharges into the River Itchen SSSI/SAC and as such has potential to be used as functional habitat for the species of conservation interest of the designated site, such as Atlantic salmon.

3.11.5 The Bow Lake WFD water body (GB107042016650) is monitored by the EA at the 'Bow Lake Stoke Common' monitoring site and is of 'Bad' ecological status overall. Fish status is Bad, and the invertebrate status is Moderate – the hydrological regime does not support Good. Main pressures in the catchment are caused by diffuse pollution from agriculture (poor soil and nutrient management) and industrial point source pollution and physical barriers. A large fishery with hatchery ponds occupies both banks of Bow Lake for some of its lower course.

3.11.6 Five watercourse crossings are proposed within the Bow Lake catchment, as detailed in Table 3-34.

Table 3-34 Bow Lake watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_L_006	Ditch south of Nob's Crook (west)	Ordinary Watercourse Ditch Located in an area of woodland upstream of Bow Lake	Open cut
OPT1_WCX_L_007	Ditch south of Nob's Crook (east)	Ordinary Watercourse Ditch	Open cut

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
		Located in an area of woodland upstream of Bow Lake	
OPT1_WCX_L_005	Bow Lake	Main River	Trenchless
OPT1_WCX_L_004	Unnamed ditch	Ordinary Watercourse Ditch Hydrologically connected to Bow Lake	Trenchless
OPT1_WCX_L_003	Drain upstream of Bow Lake north of Park Hills Wood	Ordinary Watercourse Hydrologically connected to Bow Lake	Open cut

Aquatic habitat walkover

3.11.7 Three habitat walkover surveys were undertaken on Bow Lake in 2022, namely AW4, AW14 and AW41.

3.11.8 The river reach AW4 covers approximately 2.3km reach of a tributary stream that flows west through multiple small lakes before reaching Bow Lake. The survey reach was mostly dry at the time of survey or ponded with little to no perceptible flow observed. Several reaches were also notably choked with vegetation, preventing observations of the river channel. Where wetted, river depths were recorded between 0.1-0.4m, with flow velocities of 0.0-0.1m/s. The dominant substrate throughout the reach was sand and silt, with occasional cobble, gravel and boulder. Two potential obstructions to fish passage were observed, including a sluice downstream of the small lake in the mid-reach and the culvert beneath the B3354 road bridge.

3.11.9 The river reach AW14 covers approximately 1.2km of a small drainage ditch, which flows into Bow Lake. The ditch was entirely dry at the time of the survey, and no obvious watercourse channel was identified at the mapped upstream extent. Furthermore, a short distance upstream of the confluence with Bow Lake, a potential obstruction (culvert) to fish passage was noted.

3.11.10 The river reach defined as AW41 is an approximately 360m reach of a small tributary that flows into Bow Lake. The watercourse emanates at Fishers Lake, a small fishing lake at Colden Common, before flowing beneath the B3354. At the time of survey, the watercourse was dry and choked with vegetation, making channel observations difficult. The reach is considered to significantly diminish under low flow conditions.

3.11.11 Detailed habitat survey results and maps are provided in Annex A and Annex B.

Fish

Desk study

3.11.12 EA NFPD datasets were available at three locations in the Bow Lake catchment. Site 50385 Upstream of Leylands Farm is located north of the ASNW of Hill Copseat (NGR SU 48556 20764). The site was surveyed in 2014 using a 100m single-catch methodology. Further downstream Site 38950 Leylands Farm (NGR SU 48169 20858) was surveyed in 2011 and Site 33950 Bow Lake Fish Farm (NGR SU 47337 20308) in 2009 and 2014.

3.11.13 The following fish species were recorded in Bow Lake from desk study data:

1. Fish species of conservation concern: European eel (S41 species), bullhead (Annex II species).
2. Common fish assemblage species: Three-spined stickleback, gudgeon, roach, Stone loach, tench *Tinca tinca,* barbel *Barbus barbus,* chub.

3.11.14 Several exotic species were also recorded at Bow Lake Fish Farm site, that are unusual for a river population, including: blue orfe *Leuciscus idus,* golden goldfish *Carassius auratus,* golden orfe *Leuciscus idus,* koi carp *Cyprinus rubrofuscus* var. koi, mirror carp *Cyprinus carpio.* The presence of such species is thought to be associated with the fish farm and are potential 'escapees', however this is unclear from the data.

Field survey

3.11.15 One fish survey was undertaken for the Proposed Development at the EA monitoring site 38950 Leyland's Farm on 4 August 2022. The three-run catch-depletion survey recorded just one species, three-spined stickleback (n = 50), equating to an estimated density of 64.94 individuals per 100m² of watercourse. Detailed fish survey results are provided in Annex C.

Macrophytes

Desk study

3.11.16 The EA BIOSYS database returned records of macrophyte data for Bow Lake at Bow Lake Fish Farm (2010), and further downstream at Church Road/Bishopstoke Lane (2007-2016). No records of notable or protected species were found; however the schedule 9 INNS Himalayan balsam was recorded at church road in 2010-2016.

3.11.17 Historical HBIC data returned several records of tubular water-dropwort Oenanthe fistulosa. In addition, there were several records of the INNS Himalayan balsam from 2002 to 2010 along the entire reach of the Bow Lake tributary and reports of giant hogweed *Heracleum mantegazzianum* (2014). Canadian waterweed was also recorded in 1997.

3.11.18 The HBIC data search returned a single record of signal crayfish from 2014, immediately downstream of the confluence with the Main River Itchen, adjacent to the Ancient and Semi-Natural Woodland at Breach Sling Copse.

Field survey

3.11.19 Two macrophyte surveys were undertaken within the Bow Lake catchment between 2022 and 2023 for the Proposed Development.

3.11.20 The metrics derived from LEAFPACS2 are presented in Table 3-35 and full species lists are provided in Annex D.

Table 3-35 Bow Lake catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final Score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	WFD Class
Bow Lake (Itchen_02)	7.71	4	4	62.5	0.51	0.49	0.86	0.12	0.31	Poor
Bow Lake (Itchen_04)	7.68	3	3	17.5	0.61	0.30	0.62	0.40	0.45	Moderate

Phytobenthos

3.11.21 Five phytobenthos surveys were undertaken within the Bow Lake catchment for the Proposed Development between 2022 and 2023.

3.11.22 A summary of survey details and biotic indices are presented below in Table 3-36. Species lists are provided in Annex E.

Table 3-36 Bow Lake catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
R2	Tributary of Bow Lake	SU 47416 21659	Southern Water	2022 to 2023 (4)	57.43 - 78.51 (70.01)	0.45 - 0.90 (0.63)	M – H (G)
R3	Tributary of Bow Lake	SU 48816 20979	Southern Water	2022 to 2023 (4)	68.92 - 83.5 (77.84)	0.34 - 0.63 (0.45)	P – G (M)
R4	Bow Lake	SU 48829 20686	Southern Water	2022 to 2023 (4)	65.01 - 88.58 (74.02)	0.25 - 0.77 (0.57)	P – G (M)

Site ID	Watercourse	Site NGR	Source	Survey range (count)	TDI5LM score min - max (AVG.)	TDI5LM normalised EQR min - max (AVG.)	TDI5LM EQR class min - max (AVG.)
R5	Bow Lake	SU 49522 20617	Southern Water	2022 to 2023 (4)	67.81 - 80.30 (73.74)	0.44 - 0.72 (0.59)	M – G (G)
43300	Bow Lake	SU 47150 20590	EA	2007 to 2013 (6)	63.40 - 92.30 (77.81)	0.18 - 0.85 (0.52)	B – H (M)

White-clawed crayfish

Desk study

3.11.23 No historical records of white-clawed crayfish were found for Bow Lake within the desk study area.

3.11.24 The HBIC data search returned a single record of signal crayfish from 2014, immediately downstream of the confluence with the main River Itchen, adjacent to the ancient and semi-natural woodland at Breach Sling Copse.

Field survey

3.11.25 Two white-clawed crayfish survey was undertaken in the Bow Lake catchment for the purposes of the Proposed Development, namely WCC_01 on a tributary of the Main River at NGR SU 48816 20979, and WCC_02 on Bow Lake Main River at NGR SU 48667 20722.

3.11.26 WCC_01 is a small stream bordered by industrial buildings on the right bank and buildings on the left bank with the stream running through a thin strip of woodland. Recent reports indicated the stream was dry, however, overnight rain had caused some ponding. The site was not suitable for manual search techniques however an eDNA sample was collected from the downstream extent. Potential sources of pollution were present within the watercourse.

3.11.27 No white-clawed crayfish presence was identified at WCC_01 through habitat assessment, manual search or eDNA sampling.

3.11.28 WCC_02 is a small stream bordered by grazed grassland with a thin riparian strip. No discernible flow was observed at the time of survey and the water present was likely filled by overnight rain. Manual search was undertaken in the upstream extent and an eDNA sample collected.

3.11.29 No white-clawed crayfish presence was identified at WCC_01 through habitat assessment, manual search or eDNA sampling. Detailed survey results are provided in Annex F.

Macroinvertebrates

3.11.30 Macroinvertebrate survey data collected between 2003 and 2024 were available for two EA monitoring sites in the Bow Lake catchment within the desk study area.

3.11.31 Standard macroinvertebrate surveys were undertaken at three sites in the Bow Lake catchment between 2022 and 2023 for the Proposed Development. Two sites were located on Bow Lake (Sites R4 and R5). The other site was located on a tributary of Bow Lake (Site R3).

3.11.32 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-37. Full taxa lists are provided in Annex G.

3.11.33 No macroinvertebrate species of conservation importance were identified in the macroinvertebrate samples from the Bow Lake catchment. The INNS Jenkins' spire snail was identified in samples collected from Bow Lake catchment.

3.11.34 One site (WCX19) was surveyed within the Bow Lake catchment in spring 2024 using the methodology devised for temporary watercourses. The DEHLI score for this site was calculated as 3.86 and the MIS-index score was calculated as 3.80. The site was scoped-in for a second survey in autumn 2024 but the watercourse was dry at the time of survey. No species of conservation importance were identified in the spring sample. The dominant species was the amphipod shrimp *Gammarus pulex*, which is associated with lotic environments, rather than species associated with temporary watercourses.

Table 3-37 Bow Lake catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
43300	EA	Bow Lake	SU 47150 20590	2004 to 2016 (11)	6.00 – 7.00 (6.49)	0.88 - 1.03 (0.94)	B – A (A)	9.52 - 48.57 (28.76)	0.23 - 1.02 (0.64)	B – A (B)	3.38 - 4.50 (4.11)	0.67 - 0.87 (0.79)	P – G (M)	7 – 21 (15)	0.28 - 0.81 (0.59)	B – H (M)
79528	EA	Bow Lake	SU 51710 20350	2003 to 2004 (5)	5.85 - 6.33 (6.18)	0.81 - 0.87 (0.85)	B – B (B)	17.65 – 30.00 (23.88)	0.29 - 0.49 (0.39)	B – B (B)	3.97 - 4.19 (4.08)	0.63 - 0.70 (0.66)	P – P (P)	15 – 22 (19)	0.87 - 1.10 (0.99)	H – H (H)
R4	Southern Water	Bow Lake	SU 48829 20686	2022 to 2023 (4)	5.80 - 7.67 (6.84)	0.83 - 1.11 (0.99)	B – A (A)	16.67 – 100.00 (52.22)	0.35 - 2.29 (1.18)	B – A (A)	3.69 - 4.13 (3.90)	0.67 - 0.80 (0.73)	P – M (M)	3 – 8 (6)	0.12 - 0.31 (0.22)	B – B (B)
R5	Southern Water	Bow Lake	SU 49522 20617	2022 to 2023 (4)	1.00 – 7.00 (5.27)	0.15 – 1.00 (0.76)	B – A (B)	14.29 – 25.00 (18.65)	0.31 - 0.59 (0.42)	B – B (B)	1.20 - 4.34 (3.25)	0.23 - 0.80 (0.61)	B – M (P)	1 – 8 (5)	0.04 - 0.33 (0.19)	B – B (B)
R3	Southern Water	Trib of Bow Lake	SU 48816 20979	2022 to 2023 (4)	6.00 - 7.33 (6.82)	0.86 - 1.03 (0.97)	B – A (A)	25.00 – 100.00 (55.43)	0.54 - 2.16 (1.16)	B – A (A)	2.98 - 4.50 (3.66)	0.53 - 0.80 (0.67)	B – M (P)	5 – 8 (7)	0.20 - 0.34 (0.27)	B – B (B)

3.12 River Itchen and Itchen Navigation

3.12.1 The location of the River Itchen within the Order Limits is shown on ES Figure 8.51 Watercourses and watercourse crossings, Volume III (Document reference 6.3, DCO Volume 6).

3.12.2 The River Itchen rises from a small spring to the south of New Cheriton, where it flows north towards the village of New Arlesford before diverting west towards Kings Worthy and finally south, where it anabranches through the cities of Winchester and Southampton before it meets the tidal estuary of Southampton Water, below Itchen Bridge.

3.12.3 Earlier in the Holocene, the River Itchen was likely to have been a natural multi-thread (anastomosing) channel. In places some of these channels are still evident but they are generally set within a heavily managed system of leets, weirs, offtakes and numerous artificial ditches and drains that characterise the floodplain. Water is also drawn off the Itchen for the Itchen Navigation, which runs parallel to the river. In the Otterbourne area there are areas of riparian woodland.

3.12.4 The Itchen Navigation is a 16.7km canal system, constructed in 1710 by widening and dredging sections of the River Itchen in order to improve navigation. The reach comprises 15 locks and two single gates, starting at Black Bridge in the North to Woodmill in the South, where it joins the estuary of the River Itchen. The navigation was abandoned in the late 1800's and is no longer in operation. A joint venture with the EA and Hampshire and Isle of Wight Wildlife Trust (HIWWT) led to a five-year restoration project to restore the watercourse including the installation of bypass channels to aid fish movement.

3.12.5 The River Itchen is a chalk stream and therefore S41 habitat. The River Itchen and Navigation is also designated as a SSSI and a SAC, designated for its Annex I habitat of '3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation' and Annex II species southern damselfly *Coenagrion mercurial* and bullhead. In addition, the presence of the Annex II species, white-clawed crayfish, brook lamprey, Atlantic salmon and otter *Lutra lutra* are a qualifying feature, but not a primary reason for site selection.

3.12.6 The River Itchen WFD water body (GB107042022580) is monitored by the EA at the 'River Itchen at Cross Bridge' monitoring site and is of 'Good' ecological status overall. The Itchen Navigation WFD water body (GB70710008) is assessed by the EA for compliance with the WFD only as far north as the M3 motorway and is of 'Good' overall ecological status.

3.12.7 Twelve watercourse crossings are proposed within the River Itchen and Itchen Navigation catchment, as detailed in Table 3-38.

Table 3-38 River Itchen and Itchen Navigation watercourse crossings

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_L_001	Unnamed tributary of the River Itchen	Main River Tributary of the River Itchen	Trenchless

Watercourse crossing ID	Watercourse	Watercourse description	Proposed construction method
OPT1_WCX_M_001	Unnamed watercourse	Main River Upstream of the Itchen Navigation	Trenchless
OPT1_WCX_M_002	Upstream tributary of the Itchen Navigation south of Otterbourne WSW	Main River Upstream of the Itchen Navigation	Trenchless
OPT1_WCX_M_004	Drain upstream of the Itchen Navigation south of Kiln Lane	Ordinary Watercourse Upstream of the Itchen Navigation	Open cut
OPT1_WCX_M_006	Drain upstream of the Itchen Navigation south of Kiln Lane	Ordinary Watercourse Upstream of the Itchen Navigation	Open cut
OPT1_WCX_M_008	Unnamed drain	Ordinary Watercourse Upstream of the Itchen Navigation	Open cut
OPT1_WCX_M_009	Drain west of the railway and River Itchen	Ordinary Watercourse Upstream of the Itchen Navigation	Trenchless
OPT1_WCX_M_010	Itchen Navigation	Main River	Trenchless
OPT1_WCX_M_011	River Itchen	Main River	Trenchless
OPT1_WCX_M_012	Unnamed ditch	Water body	Trenchless
OPT1_WCX_M_013	Unnamed ditch	Water body	Trenchless
OPT1_WCX_M_014	Unnamed ditch	Water body	Trenchless

Aquatic habitat walkover

3.12.8 A number of habitat walkover surveys were undertaken in the Itchen catchment in 2022, mainly on the Ordinary Watercourses and surrounding tributaries with potential to be impacted by the Proposed Development.

3.12.9 AW3 (Rosemary Leet, tributary of the Itchen Navigation), AW1 and AW2 (Itchen Navigation), AW36 (tributary of the River Itchen) and AW37 (ditch connected with the Otterbourne Stream).

3.12.10 Key habitat observations at each survey site are summarised in the sub-sections below and detailed survey results and illustrations are provided in Annex A and Annex B.

AW1 and AW2 River Itchen and Itchen Navigation Main Rivers

3.12.11 The river reach AW1 covers approximately 1.7km of the Itchen Navigation and the river reach AW2 covers approximately 1.6km of the adjacent River Itchen. The surrounding land use was predominantly greenfield and broad-leaf woodland, with areas of scrub. The South-Western Railway runs adjacent to the river reach to the west of the site.

3.12.12 Instream habitat was diverse and heterogenous, supporting multiple mesohabitats. Habitats comprised predominantly of run and glide throughout the reach, with some areas of pool and the occasional eddy. Notably, several key areas of sub-optimal salmonid spawning habitat and juvenile salmonid habitat were recorded. In addition, several key areas of optimal and sub optimal juvenile lamprey habitat were also noted.

3.12.13 Macrophyte vegetation cover was abundant, providing plentiful nursery habitat and refuge for fish. As such, based on the habitat observations, the River Itchen is considered to be of 'high ecological sensitivity', providing a resource to support important aquatic flora and fauna species.

AW3 Rosemary Leet

3.12.14 Rosemary Leet is a small, approximately 1km, anabranch of the Itchen Navigation. The river channel of Rosemary Leet is a managed fishery and has been described as an important trout fishery with fast flowing gravel and *Ranunculus* habitats, ideal for spawning.

3.12.15 The short approximately 160m river reach defined as AW3 was inaccessible at the time of survey, due to land access arrangements not having been agreed. Due to the short nature of this reach and it being visible from the adjacent banks of reach AW1, additional, repeat survey is not considered necessary.

AW37 Otterbourne Stream

3.12.16 The watercourse defined as AW37 is an approximately 1.3km reach of a small tributary of the main River Itchen. At the time of survey, the river reach was notably dry, choked with vegetation or with little to no perceptible flow. The watercourse is heavily modified and multiple obstructions to fish passage were recorded.

3.12.17 Downstream of Kiln Lane, some flow was observed, and habitat included some run and glide, though flows were notably low with an average velocity estimated to be 0.01-0.15m/s and water depths of 0.1-0.2m. Dominant substrate types were gravel, cobble, sand and silt. The surrounding land use was predominantly greenfield, with some road and rail infrastructure. The watercourse is bordered by a mix of broad-leafed trees and herbaceous plants. Grasses throughout the reach and emergent broad leaf and emergent fine leaf vegetation was observed throughout the river channel.

3.12.18 Despite the seeming lack of habitat heterogeneity, brown trout were observed in the vicinity of Kiln Lane.

AW36 Tributary of River Itchen

3.12.19 The watercourse defined as AW36 is a small approximately 775m reach of a small tributary of the main River Itchen. At the time of survey, flows were notably low. However, despite this some degree of habitat heterogeneity was observed.

3.12.20 The normal operation velocity was estimated to be 0.01-0.15m/s and dominant substrate types were gravel, sand and silt with occasional boulder. The surrounding land use was predominantly greenfield, with occasional residential

gardens. The watercourse is bordered by a mix of broad-leafed trees and herbaceous plants and grasses throughout the reach.

3.12.21 Instream habitat was comprised predominantly of areas of no perceptible flow, with some run and glide throughout the range and the occasional reach choked with vegetation. Multiple culverts creating obstructions to fish passage were noted throughout.

Fish

Desk study

3.12.22 EA NFPD datasets were available for several locations within the 2km desk study area: Brambridge (NGR: SU 46763 22408) located just downstream of the Order Limits where semi-quantitative data are available for the period 2018 to 2024; Shipley Bridge located near Shipley Lock (NGR: SU 47257 23508), surveyed between 2009 and 2024; Sergars Farm (SU 47639 24343) and Shawford Park (SU 47276 24617) located upstream of the Order Limits surveyed between 2008 and 2023.

3.12.23 All sites were surveyed utilising a 100m single run survey approach. Additional survey data is available approximately 2km downstream of the Order Limits at Allbrook Lock and Caravan Pool from 2002 to 2024.

3.12.24 The most recent surveys undertaken by the EA were located at:

1. Site 71443 Shawford upstream of Norris's Bridge, located on the River Itchen at NGR: SU 4782 2468. A single run survey was undertaken on 5 September 2023 and identified five species:
2. Fish species of conservation concern
    a. Atlantic salmon (Annex II and S41 species)
    b. Brook lamprey (Annex II and S41 species)
    c. Brown/sea trout (S41 species)
    d. European eel (S41 species)
3. Common fish assemblage species
    a. Minnow

3.12.25 The total number of fish captured was 15, equating to a minimum density of 1.45 individuals per 100m² of watercourse.

3.12.26 Site 34565 Shawford Park, located on the River Itchen at NGR: SU 4727 2461. A single run survey undertaken on 22 September 2023 identified ten species:

1. Fish species of conservation concern
    a. Atlantic salmon (Annex II and S41 species)
    b. Bullhead (Annex II species)
    c. European eel (S41 species)
    d. Brown/sea trout (S41 species)
    e. Brook lamprey (Annex II and S41 species)

2. Common fish assemblage species
    a. Grayling
    b. Minnow
    c. Pike Esox lucius
    d. Stone loach
    e. Three-spined stickleback

3.12.27 The total number of fish captured was 328, equating to a minimum density of 29.24 individuals per 100m² of watercourse.

3.12.28 Site 30230 Caravan Pool Highbridge, located on the River Itchen at NGR: SU 4683 2091. A single run survey undertaken on 29 August 2023 and lamprey survey on 5 September 2023 recorded the presence of six species:

1. Fish species of conservation concern
    a. Atlantic salmon (Annex II and S41 species)
    b. Brown/sea trout (S41)
    c. European eel (S41)
    d. Brook lamprey (Annex II and S41 species)
2. Common fish assemblage species
    a. Barbel
    b. Stone loach

3.12.29 The total number of fish captured in both surveys was 17, equating to a minimum density of 12.40 individuals per 100m² of watercourse.

3.12.30 Site 6520 Ham Farm, located on The Itchen Navigation at NGR: SU 4582 2055. A single run survey at Ham Farm on 30 August 2023 recorded the presence of 15 species:

1. Fish species of conservation concern
    a. Atlantic salmon (Annex II and S41 species)
    b. Brown/sea trout (S41 species)
    c. Bullhead (Annex II species)
    d. European eel (S41 species)
    e. Brook lamprey (Annex II and S41 species)
2. Common fish assemblage species
    a. Chub
    b. Dace
    c. Grayling
    d. Gudgeon
    e. Minnow
    f. Perch

g. Pike
h. Roach
i. Stone loach
j. Three-spined stickleback

3.12.31 The total number of fish captured was 320, equating to a minimum density of 42.21 individuals per 100m² of watercourse.

3.12.32 Including data from all the EA NPFD monitoring sites in the desk study area, the following fish species have been identified in the Itchen catchment:

1. Fish species of conservation concern:
   a. Atlantic salmon (Annex II and S41 species)
   b. Brown/sea trout (S41 species)
   c. Bullhead (Annex II species)
   d. European eel (S41 species)
   e. Brook lamprey ammocoetes (Annex II and S41 species)
2. Common fish assemblage species:
   a. Minnow
   b. Three-spined stickleback
   c. Stone loach
   d. Pike
   e. Grayling
   f. Perch
   g. Gudgeon
   h. Roach
   i. Dace
   j. Barbel

3.12.33 No existing fish data were available for Rosemary Leet or the Otterbourne Stream, however following analysis of GIS and satellite imagery, they appear to have direct connectivity to the River Itchen and the Itchen Navigation. The closest EA survey locations downstream on the River Itchen Navigation are at Allbrook Lock, with Brambridge, located just 300m upstream of the confluence with Otterbourne and Shipley Bridge approximately 1km upstream.

Field survey

3.12.34 Due to the availability of recent fish monitoring data from the EA NFPD in the Order Limits of the Itchen catchment, only two fish surveys were attempted for the Proposed Development in the Itchen and Itchen Navigation catchments in 2022.

3.12.35 Site RSK1 is located on the Otterbourne Stream at NGR: SU 4639 2308. The field survey on 28 October 2022 recorded no fish caught or observed within the survey

area. During a previous visit on 1 August 2022 the channel was dry, and a survey could not be completed.

3.12.36 Site RSK2 is located on the Itchen Navigation at NGR: SU 4638 2178. A field survey was scheduled on 1 August 2022 but was cancelled due to land access being refused. The re-visit scheduled on 14 October 2022 was also cancelled due to land access constraints.

3.12.37 Site RSK3 was located on the River Itchen at NGR: SU 4647 2175. A field survey was scheduled on 1 August 2022 but was cancelled due to land access being refused. A field survey could not be undertaken in 2023 due to land access being refused.

Macrophytes

Desk study

3.12.38 EA BIOSYS data has returned multiple survey locations for the River Itchen within 2km of the pipeline crossings, dating from 2000-2009. Survey data from the EA BIOSYS site 110245, which is located approximately 2km downstream of the watercourse crossings and includes records from 2006 of *Pohlia lescuriana*, a Nationally Rare and Nationally Scarce bryophyte for Britain. The INNS Canadian pondweed *Elodea canadensis*, water fern *Azolla filiculoides* and least duckweed were also present at the site.

3.12.39 Analysis of HBIC data revealed records of several protected and notable species throughout the Itchen catchment, however the records date from 1999 – 2013 and should be considered outdated. Tufted-sedge *Carex elata* (2003) was recorded 60m north of the crossing location and stream water-crowfoot (1999, 2012) was recorded approximately 1km downstream. Records of great yellow-cress *Rorippa amphibia* (2006) and water–violet *Hottonia palustris* (2013) were also recorded.

Field survey

3.12.40 Eleven macrophyte surveys were undertaken within the River Itchen catchment between 2022 and 2023 for the Proposed Development.

3.12.41 The metrics derived from LEAFPACS2 are presented in Table 3-39 and full species lists are provided in Annex D.

Table 3-39 River Itchen catchment macrophyte indices, Ecological Quality Ratios and status class

Site	Observed				EQR				Final Score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	WFD Class
River Itchen (Itchen_05,08,11)	7.59	12	8	17.5	0.82	1.52	1.49	0.40	0.61	Good
The Itchen Navigation (Itchen_07)	7.92	11	8	37.5	0.66	1.38	1.49	0.20	0.43	Moderate
Rosemary Leet (Itchen_09,12)	7.66	11	7	17.5	0.78	1.36	1.31	0.40	0.59	Moderate

Site	Observed				EQR				Final Score	
	RMNI	NTAXA	NFG	ALG	RMNI	NTAXA	NFG	ALG	EQR	WFD Class
River Itchen (Itchen_10,13)	7.39	16	8	37.55	0.91	1.58	1.49	0.20	0.56	Moderate
Kingfisher Stream (Itchen_15,16)	7.59	9	6	7.5	0.83	1.07	1.10	0.60	0.71	Good
River Itchen (Itchen_24)	7.03	3	3	0.5	0.57	0.40	0.74	0.96	0.51	Moderate
River Itchen (Itchen_28)	7.58	4	3	62.5	0.55	0.53	0.68	0.12	0.33	Poor
The Itchen Navigation (Itchen_Object_ID_01)	7.77	13	9	17.5	0.80	1.48	1.53	0.40	0.60	Moderate
River Itchen (Itchen_Object_ID_03)	7.80	9	6	37.5	0.73	1.06	1.10	0.20	0.47	Moderate
River Itchen (Itchen_Object_ID_04)	7.61	15	9	17.5	0.88	1.62	1.53	0.40	0.64	Good
River Itchen (Itchen_Object_ID_05)	7.41	15	9	17.5	0.92	1.76	1.65	0.40	0.66	Good

Phytobenthos

3.12.42 Within the 2km desk study area in the Itchen catchment, a total of six historical phytobenthos sample sites were made available through the EA catchment data explorer between 2003 and 2022.

3.12.43 Within the 500m field survey area in the Itchen Catchment, five sites were surveyed between 2022 and 2023.

3.12.44 A summary of the EA survey data, along with the recently surveyed sites as part of this investigation have been presented below in

3.12.45 Table 3-40 along with the relevant indices. Species lists are provided in Annex E.

Table 3-40 River Itchen catchment phytobenthos indices, Ecological Quality Ratios and status class

Site ID	Watercourse	Surveyor	Site NGR	Survey Range (Count)	TDI5LM Score Min - Max (AVG.)	TDI5LM Normalised EQR Min - Max (AVG.)	TDI5LM EQR Class Min - Max (AVG.) *B/P/M/G/H*
EA42063	Otterbourne Stream	Southern Water	SU 46190 23380	2022 to 2023 (4)	46.13 - 68.82 (58.49)	0.66 - 1.15 (0.88)	G – H (H)
EA42048	River Itchen	Southern Water	SU 47060 23240	2022 to 2023 (3)	62.58 - 80.84 (73.09)	0.43 - 0.85 (0.61)	M – H (G)
EA151020	River Itchen	Southern Water	SU 4680 021400	2022 to 2023 (4)	63.85 - 78.34 (71.07)	0.51 - 0.85 (0.68)	M – H (G)
R10	River Itchen	Southern Water	SU 46757 22287	2022 to 2023 (3)	78.24 - 85.09 (80.58)	0.33 - 0.48 (0.43)	P – M (M)
110184	River Itchen	EA	SU 4761 024450	2004 (1)	73.41	0.66	G
110201	River Itchen	EA	SU 46590 21540	2004 (1)	75.61	0.60	G
110202	River Itchen	EA	SU 46840 21060	2004 (1)	67.61	0.80	G
110245	River Itchen	EA	SU 4576 020630	2004 (1)	76.96	0.57	M
110185	Itchen Navigation	EA	SU 47240 24280	2004 (1)	64.17	0.88	H

White-clawed crayfish

Desk study

3.12.46 White-clawed crayfish is listed in citation for the River Itchen SAC as an Annex II species present as a qualifying feature, but not a primary reason for site selection. Populations are documented in the upper headwaters of the Itchen catchment, and in 2022 captively-bred white-clawed crayfish were released in the upper reaches [43].

3.12.47 No historical records of white-clawed crayfish (1995-2021) were found within the desk study area for the River Itchen catchment. However, historical data from the HBIC returned records from 2014 of the invasive non-native signal crayfish immediately downstream of the road bridge at Kiln Lane.

3.12.48 In addition, there were two more records of signal crayfish from 2011 and 2014, near the confluence with Bow Lake. Although these records should be considered outdated, additional investigation is required to determine the degree of invasion or colonisation in the proximity of the pipeline crossings, especially given the area's designation for white-clawed crayfish as a qualifying feature.

3.12.49 Hampshire and Isle of Wight Wildlife Trust released captively-bred white-clawed crayfish into the upper reaches on the Itchen catchment in 2022 but it is not known if a population has since become established.

3.12.50 Historical data from the HBIC provided records from 2014 of the invasive non-native signal crayfish, immediately downstream of the road bridge at Kiln Lane, and the degree to which this population may have colonised the wider watercourse and catchment is unclear.

Field survey

3.12.51 Six white-clawed crayfish surveys were undertaken in the Itchen catchment for the purposes of the Proposed Development.

3.12.52 WCC_15 is a tributary stream of the River Itchen at NGR: SU 47417 21659 running through a residential area into a field. This watercourse was unsuitable for manual search technique. The stream was mostly vegetated with trees and shrubs along the extent. Shallow slow running water with large amounts of filamentous algae were present. No white-clawed crayfish presence was identified through habitat assessments or eDNA sampling.

3.12.53 WCC_16 is on the main channel of the Itchen River running through residential grounds at NGR: SU 47241 24530. There are a number of small weirs throughout the reach, with mostly riffle and shallow glide habitat. The substrate present was mainly gravel with some larger cobbles. Much of the bank was also reinforced. Three samples were taken for the eDNA survey from the downstream of the bridge, downstream of the weir and upstream of the weir. No white-clawed crayfish presence was identified through habitat assessments or eDNA sampling.

3.12.54 WCC_17 is the Kingfisher Stream running through residential property at NGR: SU 47592 24426. The right bank consisted of a mown lawn, and woodland took up the left bank. The banks were also partially reinforced using logs. A small weir was present at the downstream extent. Signal crayfish remains were found at this site. Additional refuges were checked at the upstream extent, but no white-clawed crayfish presence was identified through habitat assessments or eDNA sampling.

3.12.55 WCC_18 is on Rosemary Leet, a tributary of the Itchen Navigation at NGR: SU 47657 24361. There was no suitable habitat present for this species at this location. No manual search of eDNA sample was taken.

3.12.56 WCC_14 is a stretch of the Itchen Navigation channel at NGR: SU 47193 24510. The reach runs through residential grounds, with a number of small weirs throughout the reach. The substrate present was mainly gravel with some larger cobbles. A large sluice gate and very deep pool is present at the bottom of the

reach. No white-clawed crayfish presence was identified through habitat assessments or eDNA sampling.

3.12.57 WCC_04 is a small channel of the Otterbourne Stream at NGR: SU 55880 16458 with almost no flow and likely to have been dry before recent rain. Firm substrate was present with 30mm silt. The channel was choked by emergent vegetation and INNS Himalayan Balsam. No suitable refuges for manual search were present therefore a hand net search was conducted and an eDNA sample taken here. No offline parts of the watercourse were detected. No white-clawed crayfish presence was identified through habitat assessments or eDNA sampling.

3.12.58 Detailed white-clawed crayfish survey results for the River Itchen catchment are provided in Annex F.

Macroinvertebrates

3.12.59 Macroinvertebrate survey data collected between 2003 and 2024 were available for ten EA monitoring site in the River Itchen catchment within the desk study area.

3.12.60 Macroinvertebrate surveys were undertaken at five sites in the River Itchen catchment between 2022 and 2023 for the Proposed Development. Three sites were located on the River Itchen (Sites 42048, 151020 and R10), one site was located on Otterbourne Stream (Site 42063), and one was located on an unnamed tributary of the River Itchen (site R2).

3.12.61 Survey details and biotic indices calculated from both the EA monitoring data and the Proposed Development survey data are summarised in Table 3-41. Full taxa lists are provided in Annex G.

3.12.62 Between the desk study records and Proposed Development survey data, six Nationally Scarce aquatic macroinvertebrate species were identified, including two caddisfly *Ylodes conspersus* and *Potamophylax rotundipennis*, dark olive mayfly *Baetis atrebatinus*, a riffle beetle *Riolus subviolaceus*, a diving beetle *Deronectes latus* and a water beetle *Hydraena rufipes*. The Nationally Rare scarce iron blue mayfly *Baetis digitatus* and mayfly *Caenis pusilla* were recorded. The desk study also identified records of Southern iron blue mayfly *Nigrobaetis niger* (S41 species) at an EA monitoring site of the River Itchen.

3.12.63 Three macroinvertebrate INNS were recorded, Jenkins' spire snail, amphoipod shrimp *Crangonyx pseudogracilis/floridanus* and a species of planarian flatworm *Planaria torva*.

Table 3-41 River Itchen catchment macroinvertebrate survey details and biotic indices

Site ID	Source	Watercourse	NGR	Survey range (no. surveys)	LIFE (family) min - max (average)	LIFE EQR min - max (average)	LIFE (family) EQR class min - max (average)	PSI (family) min - max (average)	PSI (family) EQR min - max (average)	PSI (family) EQR class min - max (average)	WHPT ASPT min - max (average)	WHPT ASPT EQR min - max (average)	WHPT ASPT EQR class min - max (average)	WHPT NTAXA min - max (average)	WHPT NTAXA EQR min - max (average)	WHPT NTAXA EQR class min - max (average)
42063	Southern Water/EA	Otterbourne Stream	SU 46190 23380	2005 to 2023 (8)	5.56 - 11.00 (6.96)	0.80 - 1.59 (1)	B – A (A)	16.67 - 57.14 (35.62)	0.37 - 1.28 (0.76)	B – A (A)	3.10 - 5.19 (4.13)	0.59 - 0.93 (0.76)	P – G (M)	2 – 25 (14)	0.08 - 0.98 (0.57)	B – H (M)
42048	Southern Water/EA	River Itchen	SU 47060 23240	2003 to 2023 (39)	6.50 - 7.61 (7.23)	1.02 - 1.19 (1.12)	A – A (A)	33.33 - 68.09 (51.77)	1.01 - 2.27 (1.63)	A – A (A)	5.01 - 6.55 (5.92)	1.08 - 1.41 (1.24)	H – H (H)	15 – 45 (33)	0.55 - 1.64 (1.22)	P – H (H)
151020	Southern Water/EA	River Itchen	SU 46800 21400	2008 to 2023 (5)	7.00 - 8.04 (7.77)	1.02 - 1.16 (1.10)	A – A (A)	31.82 - 80.65 (64.21)	0.68 - 1.73 (1.24)	B – A (A)	4.79 - 6.59 (6.12)	0.83 - 1.09 (1.03)	M – H (H)	9 – 30 (19)	0.28 - 0.95 (0.59)	B – H (M)
151194	EA	River Itchen	SU 46800 20700	2008 (1)	7.08	1.07	A	48.81	1.30	A	5.76	1.15	H	43	1.64	H
R10	Southern Water	River Itchen	SU 46757 22287	2022 to 2023 (3)	7.82 - 8.50 (8.15)	1.15 - 1.25 (1.19)	A – A (A)	66.67 - 88.24 (78.3)	1.59 - 2.10 (1.82)	A – A (A)	5.57 - 6.84 (6.33)	1.08 - 1.29 (1.22)	H – H (H)	11 – 19 (14)	0.37 - 0.66 (0.47)	B – M (B)
R2	Southern Water	Trib of River Itchen	SU 47416 21659	2022 to 2023 (4)	6.57 – 9.00 (7.73)	0.89 - 1.22 (1.04)	B – A (A)	16.67 – 70.00 (50.24)	0.28 - 1.06 (0.79)	B – A (A)	4.05 - 5.05 (4.62)	0.66 - 0.77 (0.72)	P – M (M)	2 – 10 (7)	0.08 - 0.39 (0.29)	B – B (B)
152884	EA	Itchen Navigation	SU 47402 25037	2007 to 2011 (5)	6.97 - 7.71 (7.22)	1.02 - 1.12 (1.05)	A – A (A)	46.27 - 62.50 (51.98)	1.06 - 1.43 (1.19)	A – A (A)	5.40 - 6.27 (5.72)	1.05 - 1.22 (1.11)	H – H (H)	31 – 45 (38)	1.10 - 1.60 (1.36)	H – H (H)
152885	EA	Itchen Navigation	SU 47402 25037	2007 to 2011 (2)	6.89 - 7.03 (6.96)	1.01 - 1.03 (1.02)	A – A (A)	44.64 - 49.21 (46.93)	1.03 - 1.14 (1.08)	A – A (A)	5.46 - 5.51 (5.49)	1.06 - 1.00 (1.06)	H – H (H)	31 – 34 (33)	1.08 - 1.18 (1.13)	H – H (H)
152886	EA	Itchen Navigation	SU 45719 20809	2007 to 2011 (5)	6.88 - 7.48 (7.22)	1.04 - 1.13 (1.09)	A – A (A)	42.47 - 56.96 (50.99)	1.13 - 1.52 (1.36)	A – A (A)	5.32 - 6.11 (5.80)	1.08 - 1.24 (1.18)	H – H (H)	35 – 46 (41)	1.28 - 1.68 (1.51)	H – H (H)
152887	EA	Itchen Navigation	SU 45719 20809	2007 to 2011 (2)	6.95 - 7.10 (7.03)	1.05 - 1.07 (1.06)	A – A (A)	45.45 - 52.11 (48.78)	1.21 - 1.39 (1.30)	A – A (A)	5.60 - 5.70 (5.65)	1.14 - 1.16 (1.15)	H – H (H)	35 – 45 (40)	1.28 - 1.65 (1.46)	H – H (H)
155893	EA	Itchen Navigation	SU 47061 22826	2007 (1)	7.26	1.09	A	48.08	1.26	A	6.08	1.22	H	32	1.10	H
155894	EA	Itchen Navigation	SU 47061 22826	2007 to 2010 (4)	6.90 - 7.33 (7.05)	1.03 - 1.10 (1.06)	A – A (A)	45.68 - 56.52 (49.79)	1.20 - 1.48 (1.31)	A – A (A)	5.50 - 6.01 (5.67)	1.11 - 1.21 (1.14)	H – H (H)	33 – 46 (40)	1.14 - 1.59 (1.39)	H – H (H)

3.13 Aquatic Invasive Non-Native Species

3.13.1 An INNS desk study was undertaken using several datasets to collate the INNS baseline. The study area for INNS records was limited to the Hermitage Stream and River Itchen (source and receptor catchments), locations around the existing and proposed assets in or from which raw water may be moved or transferred. Data from the following sources was reviewed as part of the desk study:

1. Biological records from the HBIC [31] up to 2km from the Order Limits.
2. Open-source macroinvertebrate, macrophyte and fish data from all watercourses crossed by the Proposed Development from the EA Ecology and Fish Data Explorer [29] up to 2km from the Order Limits.
3. Results from ecological surveys undertaken for the purposes of the Proposed Development. It should be noted that no comprehensive surveys for INNS were carried out, therefore a precautionary approach was taken to assumed presence, even where there were no positive records.
4. The INNS South East Regional Invasive Species Management Plan (RIMP) [44].
5. The Test and Itchen Invasive Species Partnership [45].

The RAPID LIFE Project

3.13.2 The Reducing and Preventing Invasive Alien Species Dispersal (RAPID) LIFE project has produced five regional RIMPs and aims to deliver regionally relevant information and advice for controlling INNS that are already present in all or part of the region. Regions are based on EA management catchments, with two transitional and coastal catchments and 17 freshwater catchments included in the South East region. This includes the East Hampshire Rivers catchment and the Test and Itchen catchment, between which the source, pathway and receptor of the Proposed Development are located. The RIMP prioritises aquatic habitats and given the unlikely ingress of coastal and estuarine species to the freshwater habitats typical of the study area, only species found in freshwater aquatic habitats were considered relevant to this assessment. Forty-four freshwater species are included on the RIMP list of INNS species already present in the South East region, and these species were assumed as the initial unconstrained INNS baseline for the Proposed Development. All other data sources listed above were cross-checked with the RIMPS list and any additional records of INNS identified within were also included in the INNS baseline.

3.13.3 Table 3-42 shows the INNS species included in the initial unconstrained INNS baseline. The table indicates which species are considered ‘High Priority’ INNS species. High Priority INNS species are defined as:

1. Any species listed on Schedule 9 of the Wildlife and Countryside Act (as amended) 1981 [46].
2. Any species categorised as High Impact on the WFD-UKTAG aquatic alien species list [47].
3. Any species listed on the current European Invasive Alien Species of Union Concern (Regulation (EU) 1143/2014) [48].

4. Any species where the South East RIMP risk of introduction is considered High, a risk band based on how well established the species is in the region, and their predicted rate of colonisation.

Table 3-42 'High Priority' Invasive Non-Native Species present in the South East region

Scientific Name	Common Name	RIMP Risk of Introduction	WCA Schedule. 9 species (year added to Schedule)	WFD-UKTAG Risk	European Species of Union Concern
Elodea canadensis	Canadian pondweed	High	Yes (2010)	High	No
Lagarosiphon major	Curly waterweed	High	Yes (2005)	High	Yes
Hydrocotyle ranunculoides	Floating pennywort	High	Yes (2005)	High	Yes
Azolla filiculoides	Water fern	High	Yes (2005/2010)	High	No
Ludwigia grandiflora	Water primrose	Medium	Yes (2010)	High	Yes
Crassula helmsii	New Zealand pigmyweed	High	Yes (2005)	High	No
Elodea nuttallii	Nuttall's waterweed	High	Yes (2010)	High	Yes
Myriophyllum aquaticum	Parrot's feather	High	Yes (2010)	High	Yes
Sagittaria latifolia	Duck potato	Medium	Yes (2010)	N/A	No
Lysichton americanus	American Skunk Cabbage	High	No	High	Yes
Heracleum mantegazzianum	Giant hogweed	High	Yes (1981)	High	Yes
Fallopia sachalinensis	Giant knotweed	High	Yes (2010)	High	No
Gunnera tinctoria	Giant rhubarb	High	Yes (2010)	High	Yes
Galega officinalis	Goat's rue	High	No		No
Impatiens glandulifera	Himalayan balsam	High	Yes (2010)	High	Yes
Persicaria wallichii	Himalayan knotweed	High	No	High	No

Scientific Name	Common Name	RIMP Risk of Introduction	WCA Schedule. 9 species (year added to Schedule)	WFD-UKTAG Risk	European Species of Union Concern
Reynoutria japonica syn. Fallopia japonica	Japanese knotweed	High	Yes (2010)	High	No
Impatiens capensis	Orange balsam	High	No	Low	No
Dreissena polymorpha	Zebra mussel	High	No	High	No
Procambarus clarkii	Red swamp crayfish	Medium	Yes (2010)	High	Yes
Pacifastacus leniusculus	Signal crayfish	High	Yes (1992)	High	Yes
Orconectes limosus	Spiny-cheek crayfish	Medium	Yes (2010)	Moderate	Yes
Orconectes virilis	Virile crayfish	Medium	No	High	Yes
Eriocheir sinensis	Chinese mitten crab	High	Yes (2010)	High	Yes
Trachemys scripta spp	Terrapin	Medium	No	N/A	Yes
Pelophylax ridibundus	Marsh frog	High	No	N/A	No
Oxyura jamaicensis	Ruddy duck	Medium	Yes (1981)	N/A	Yes
Alopochen aegyptiacus	Egyptian goose	High	Yes (1981)	N/A	Yes
Neovison vison	American mink	High	No	N/A	No

The Test and Itchen Invasive Species Partnership

3.13.4 The Test and Itchen Invasive Species Partnership is a project between the Test and Itchen Catchment Partnership, the HIWWT and various stakeholders, aimed at managing the threat and impact of INNS in the Test and Itchen river catchments.

3.13.5 The Partnership has been monitoring INNS in the Test and Itchen catchments since 2021, with 14 INNS species identified as posing the most significant risk. These species are:

1. American skunk-cabbage *Lysichiton americanus*
2. Giant hogweed *Heracleum mantegazzianum*

3. Giant knotweed *Fallopia sachalinensis*
4. Himalayan balsam
5. Japanese knotweed *Fallopia japonica*
6. Bohemian knotweed *Fallopia x bohemica*
7. Orange balsam *Impatiens capensis*
8. Monkey flower *Mimulus guttatus*
9. Red-osier dogwood *Cornus sericea*
10. Floating pennywort
11. New Zealand pygmyweed
12. Parrot's feather
13. Water fern *Azolla filiculoides*
14. American mink *Neovison vison*

3.13.6 It is recognised that three species on the action list from the Test and Itchen Partnership are not included on the RIMP list for the South East region, namely bohemian knotweed, monkey flower, and Red-osier dogwood. This is probably because of the focus of the RIMP list was on species found in aquatic habitats, whereas these species are predominately terrestrial, often found in river margins, but also capable of growing in damp terrestrial environments. For completeness, they will be considered as High Priority in the same way as the RIMP list species for the Proposed Development.

Other notable Invasive Non-Native Species present at key locations

3.13.7 As well as the species identified in the South East RIMP list and the Test and Itchen Invasive Species Partnership, the following INNS species have been identified from HBIC biological records or from ecological surveys which have the potential to pose a current or future threat to the Proposed Development. Although not currently considered high-priority threats, they have been chosen due to their known populations in the East Hampshire Rivers, Test and Itchen or neighbouring catchments. Only species which have been assessed to have a high likelihood of arrival by the RAPID (2018) RIMP list have been included:

1. Quagga mussel *Dreissena rostriformis bugensis*
2. Jenkins' spire mudsnail
3. Caspian mud shrimp *Chelicorophium curvispinum*
4. Florida crangonyx *Crangonyx floridanus*
5. Demon shrimp *Dikerogammarus haemobaphes*
6. Killer shrimp *Dikerogammarus villosus*
7. Zebra mussel *Dreissena polymorpha*

3.13.8 These additional aquatic invertebrate species have the ability to alter ecosystems. Zebra and quagga mussels can encrust hard structures leading to operational issues (e.g. blocking pipes and encrusting sluices and penstocks). They filter large volumes of water, moving waterbodies from an algal-dominated state to a macrophyte dominated state. The killer shrimp is a predatory species, it feeds upon native invertebrates and become dominant at the expense of native species. This

could have impacts on the invertebrates in the wildfowl feeding areas such as the operational reservoir.

3.13.9 Two invasive low impact species, the Florida crangonyx (an amphipod crustacean) and the Jenkins' spire snail, have been identified in the desk study of the Proposed Development area. The impacts of these species in literature are currently inconclusive, but they both have the capability to become dominant within aquatic invertebrate communities. The Caspian mud shrimp is another successful invader displacing native amphipods and other invertebrate species which graze on algae.

3.13.10 Although there are no plans for recreational fishing at the operational Havant Thicket Reservoir, accidental fish stocks are likely (naturally input from the upstream catchment, carried by birds or illegal fish stocking for example) and there is a risk of INNS fish species being introduced. Examples of INNS fish species present in the catchment include zander *Sander lucioperca*, goldfish *Carassius auratus*, Prussian carp *Carassius gibelio* and Wels catfish *Silurus glanis*, but realistically input of any INNS fish species is a possibility. Thus, the presence of INNS fish species as a whole functional group should be considered accordingly for the Proposed Development.

4 Summary

4.1.1 This section summarises the freshwater ecology baseline within the ZoI of the Proposed Development. Baseline conditions for the following aquatic ecological receptors were assessed as they are potentially sensitive to impacts arising from the Proposed Development:

1. Aquatic habitats
2. Freshwater fish
3. Macrophytes
4. Phytobenthos
5. White-clawed crayfish
6. Aquatic macroinvertebrates

4.1.2 The ZoI was defined as 500m upstream and downstream of the Order Limits for aquatic habitats, macrophytes and phytobenthos, and 1km upstream and all suitable habitat with a downstream hydrological connection to the Order Limits for fish, aquatic macroinvertebrates and white-clawed crayfish.

4.1.3 The baseline was established through a combination of desk study and field surveys. The desk study area was defined as 2km upstream and downstream of the Order Limits. The field survey area was defined as the ZoI.

4.1.4 Third party aquatic ecology monitoring data were sourced from the EA, HBIC and NE for the desk study. Field surveys were undertaken between 2022 and 2024.

4.1.5 The Proposed Development spans a number of river catchments. The key findings of the baseline assessment are presented in Table 4-1 below for each river catchment.

Table 4-1 Summary of notable species identified by the desk study and during field surveys

Catchment	Species of conservation importance			Invasive Non-Native Species
	Fish	Macrophytes	Macroinvertebrates	
Riders Lane Stream	Bullhead (Annex II) European eel (S41)	None recorded	None recorded	Himalayan balsam Parrot's feather Jenkins' spire snail
Hermitage Stream	Bullhead (Annex II) European eel (S41)	None recorded	None recorded	Himalayan balsam Jenkins' spire snail Planarian flatworm *Planaria torva*
River Wallington	Bullhead (Annex II) European eel (S41) Brown/sea trout (S41)	None recorded	Purple dun mayfly (Nationally Scarce)	Himalayan balsam Jenkins' spire snail Amphipod shrimp *Crangonyx pseudogracilis/floridanus* Brown planarian flatworm

Catchment	Species of conservation importance			Invasive Non-Native Species
	Fish	Macrophytes	Macroinvertebrates	
River Meon	Bullhead (Annex II) European eel (S41) Brown/sea trout (S41) Brook lamprey (Annex II and S41) Atlantic salmon (Annex II and S41)	None recorded	Southern damselfly (Annex II) Purple dun mayfly (Nationally Scarce) Riffle beetle *Riolus subviolaceus* (Nationally Scarce) Caddisfly *Allotrichia pallicornis* (Nationally Scarce) Caddisfly *Notidobia ciliaris* (Nationally Scarce) Ram's horn snail *Gyraulus laevis* (Nationally Scarce) Blue-winged olive mayfly (Nationally Scarce) Trumpet-net caddisfly *Tinodes unicolor* (Nationally Notable) Banded general soldier fly (Nationally Notable) Mayfly *Caenis pseudorivulorum* (Nationally Rare)	Himalayan balsam Orange balsam Canadian pondweed New Zealand pigmyweed Jenkins' spire snail Amphipod shrimp *Crangonyx pseudogracilis/floridanus* Brown planarian flatworm
South East coastal	None recorded	None recorded	None recorded	Jenkins' spire snail
Moors Stream	Brown/sea trout (S41)	Fen pondweed (Nationally Scarce) Flat-sedge (S41)	Riffle beetle *Riolus subviolaceus* (Nationally Scarce) Caddisfly *Potamophylax rotundipennis* (Nationally Scarce) Caddisfly *Allotrichia pallicornis* (Nationally Scarce) Stonefly *Amphinemura standfussi* (Nationally Scarce) Trumpet-net caddisfly (Nationally Notable)	Himalayan balsam Jenkins' spire snail Amphipod shrimp *Crangonyx pseudogracilis/floridanus*

Catchment	Species of conservation importance			Invasive Non-Native Species
	Fish	Macrophytes	Macroinvertebrates	
Main River Hamble	Bullhead (Annex II) European eel (S41) Brown/sea trout (S41) Brook lamprey (Annex II and S41)	None recorded	Long-horned soldier fly (Nationally Scarce) Diving beetle *Nebrioporus depressus* (Nationally Notable)	Himalayan balsam Jenkins' spire snail Amphipod shrimp *Crangonyx pseudogracilis/floridanus*
Upper Hamble	Bullhead (Annex II) European eel (S41) Brown/sea trout (S41) Brook lamprey (Annex II and S41)	None recorded	True fly *Dixa maculata* (Nationally Scarce) Caddisfly *Potamophylax rotundipennis* (Nationally Scarce) Caddisfly *Limnephilus bipunctatus* (Nationally Scarce) Red-legged moss beetle (Nationally Scarce) Nut orb mussel (Nationally Scarce)	Himalayan balsam New Zealand pigmyweed Jenkins' spire snail
Horton Heath Stream	Bullhead (Annex II) European eel (S41) Brown/sea trout (S41)	None recorded	None recorded	Amphipod shrimp *Crangonyx pseudogracilis/floridanus*
Bow Lake	Bullhead (Annex II) European eel (S41)	None recorded	None recorded	Blue orfe Golden goldfish Golden orfe Koi carp Mirror carp Himalayan balsam Canadian pondweed Giant hogweed Signal crayfish Jenkins' spire snail
River Itchen and Itchen Navigation	Bullhead (Annex II) European eel (S41)	Water violet (Red List Vulnerable)	Southern damselfly (Annex II) Southern iron blue mayfly (S41)	Himalayan balsam Orange balsam American skunk cabbage Monkey flower

Catchment	Species of conservation importance			Invasive Non-Native Species
	Fish	Macrophytes	Macroinvertebrates	
	Brown/sea trout (S41) Brook lamprey (Annex II and S41) Atlantic salmon (Annex II and S41)		White-clawed crayfish Caddisfly *Ylodes conspersus* (Nationally Scarce) Caddisfly *Potamophylax rotundipennis* (Nationally Scarce) Dark olive mayfly (Nationally Scarce) Riffle beetle *Riolus subviolaceus* (Nationally Scarce) Diving beetle *Deronectes latus* (Nationally Scarce) Water beetle *Hydraena rufipes* (Nationally Scarce) Iron blue mayfly (Nationally Rare) Mayfly *Caenis pusilla* (Nationally Rare)	Signal crayfish Jenkins' spire snail Amphoipod shrimp *Crangonyx pseudogracilis/floridanu* Planarian flatworm *Planaria torva*

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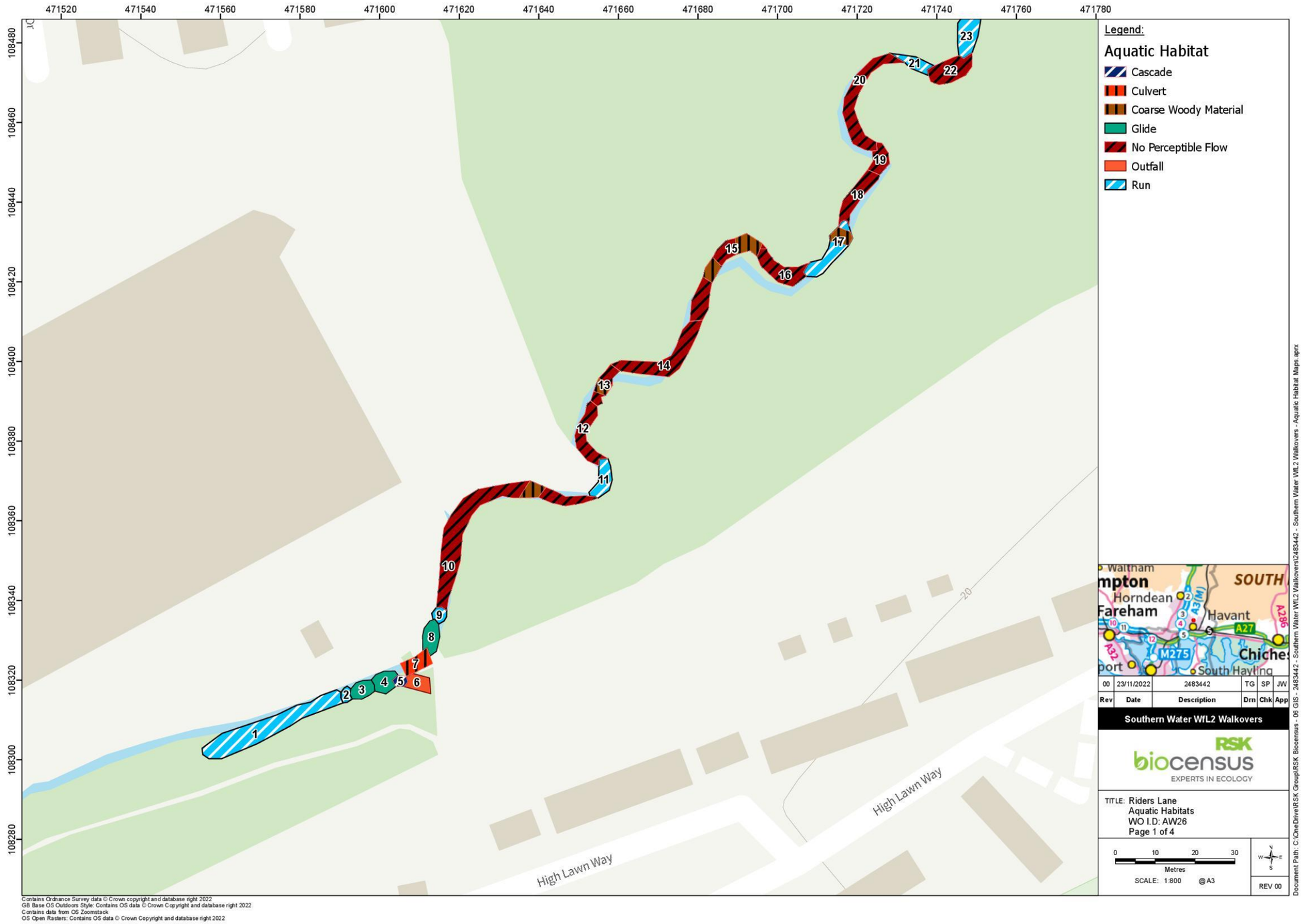
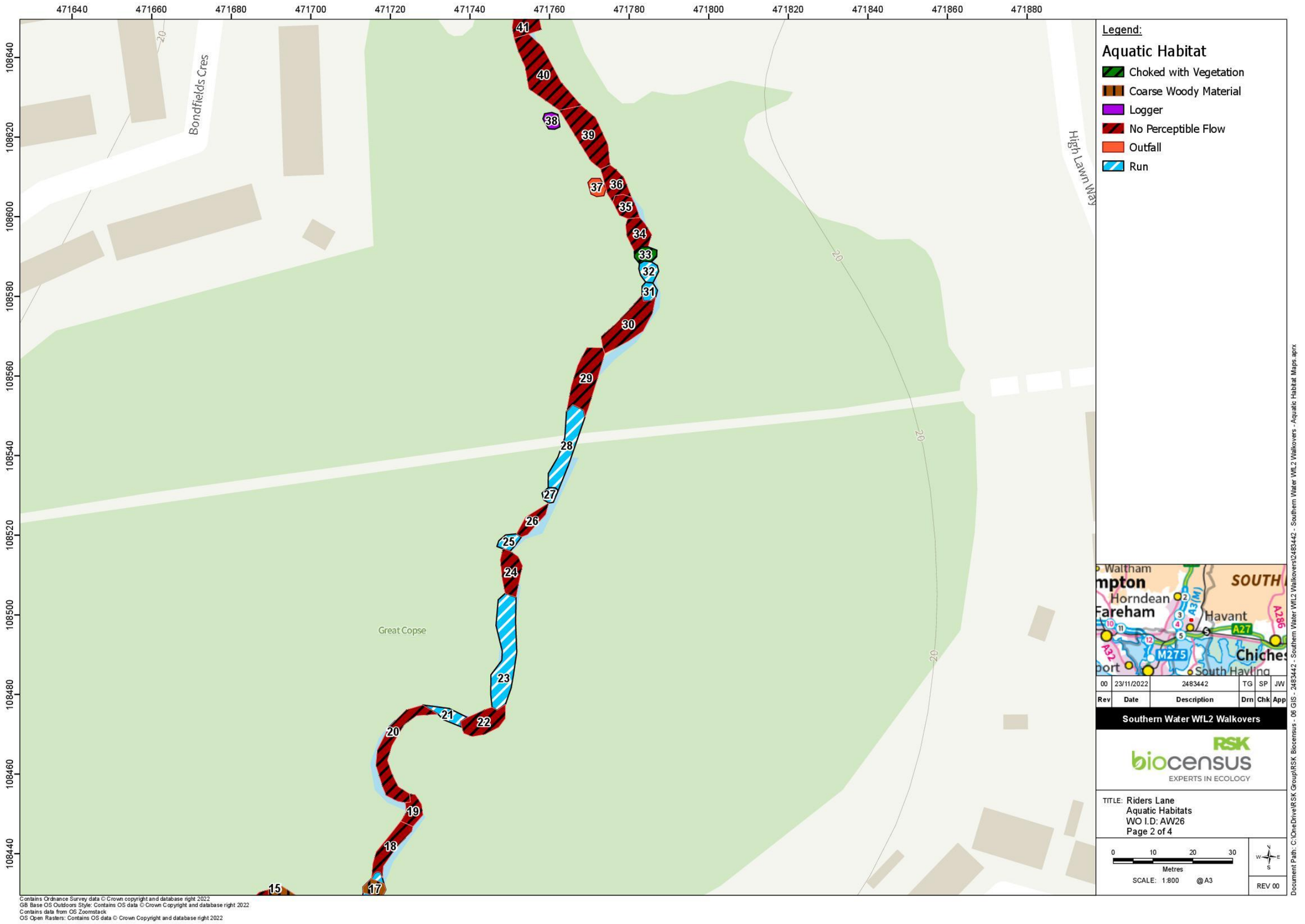
Annex A Site-specific aquatic habitat survey maps

A.1 Riders Lane Stream

Graphic A-1 Riders Lane Stream aquatic habitats – Site AW26

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Bondfields Cres
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Great Copse
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Legend:
Aquatic Habitat
Choked with Vegetation
Coarse Woody Material
Logger
No Perceptible Flow
Outfall
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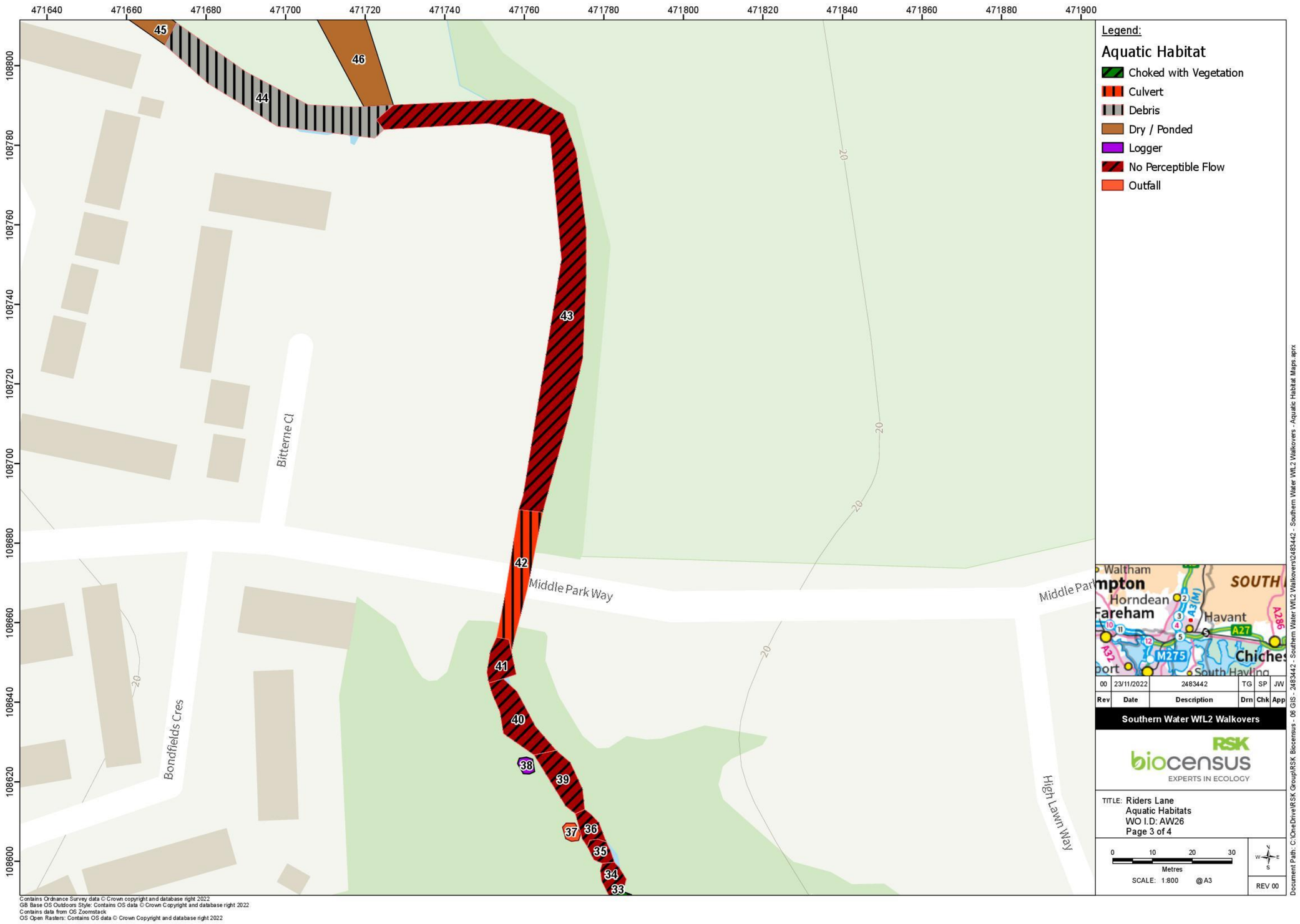
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Legend:
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Choked with Vegetation
Culvert
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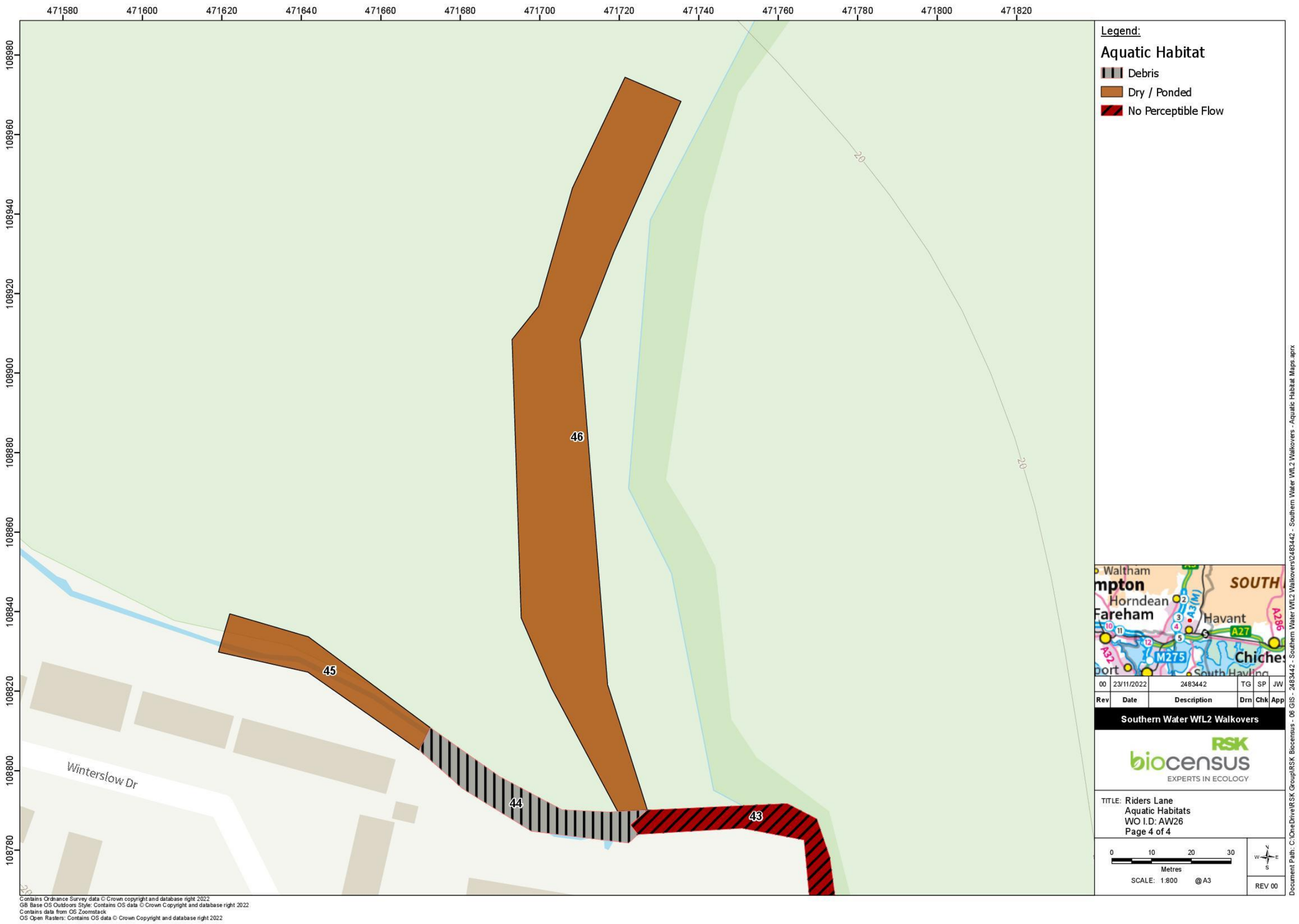
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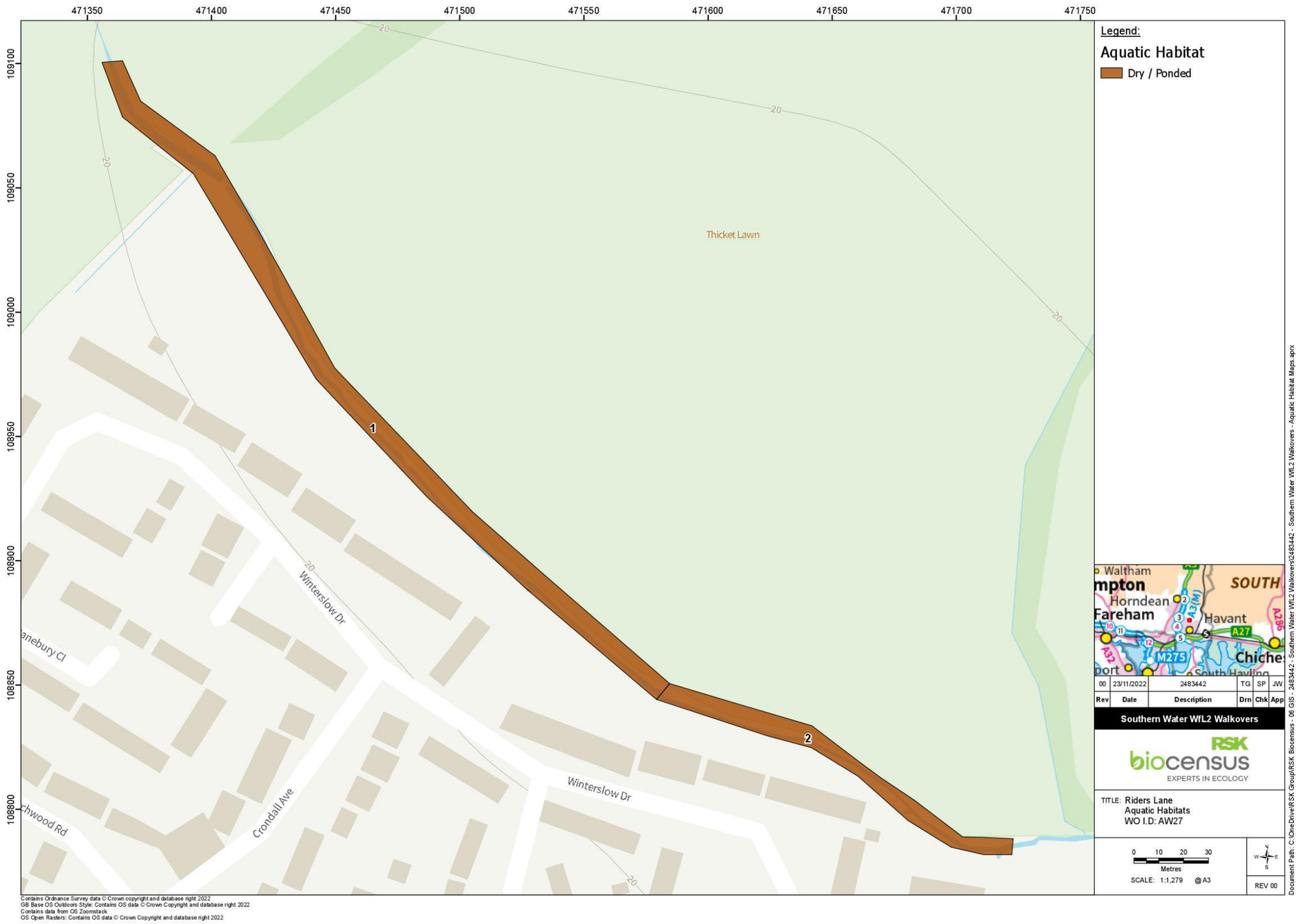
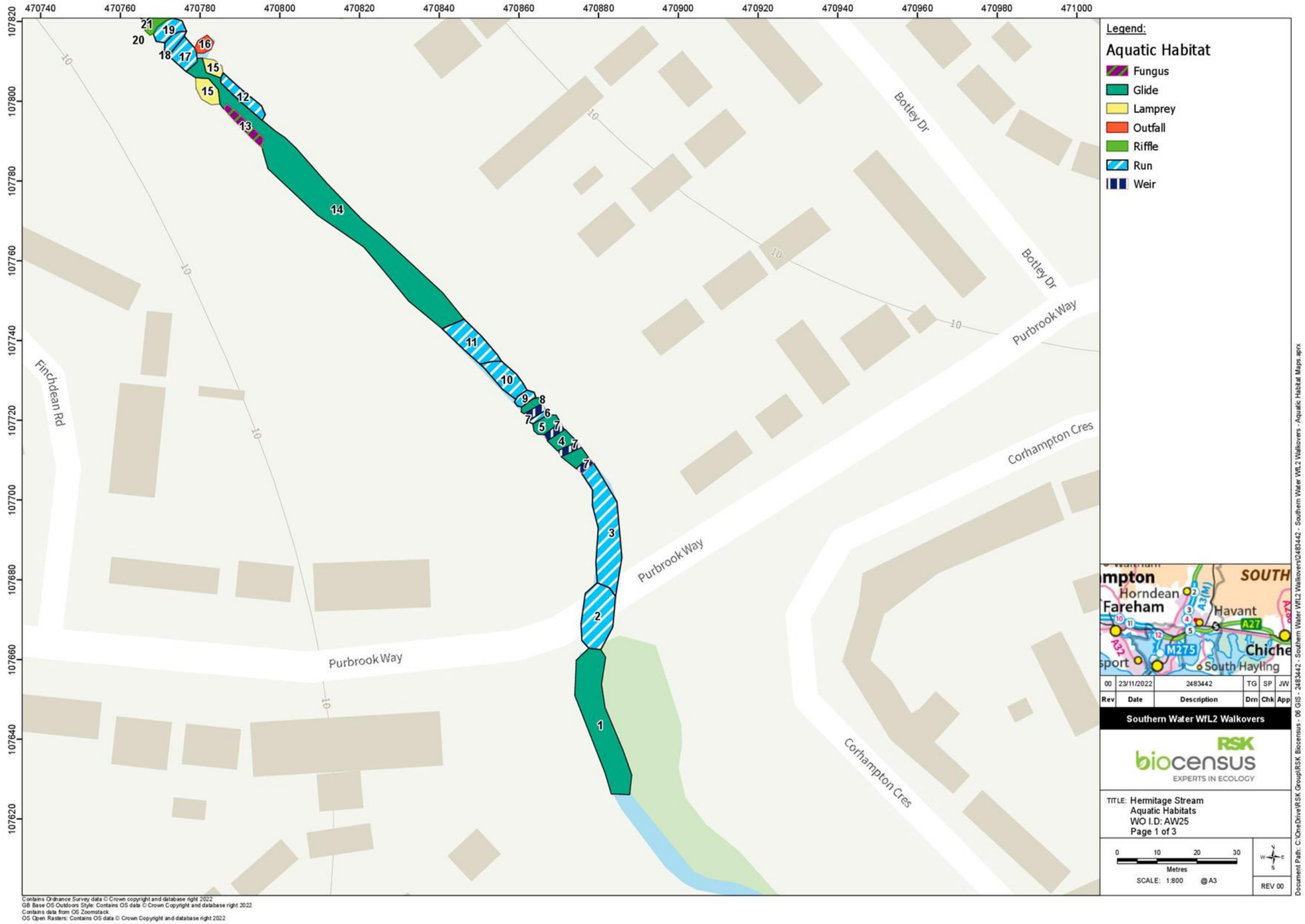
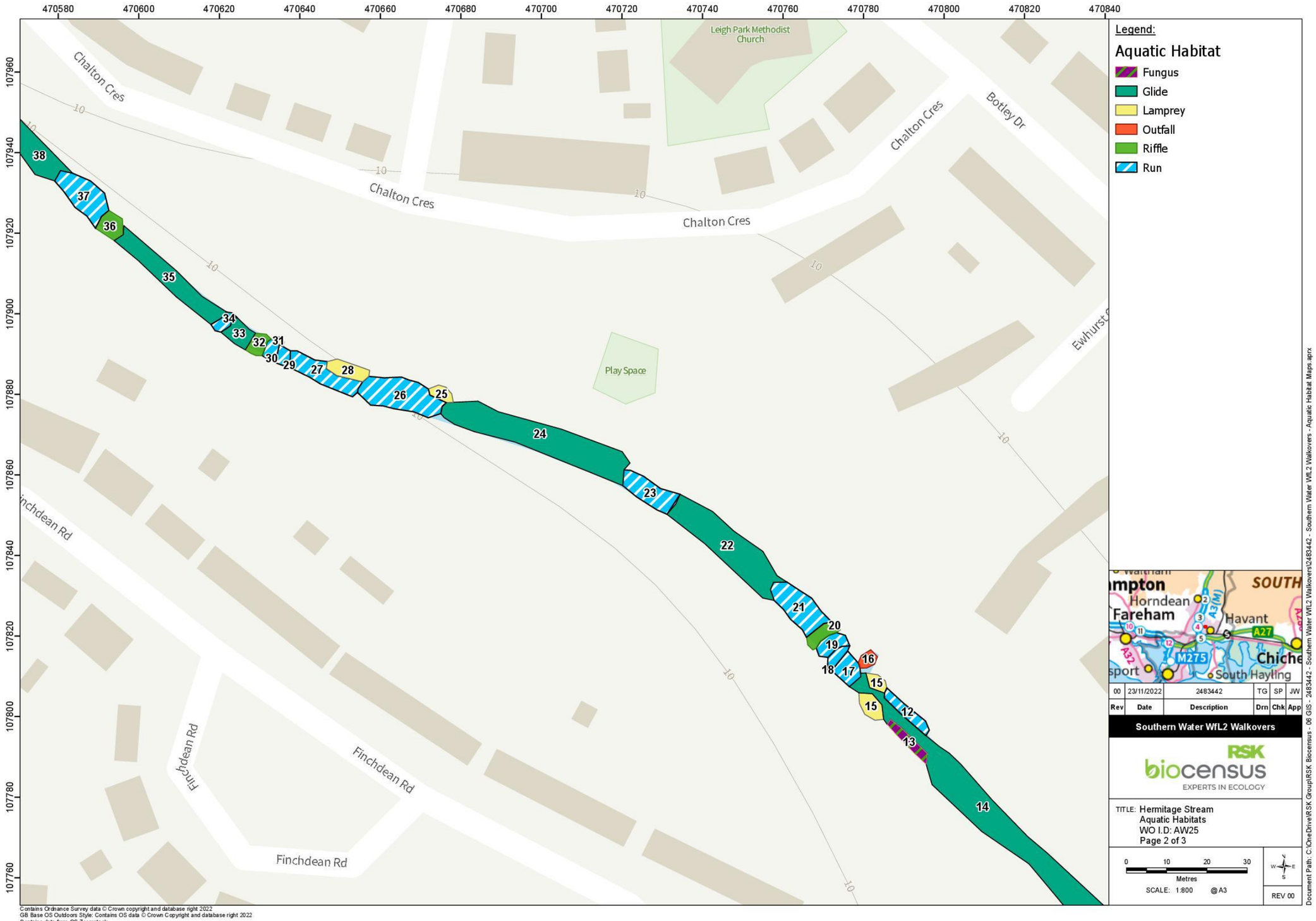
Graphic A-2 Riders Lane Stream aquatic habitats – Site AW27



A.2 Hermitage Stream

Graphic A-3 Hermitage Stream aquatic habitats – Site AW25

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Leigh Park Methodist Church
Chalton Cres
Botley Dr
Play Space
Finchdean Rd
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Legend:
Aquatic Habitat
Fungus
Glide
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Outfall
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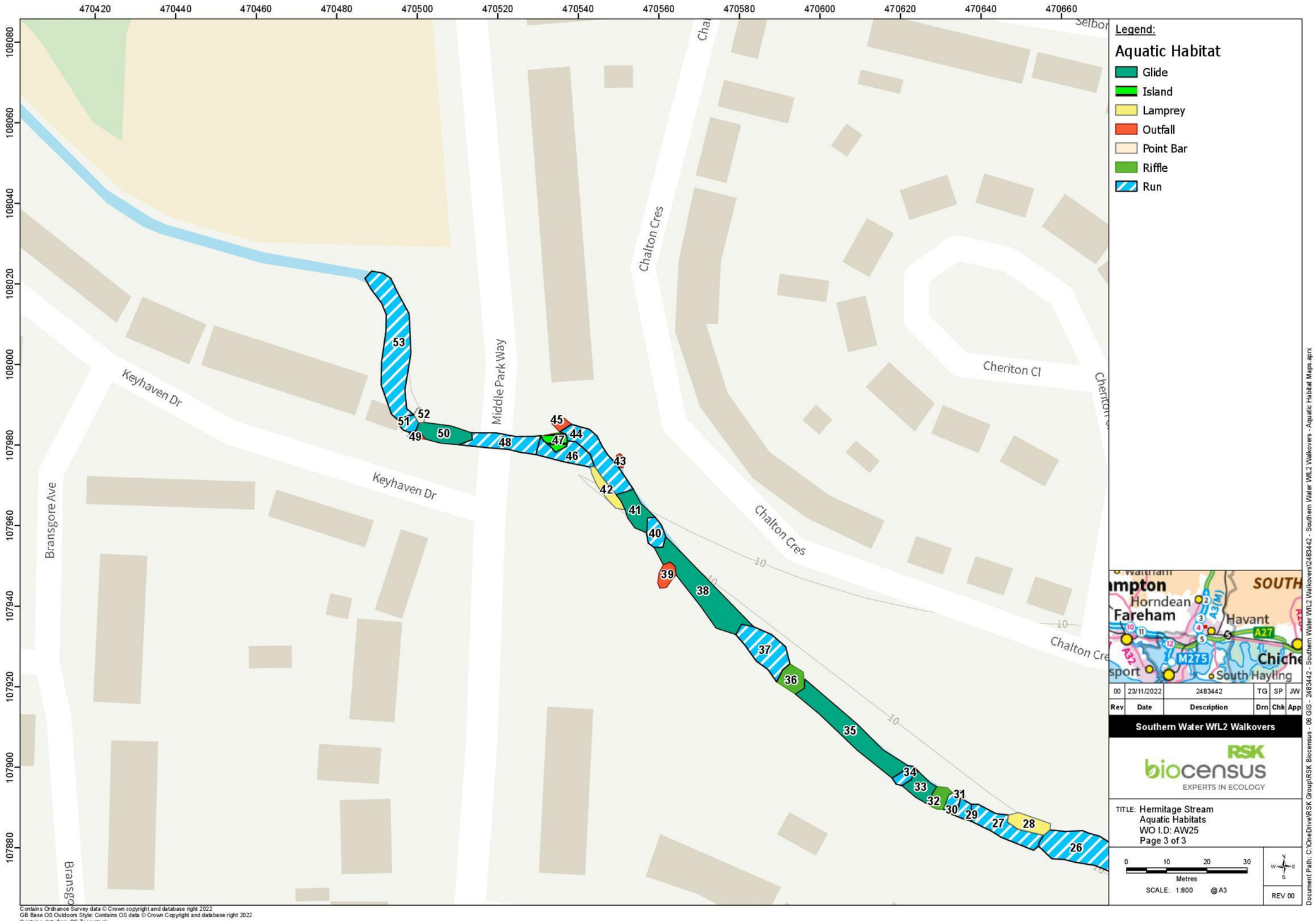
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Legend:
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Riffle
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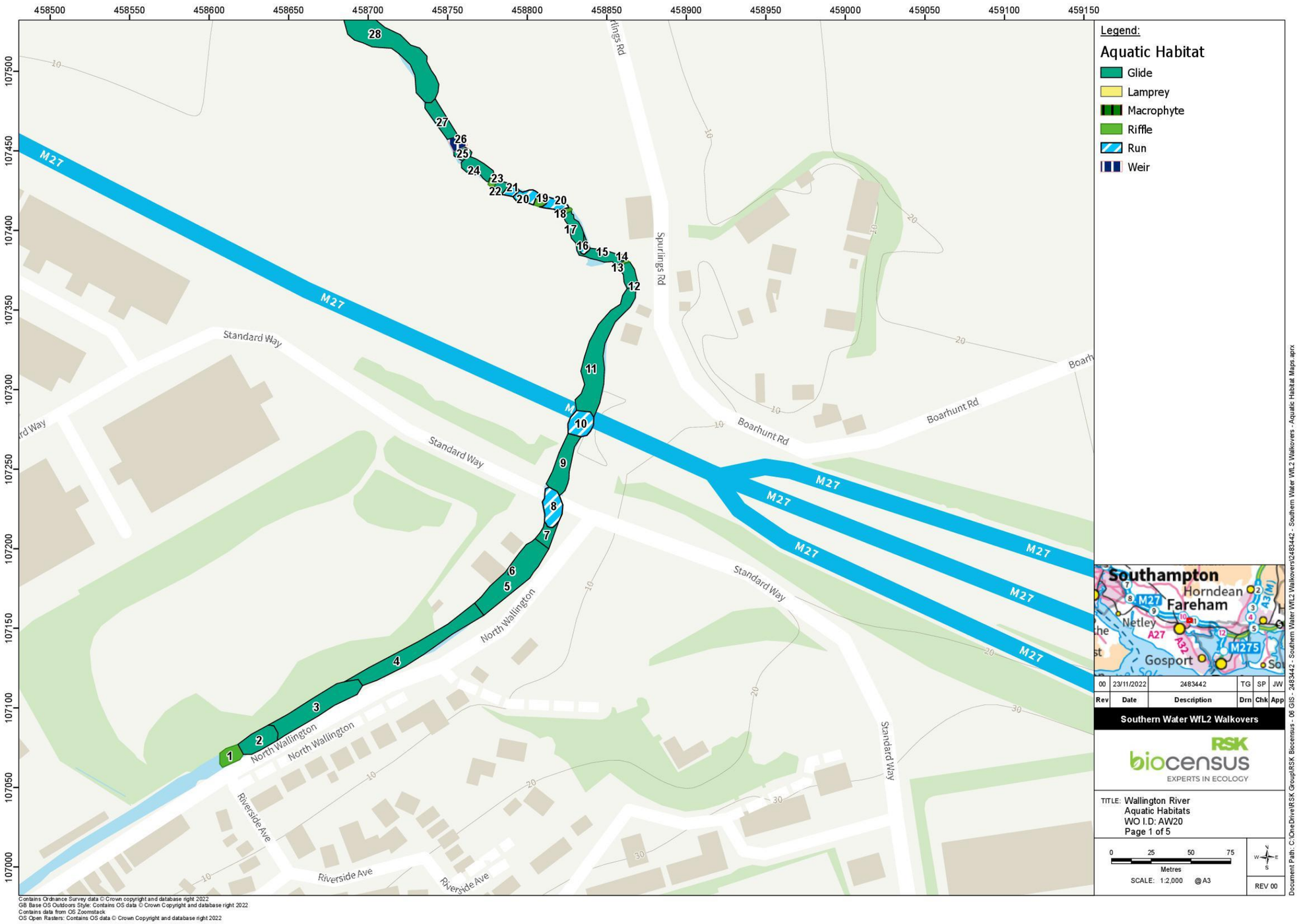
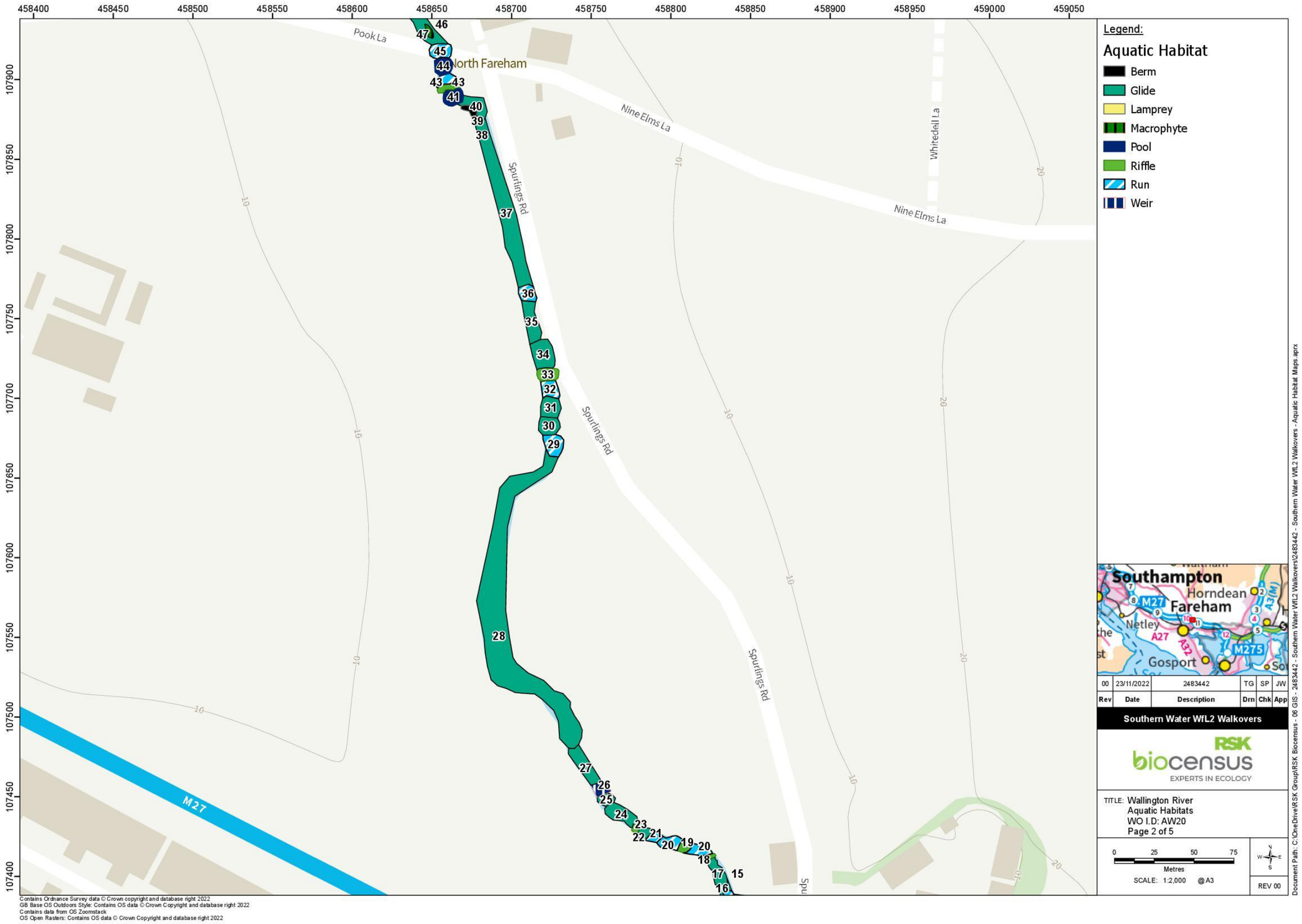
A.3 River Wallington

Graphic A-4 River Wallington aquatic habitats – Site AW20

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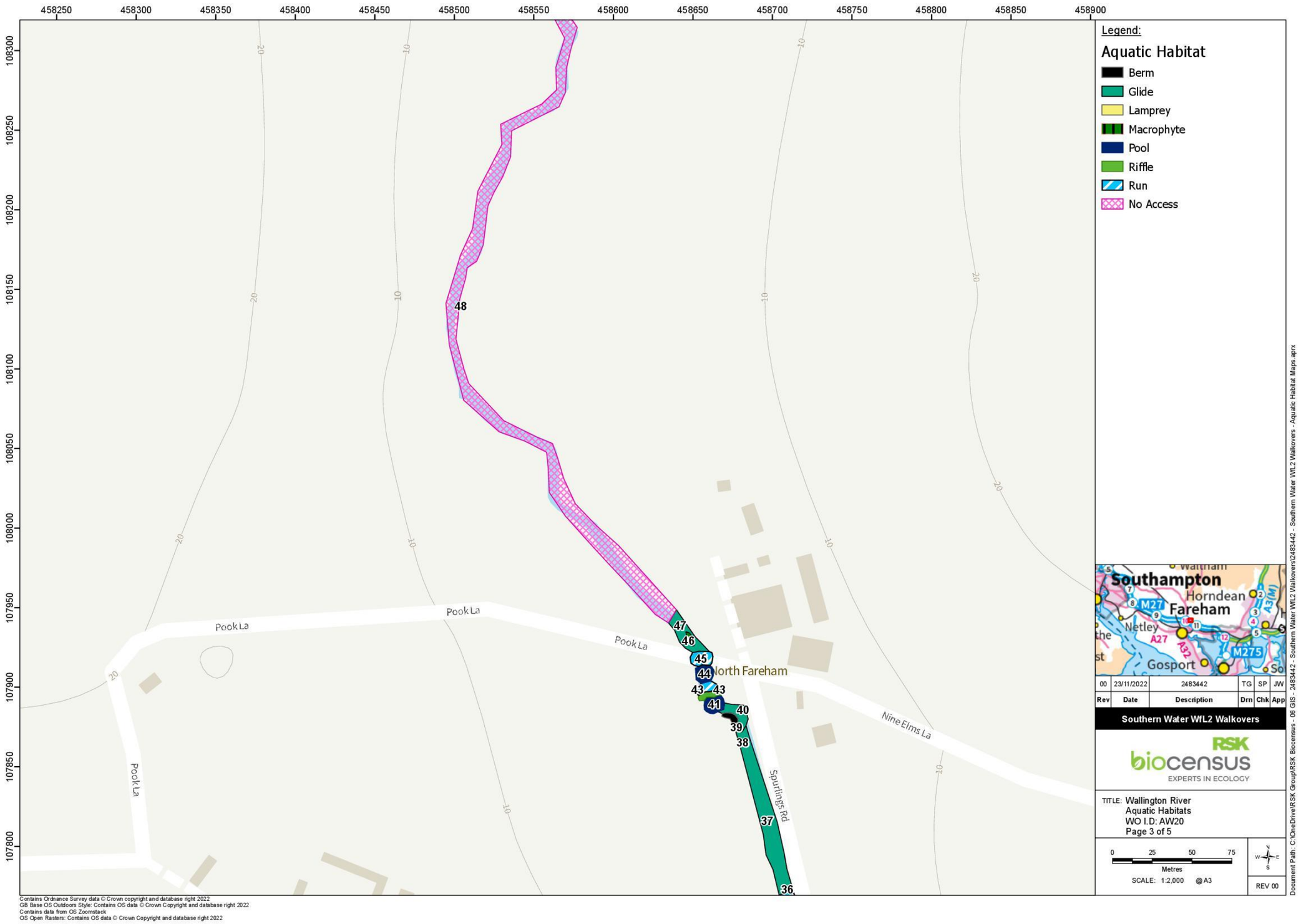

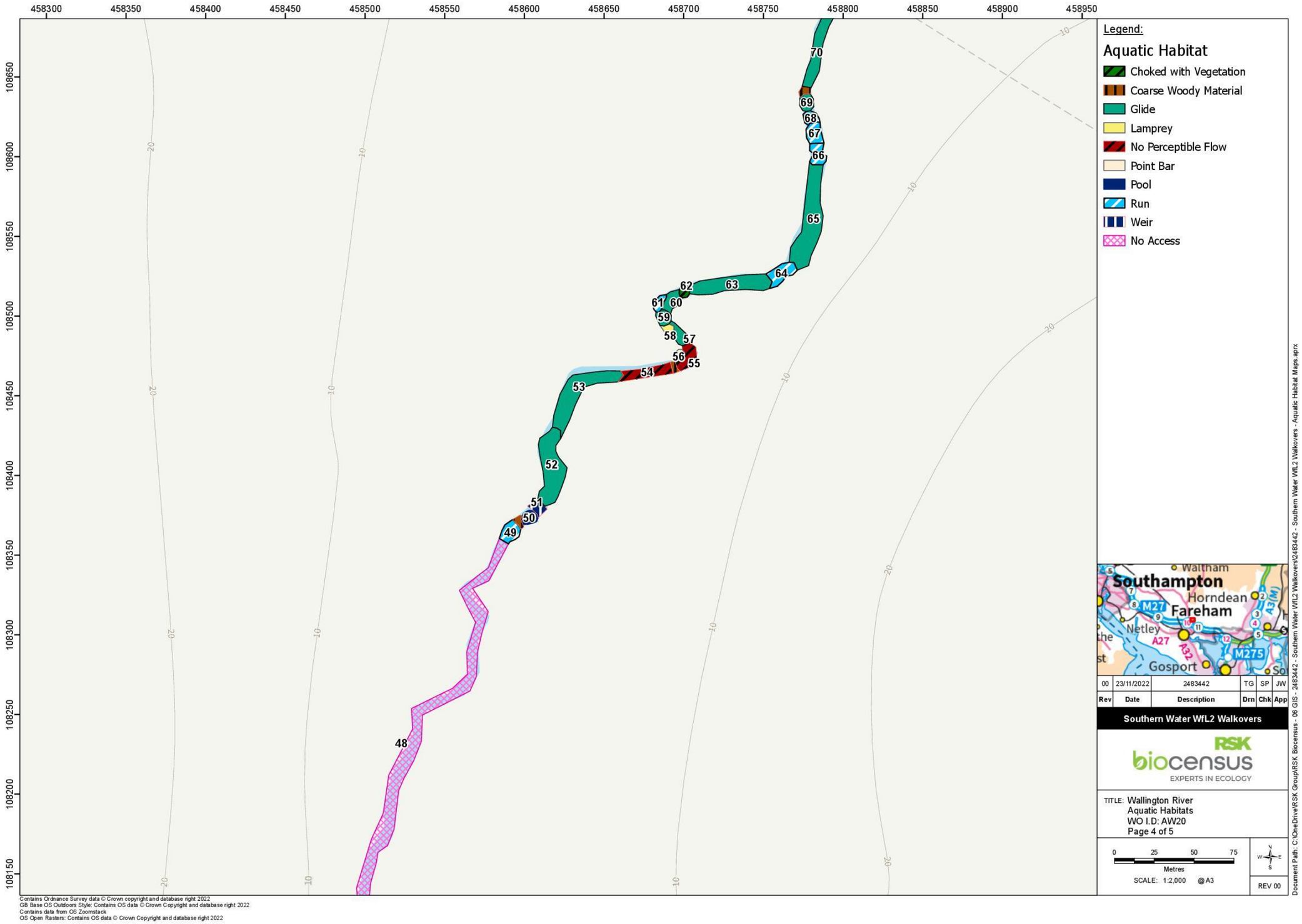
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Legend:
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Glide
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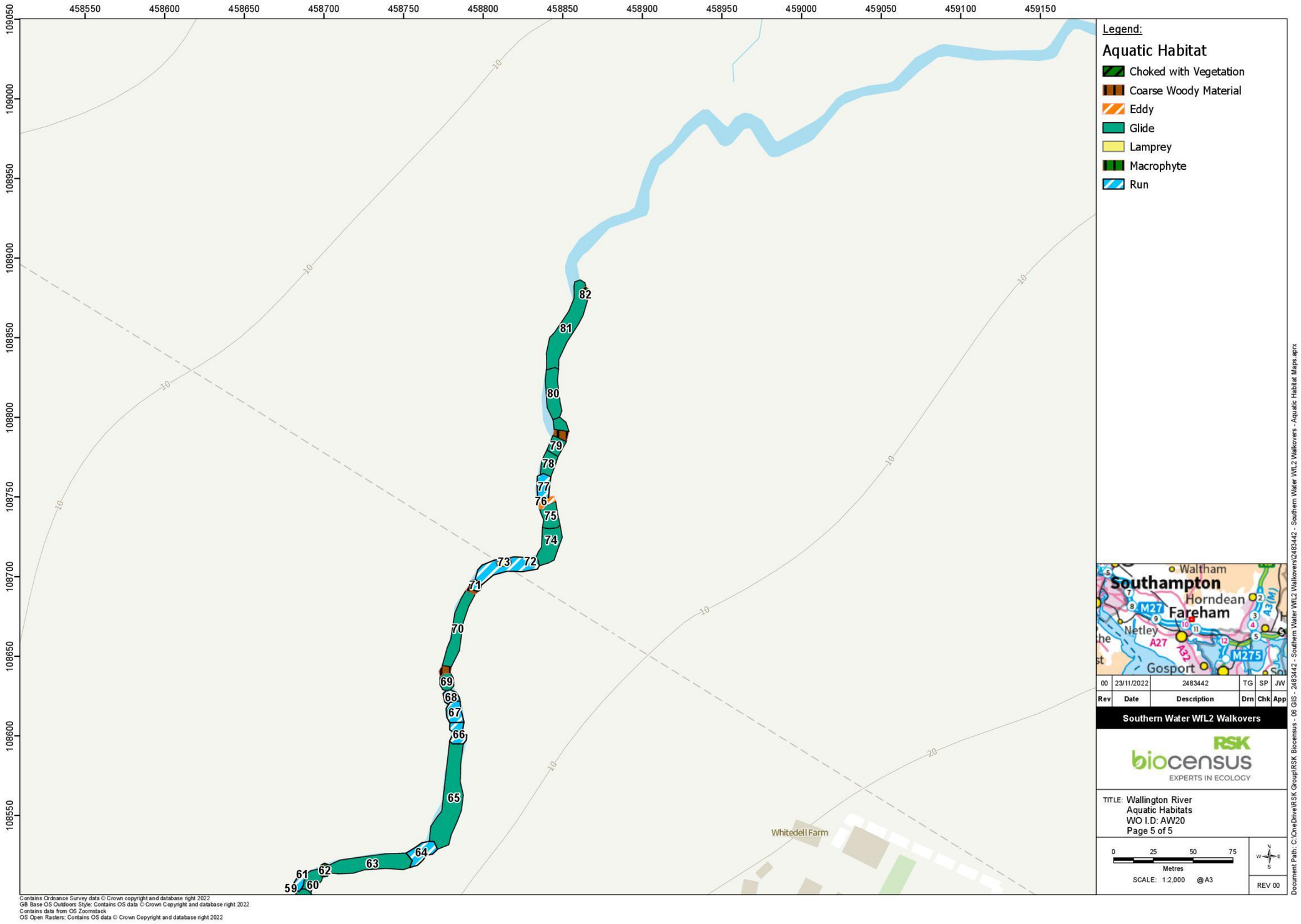
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Lamprey
Macrophyte
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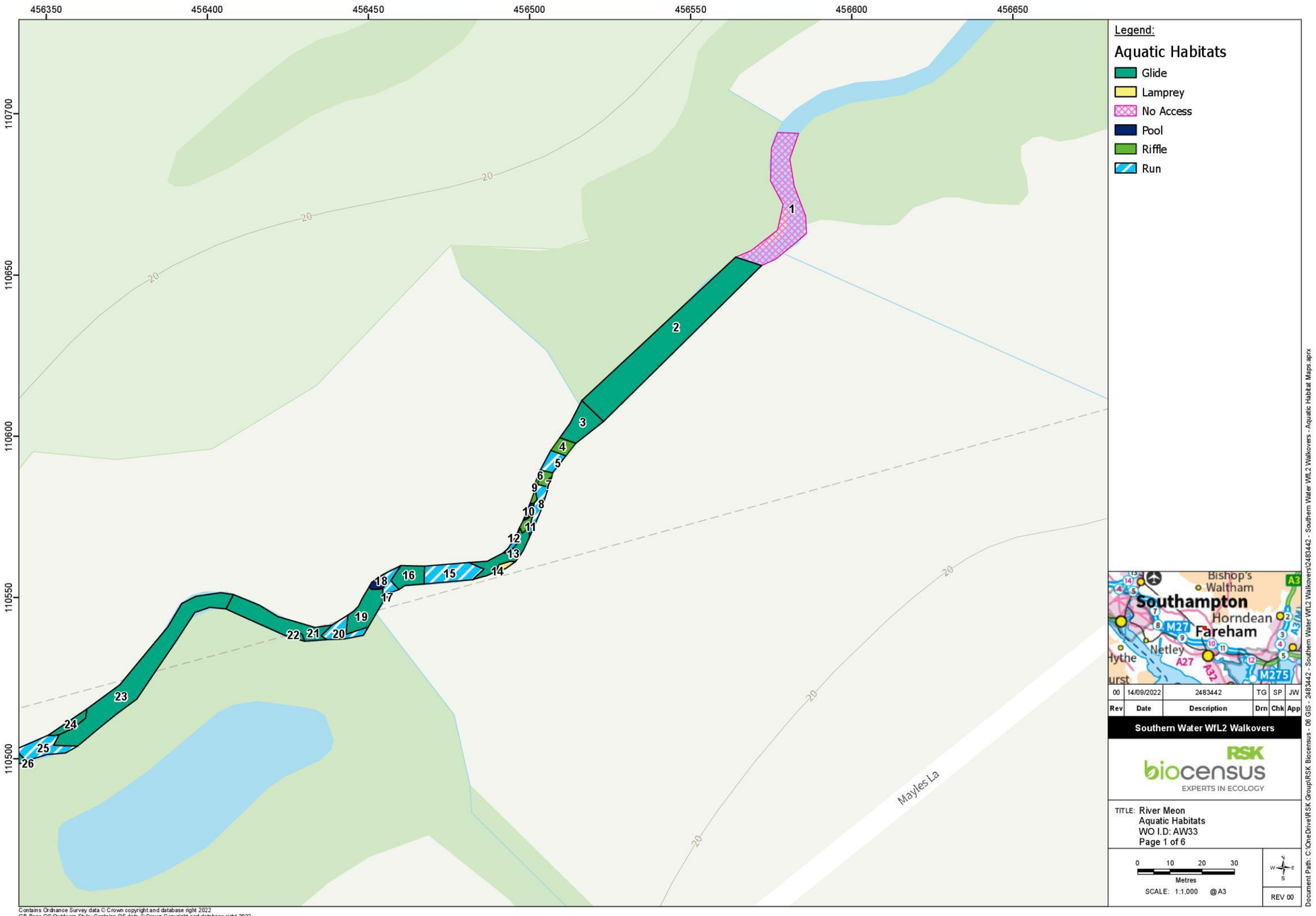
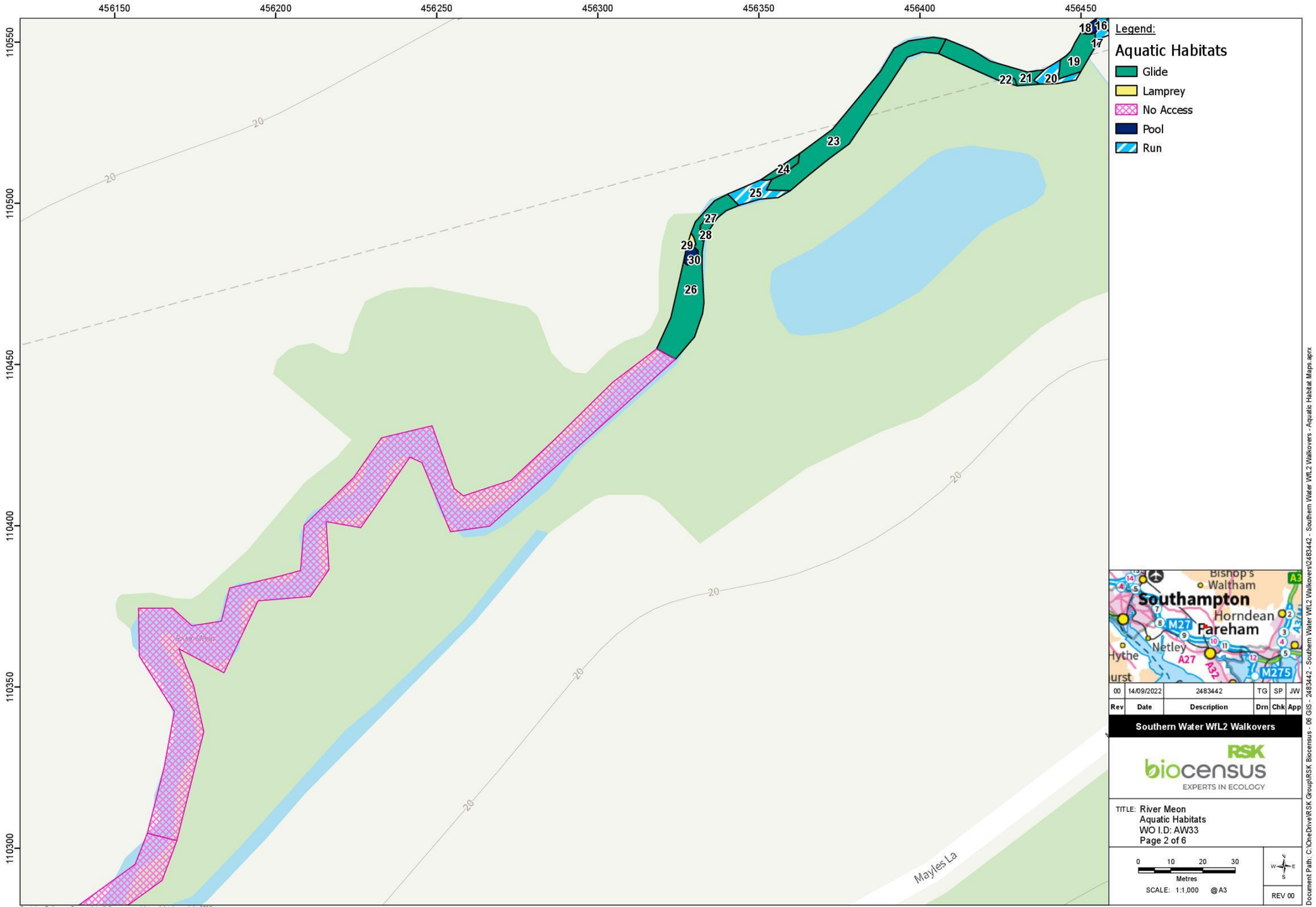
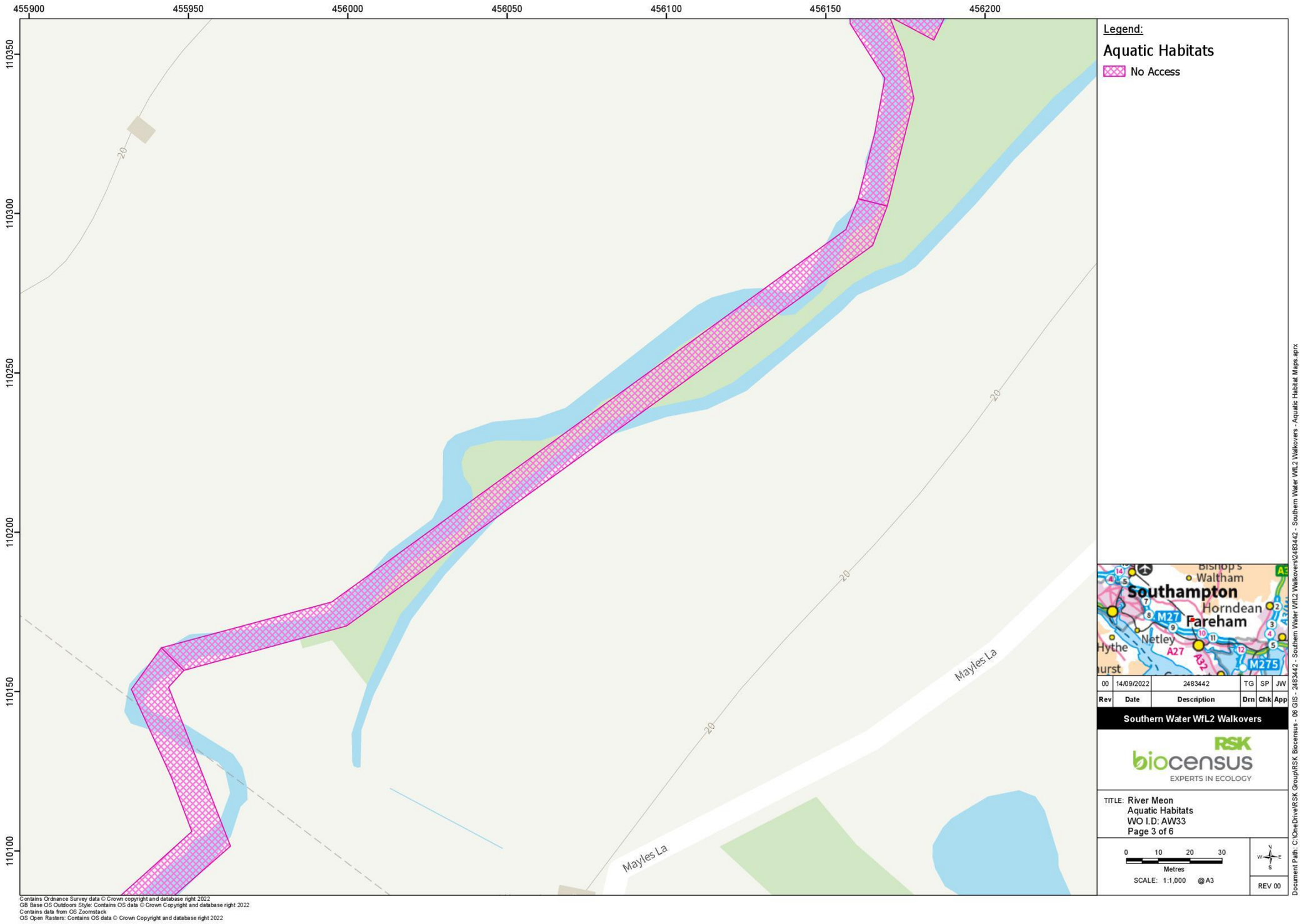
A.4 River Meon

Graphic A-5 River Meon aquatic habitats – Site AW33



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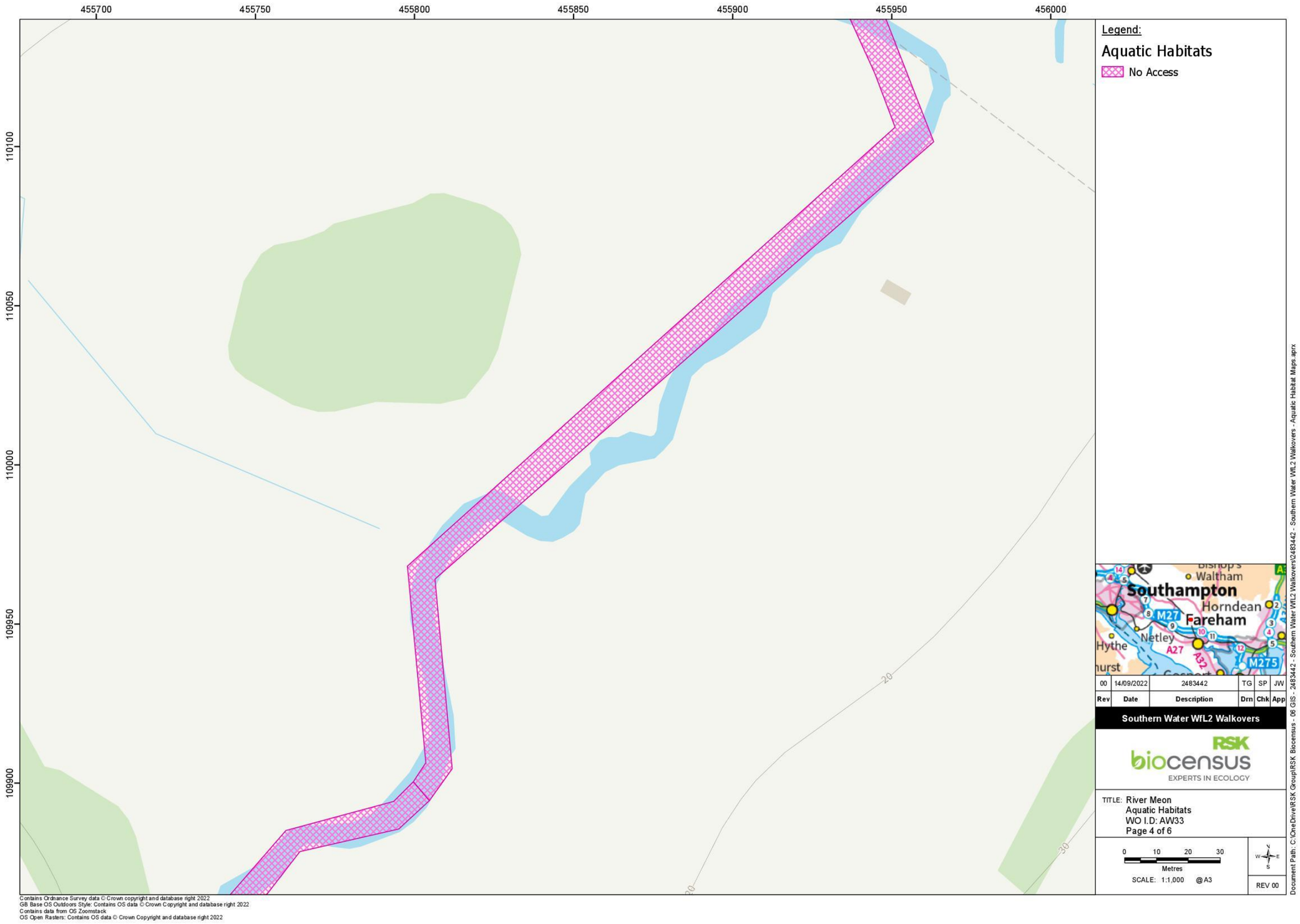
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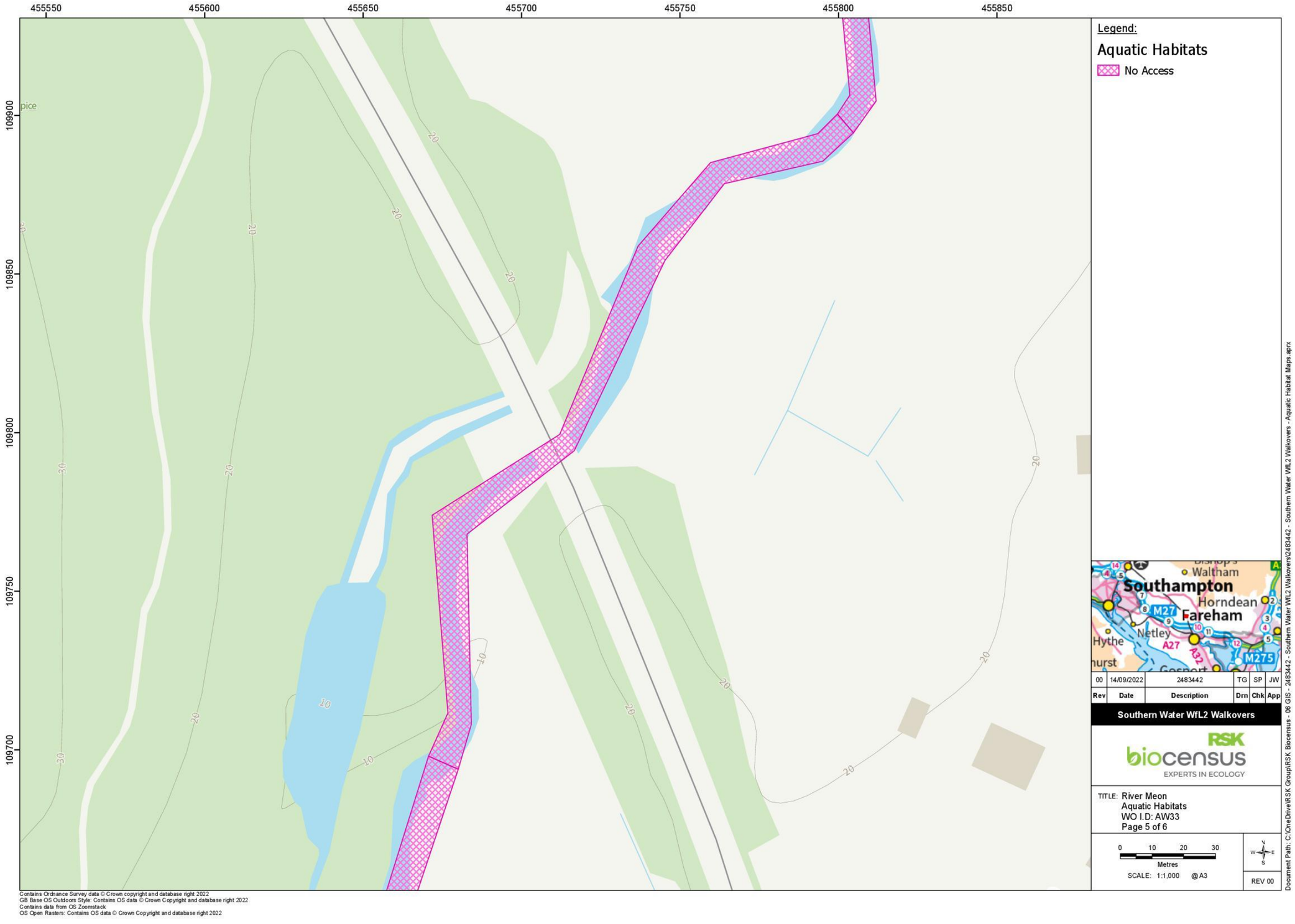
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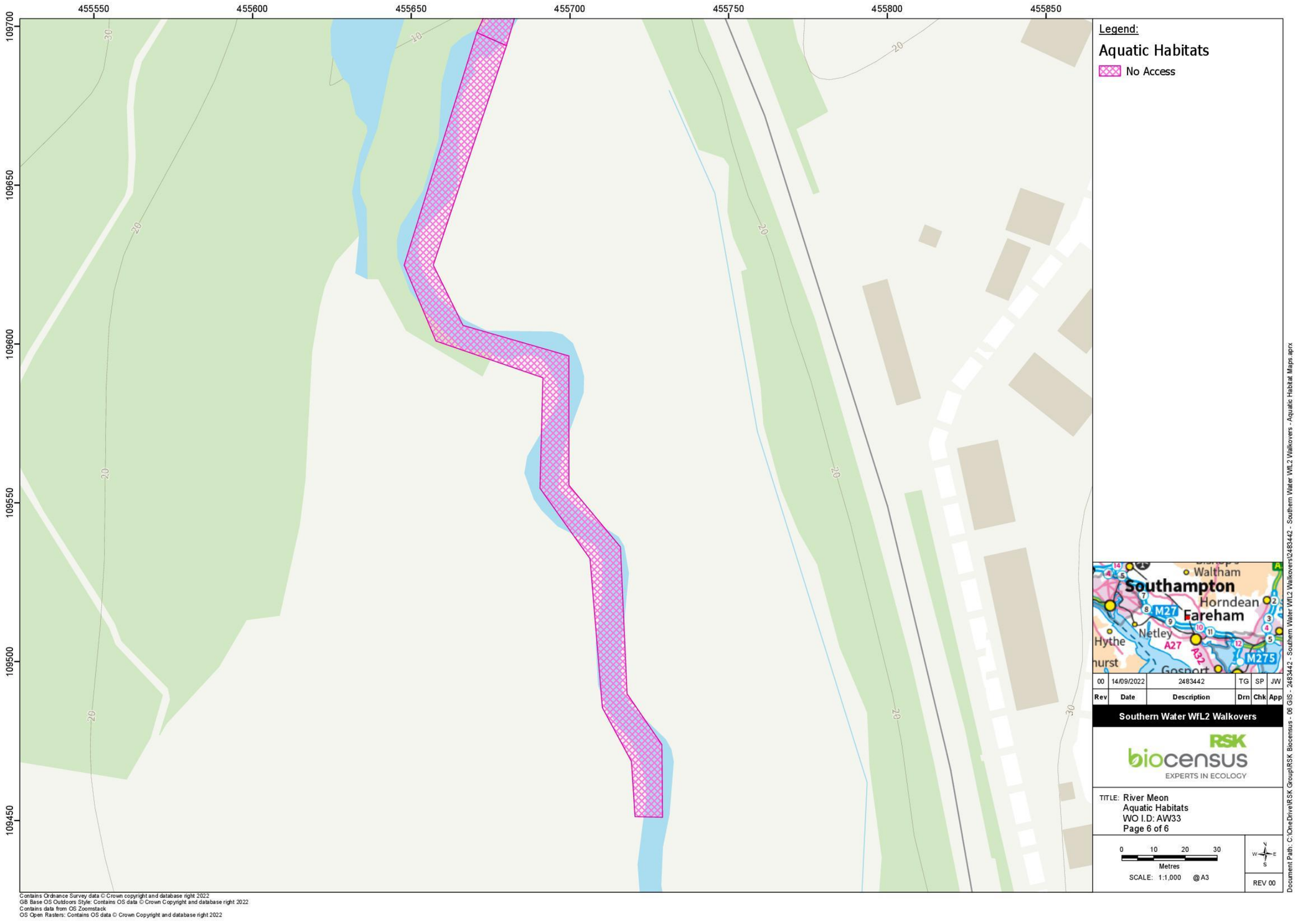
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Rev Date Description Drn Chk App
Southern Water WfL2 Walkovers
RSK biocensus
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WO I.D: AW33
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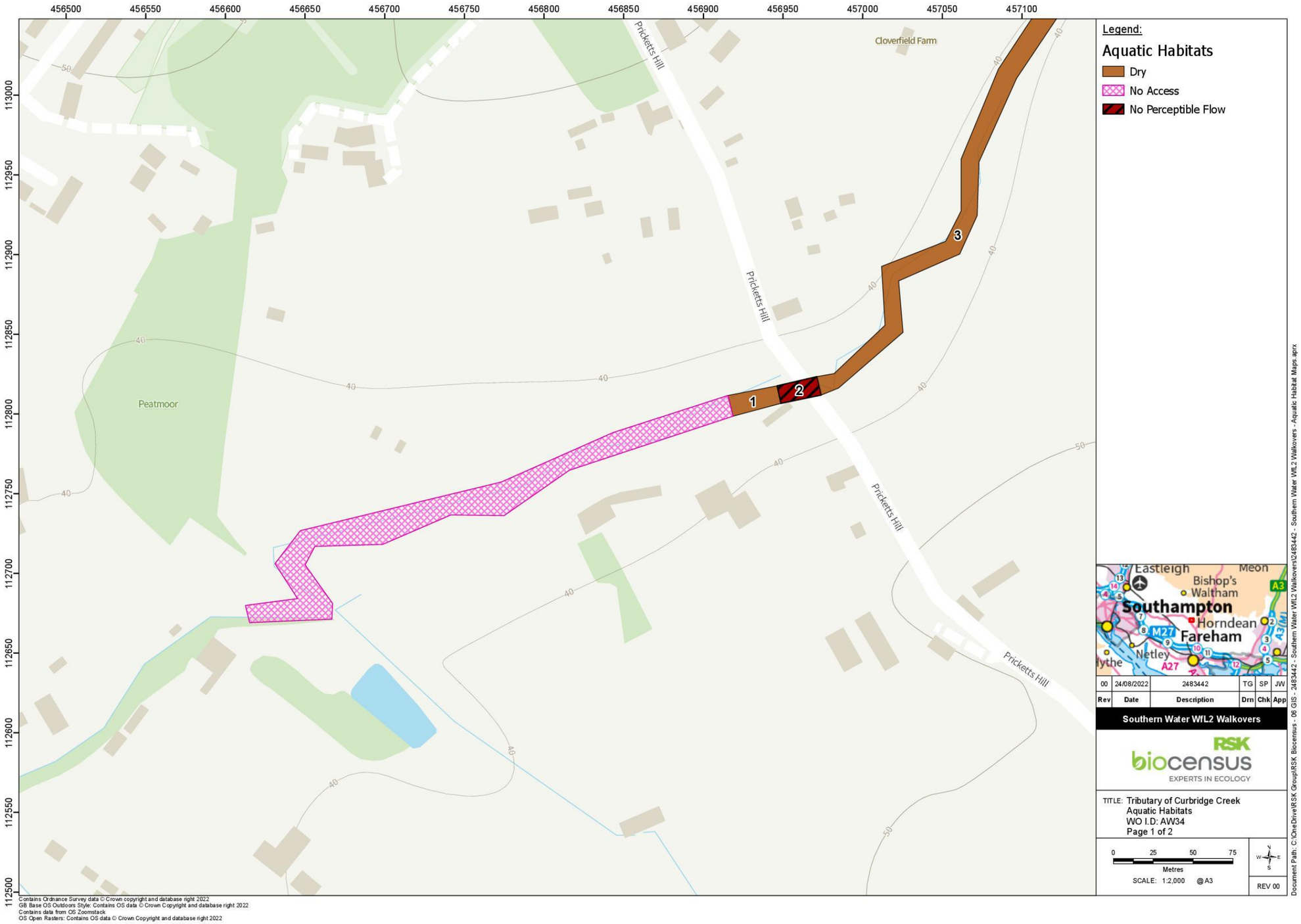
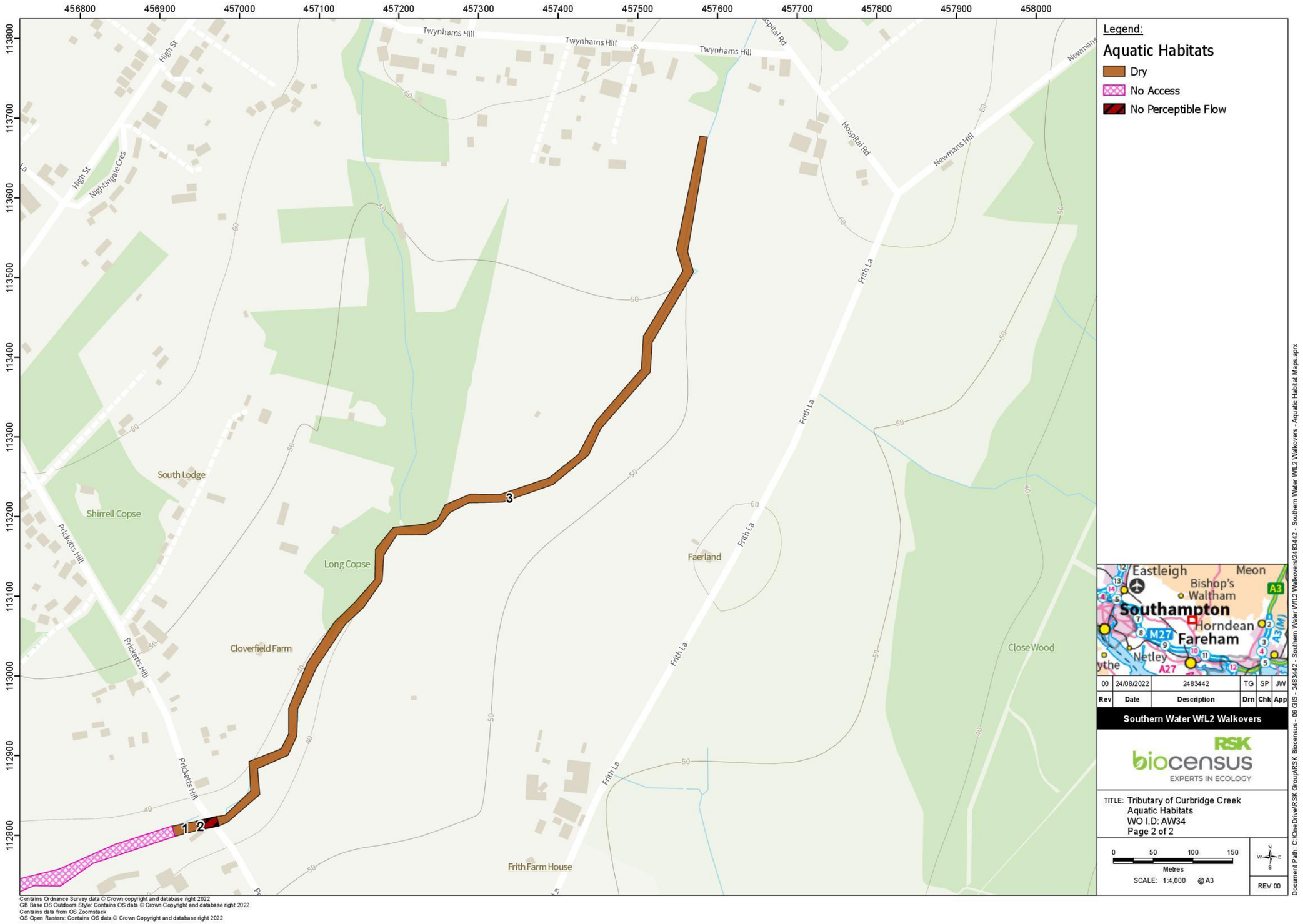
A.5 Moors Stream

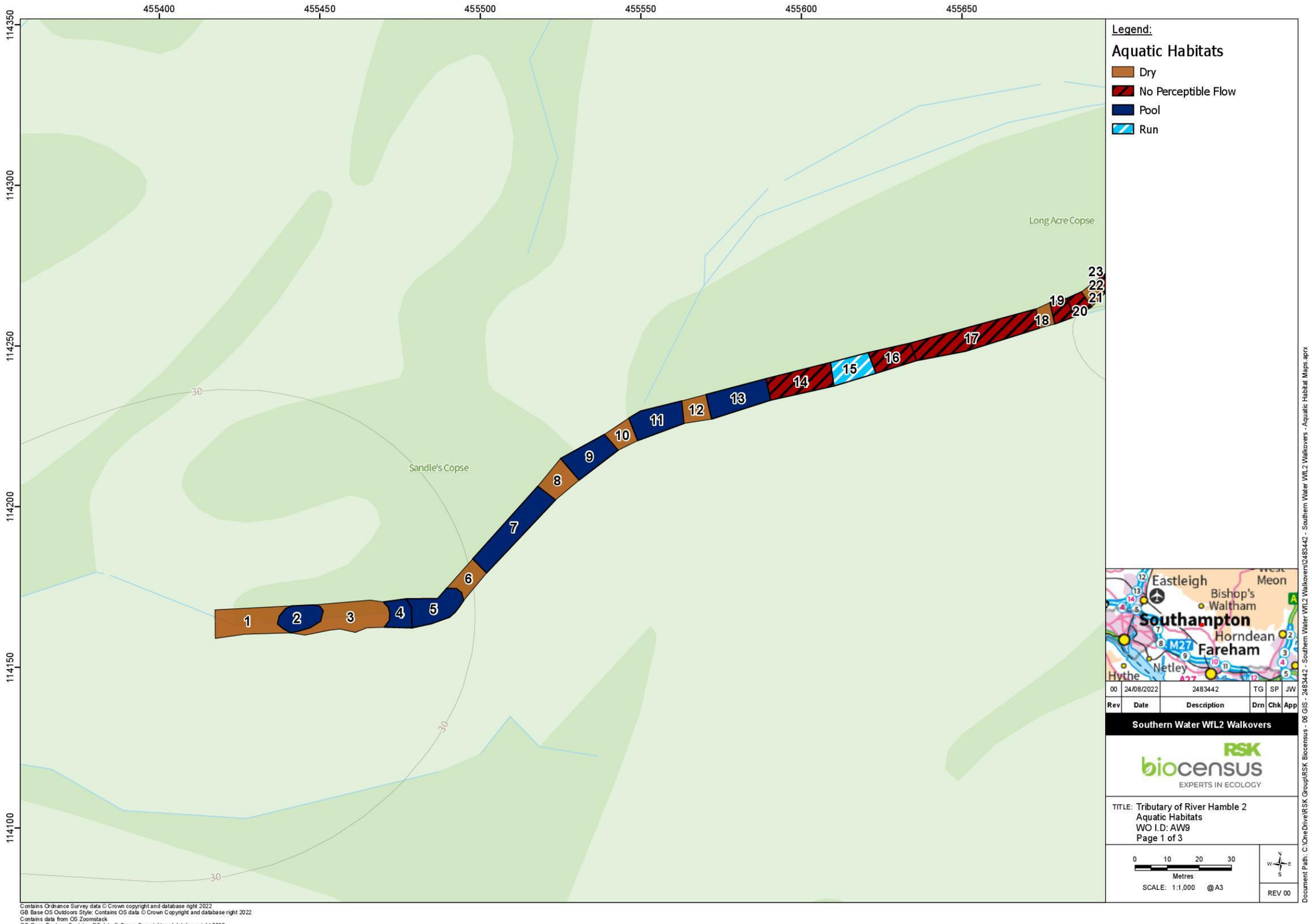
Graphic A-6 Tributary of Curbridge Creek aquatic habitats – Site AW34

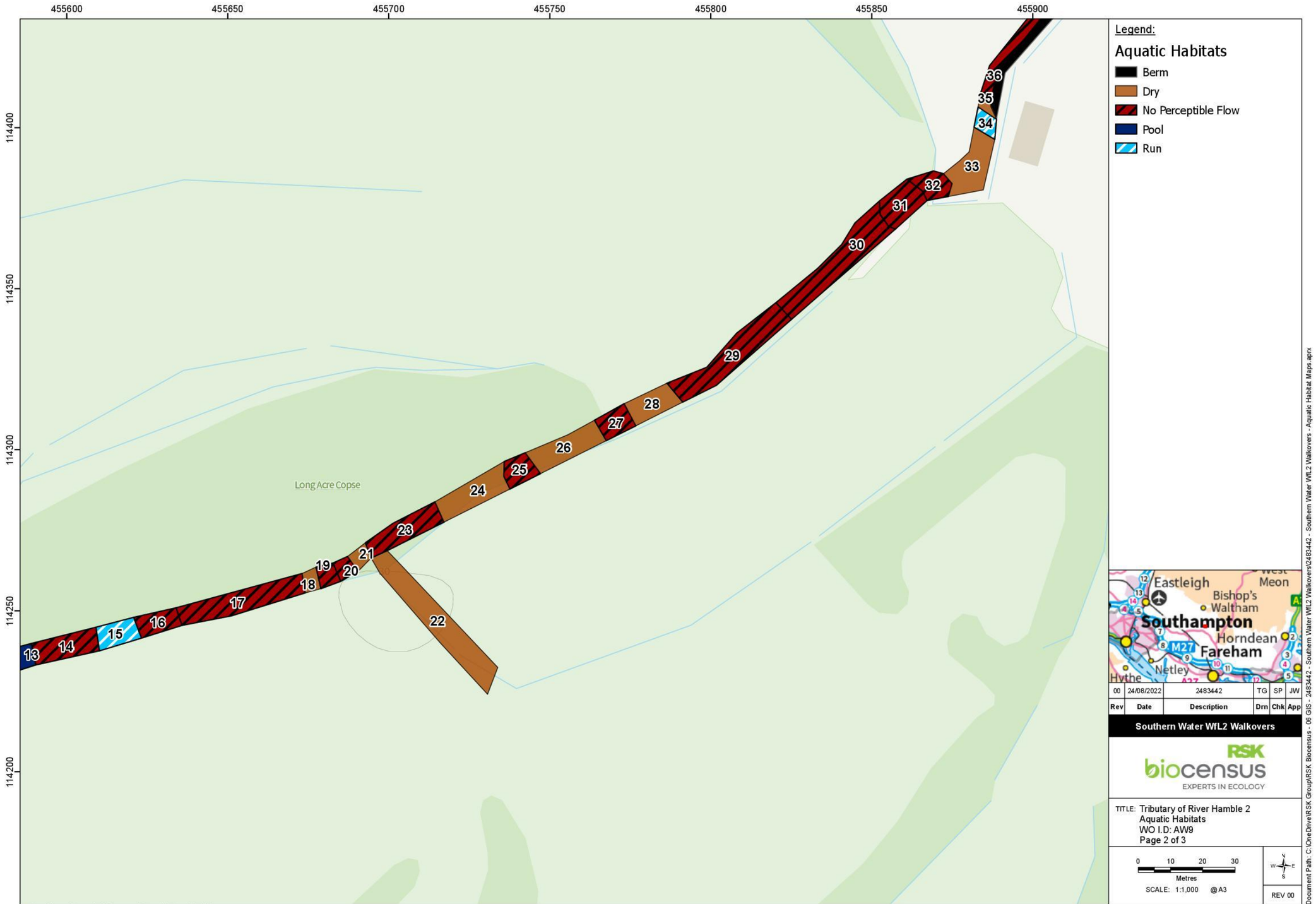




A.6 River Hamble

Graphic A-7 Tributary of River Hamble 2 aquatic habitats – Site AW9

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Legend:
Aquatic Habitats
Berm
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No Perceptible Flow
Pool
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Eastleigh
Bishop's Waltham
Southampton
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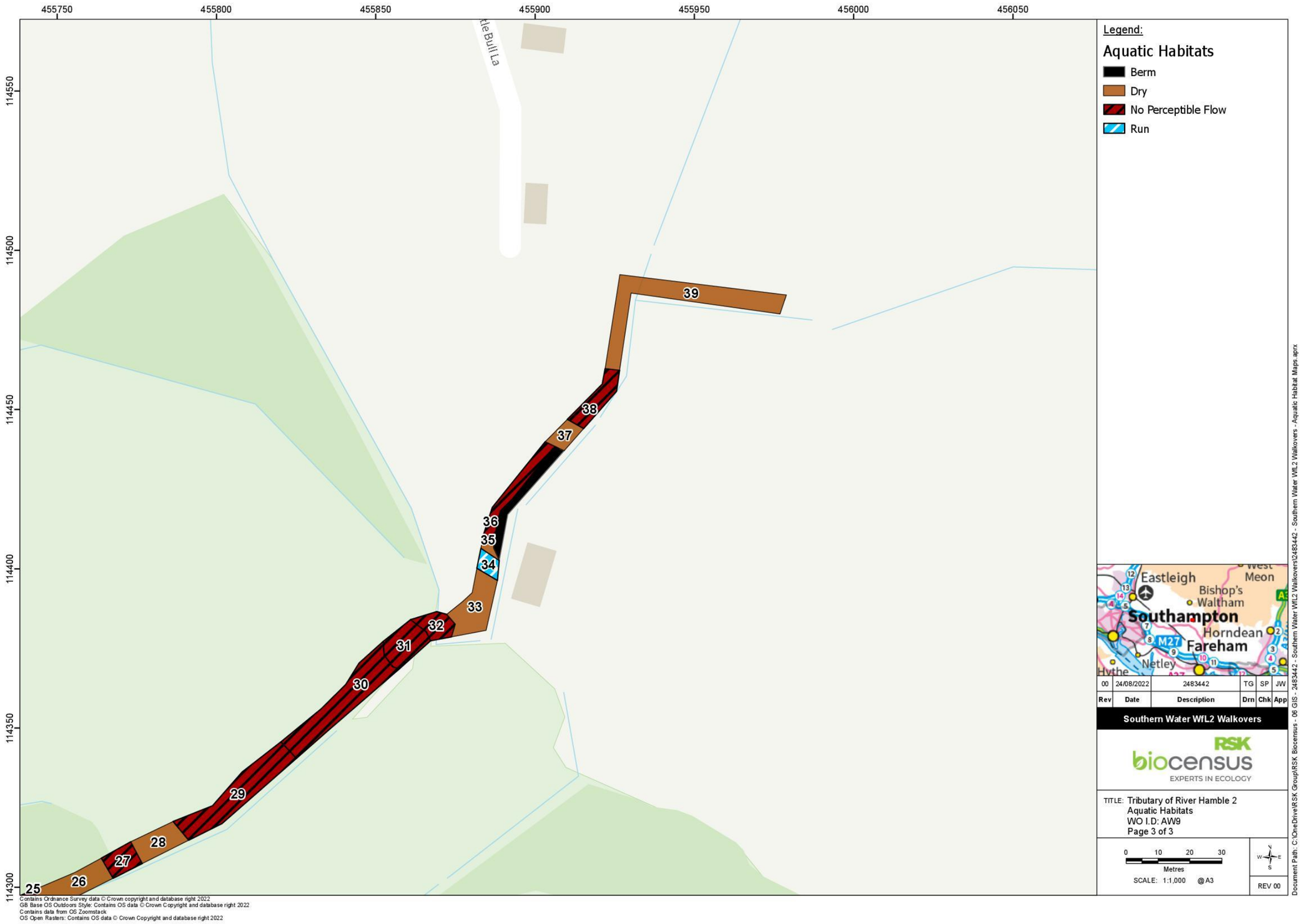
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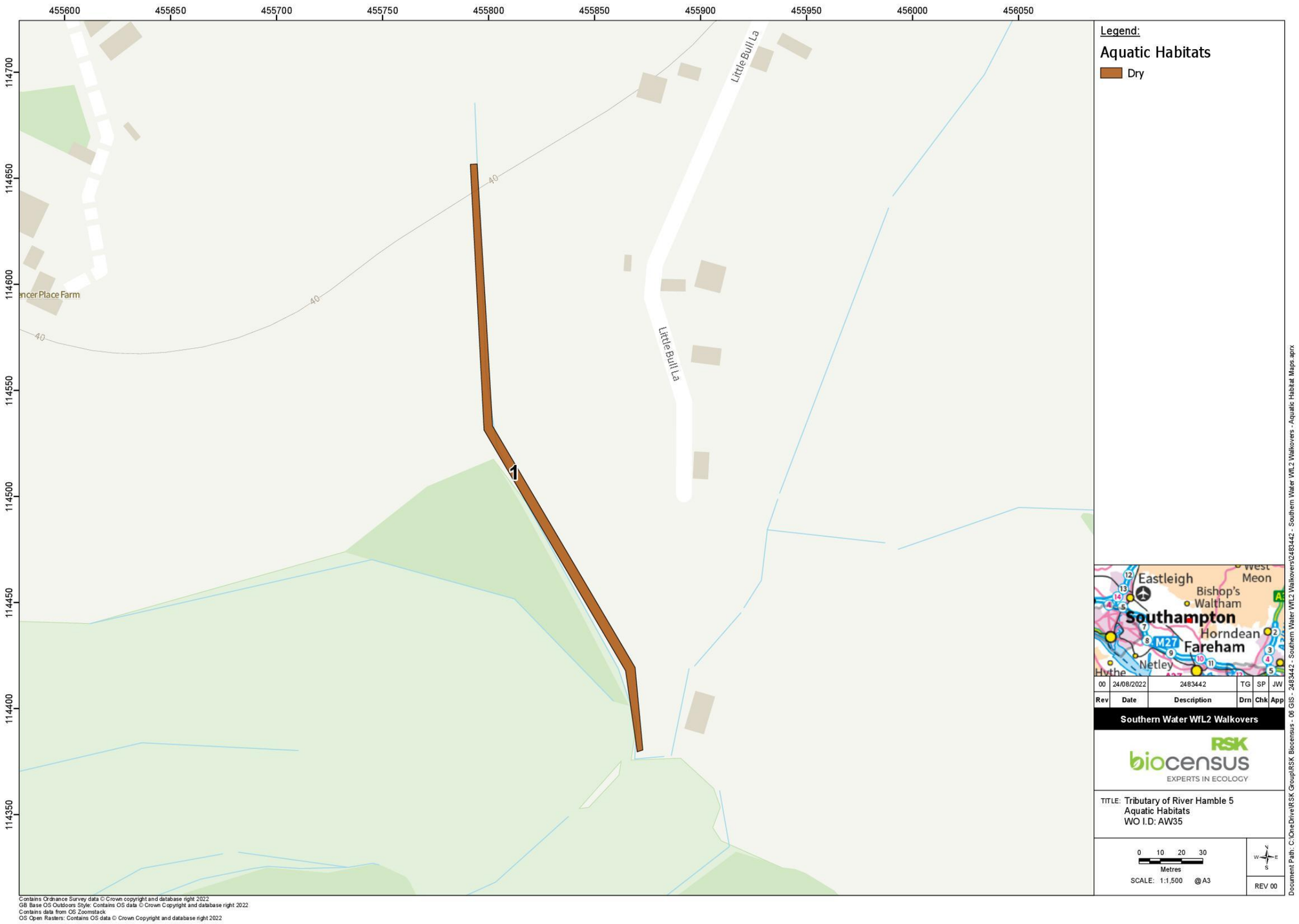
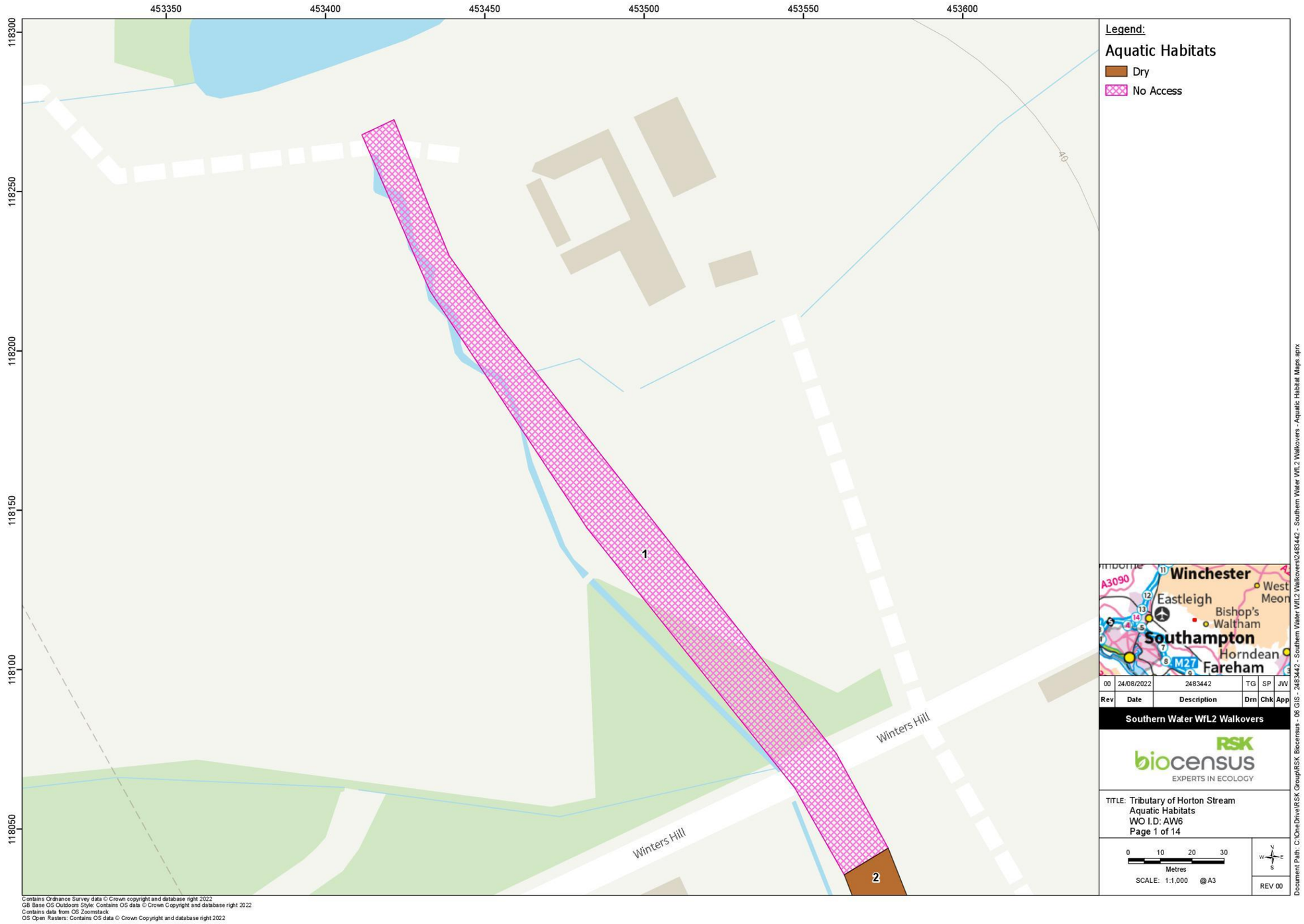
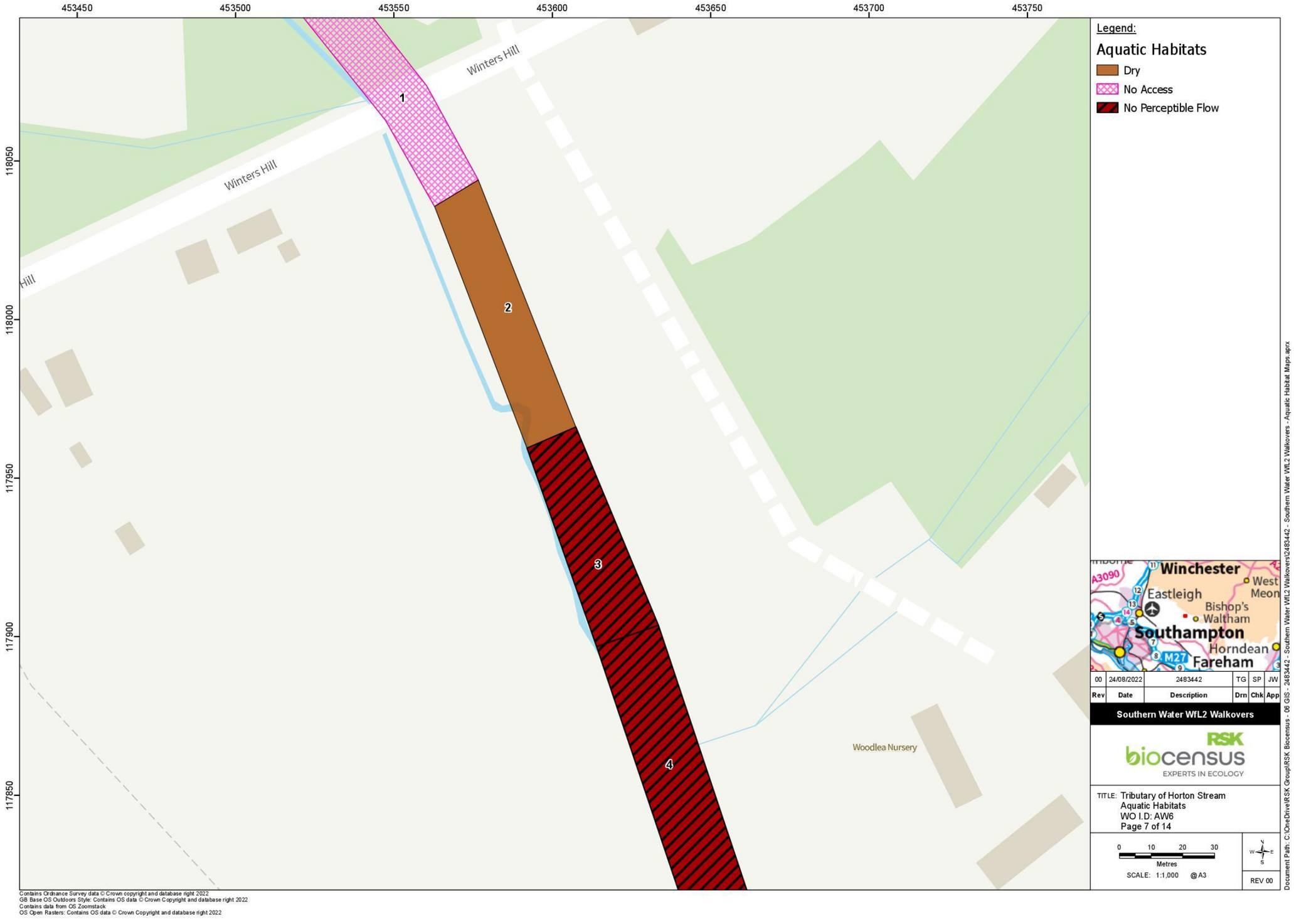
Graphic A-8 Tributary of River Hamble 5 aquatic habitats – Site AW35



A.7 Upper Hamble

Graphic A-9 Tributary of River Hamble 1 aquatic habitats – Site AW6

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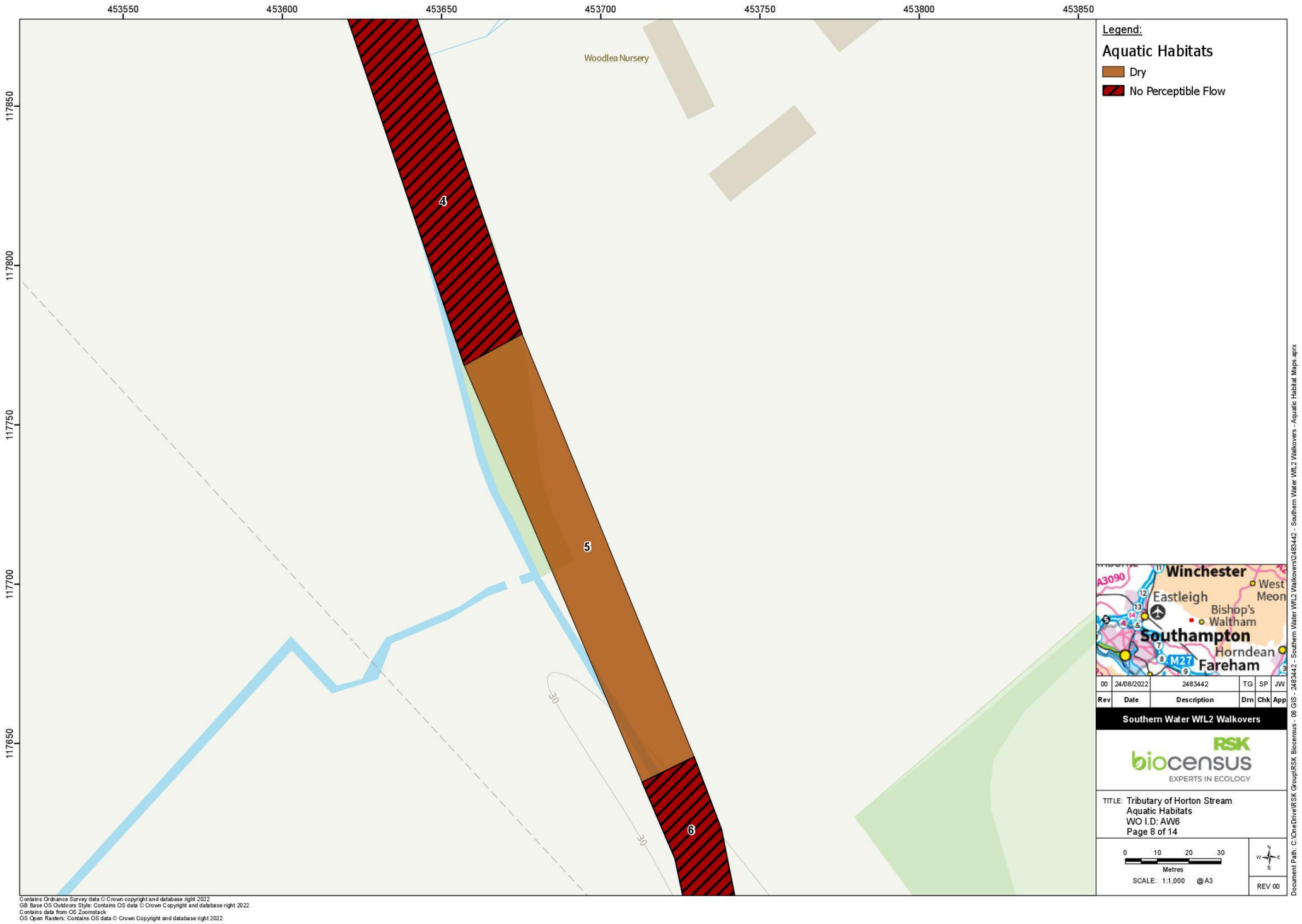
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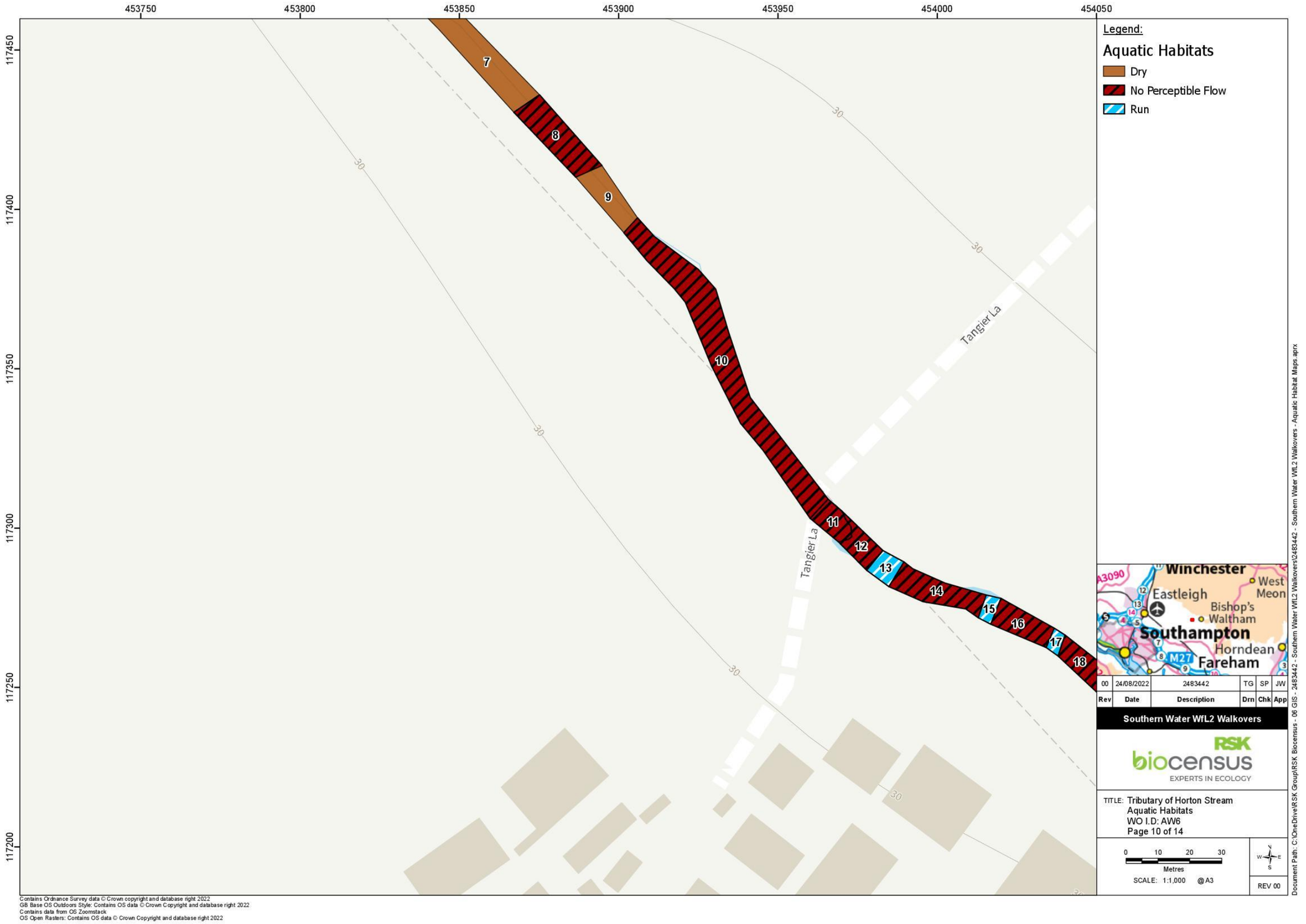
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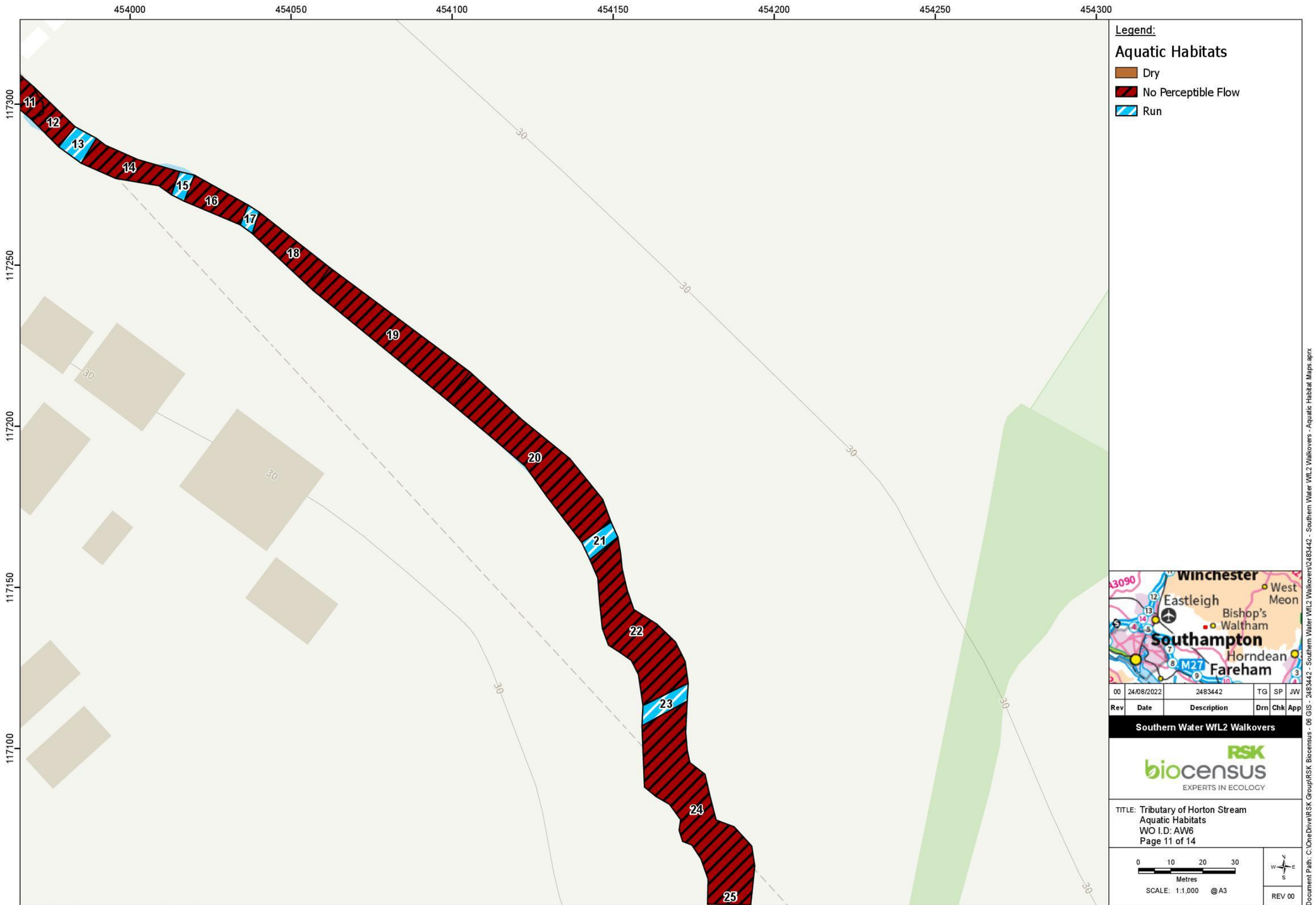
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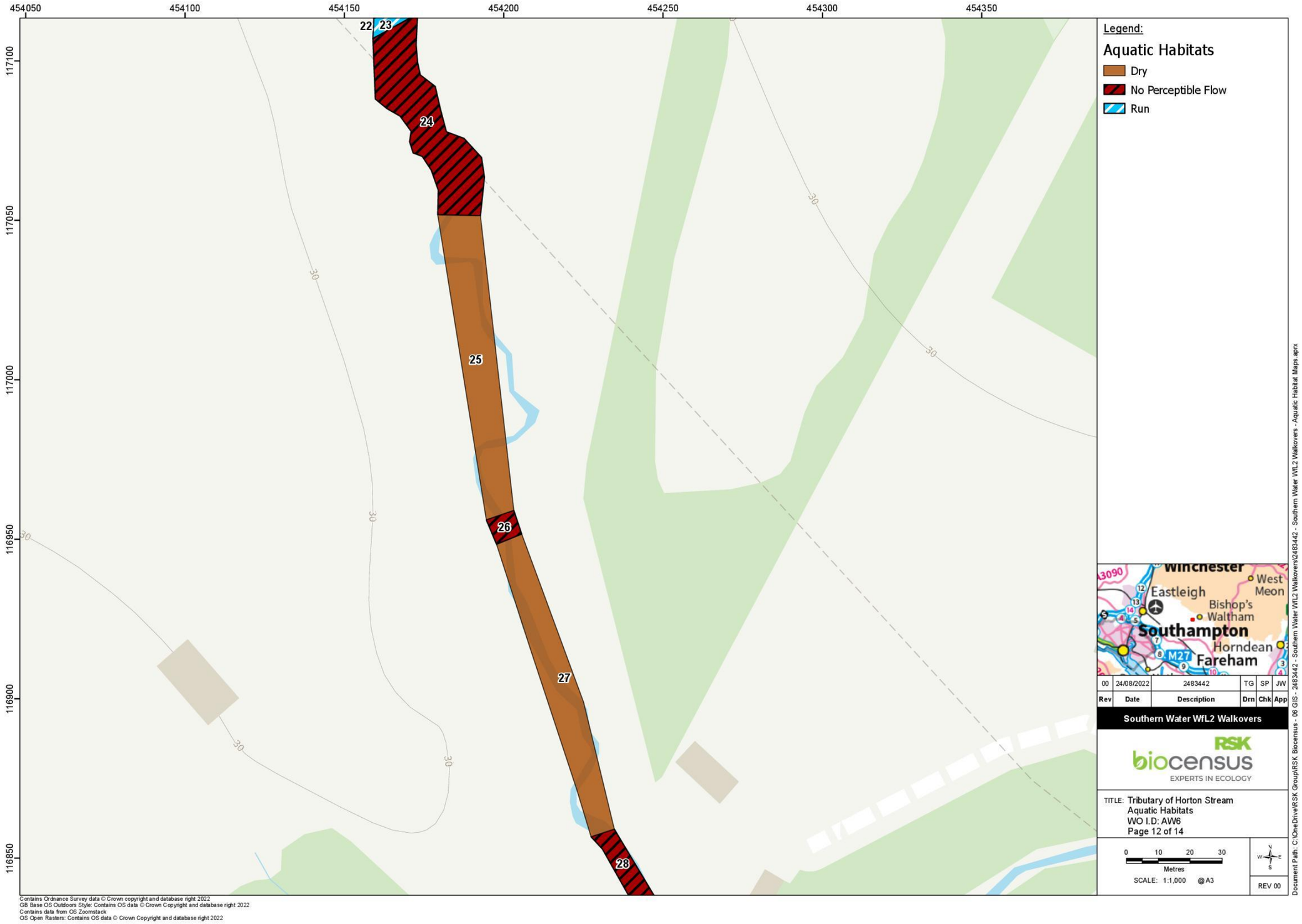
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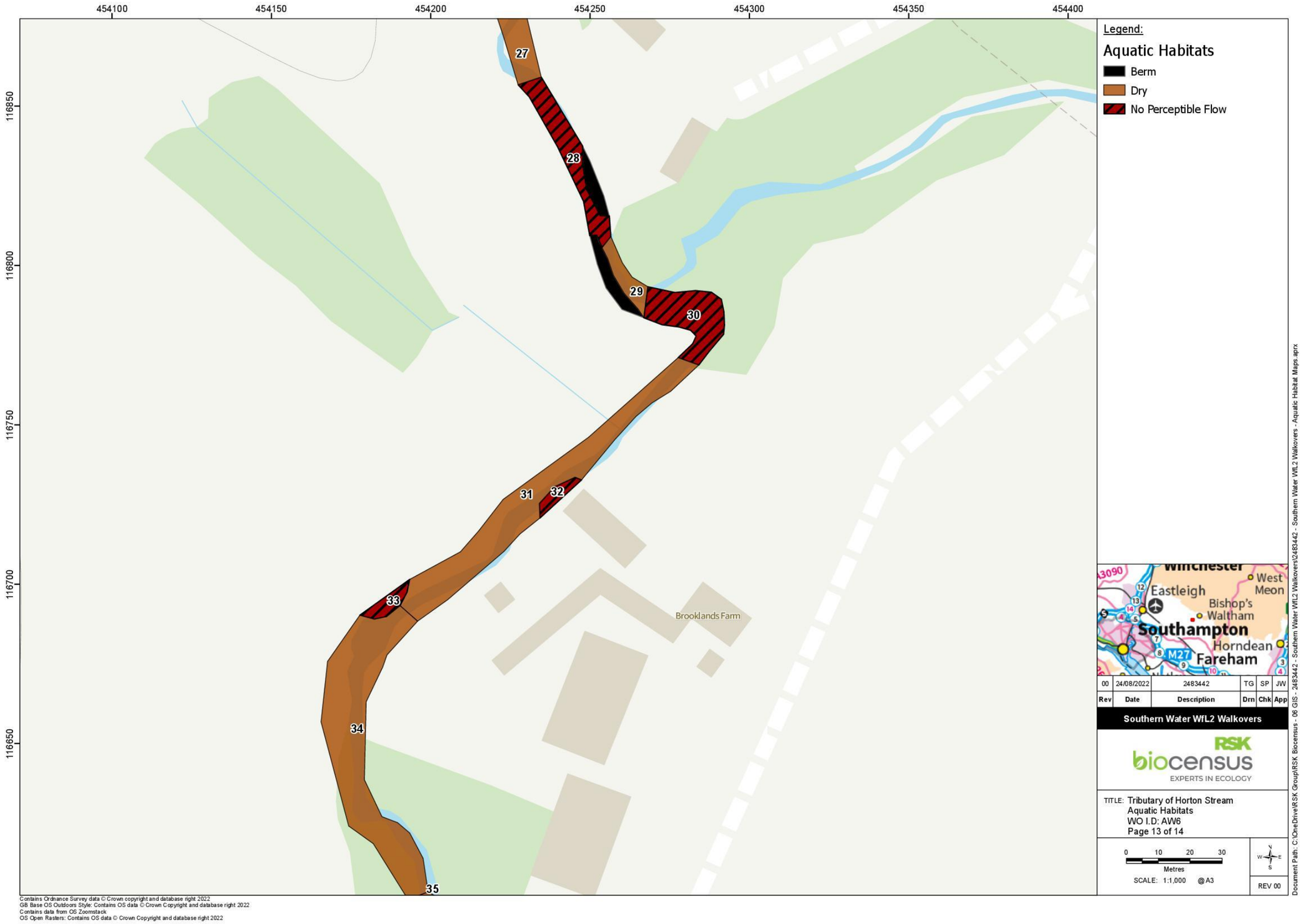
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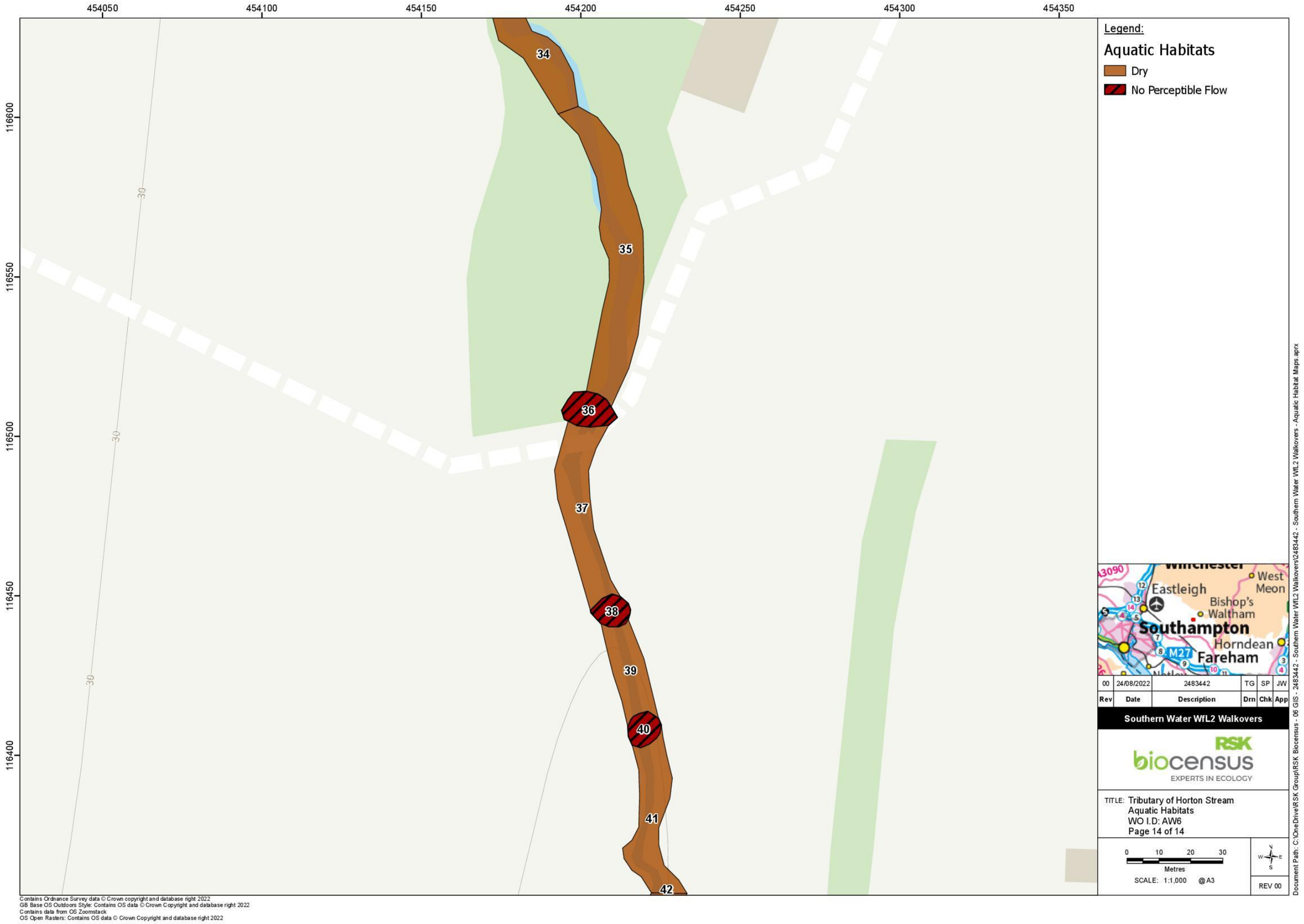
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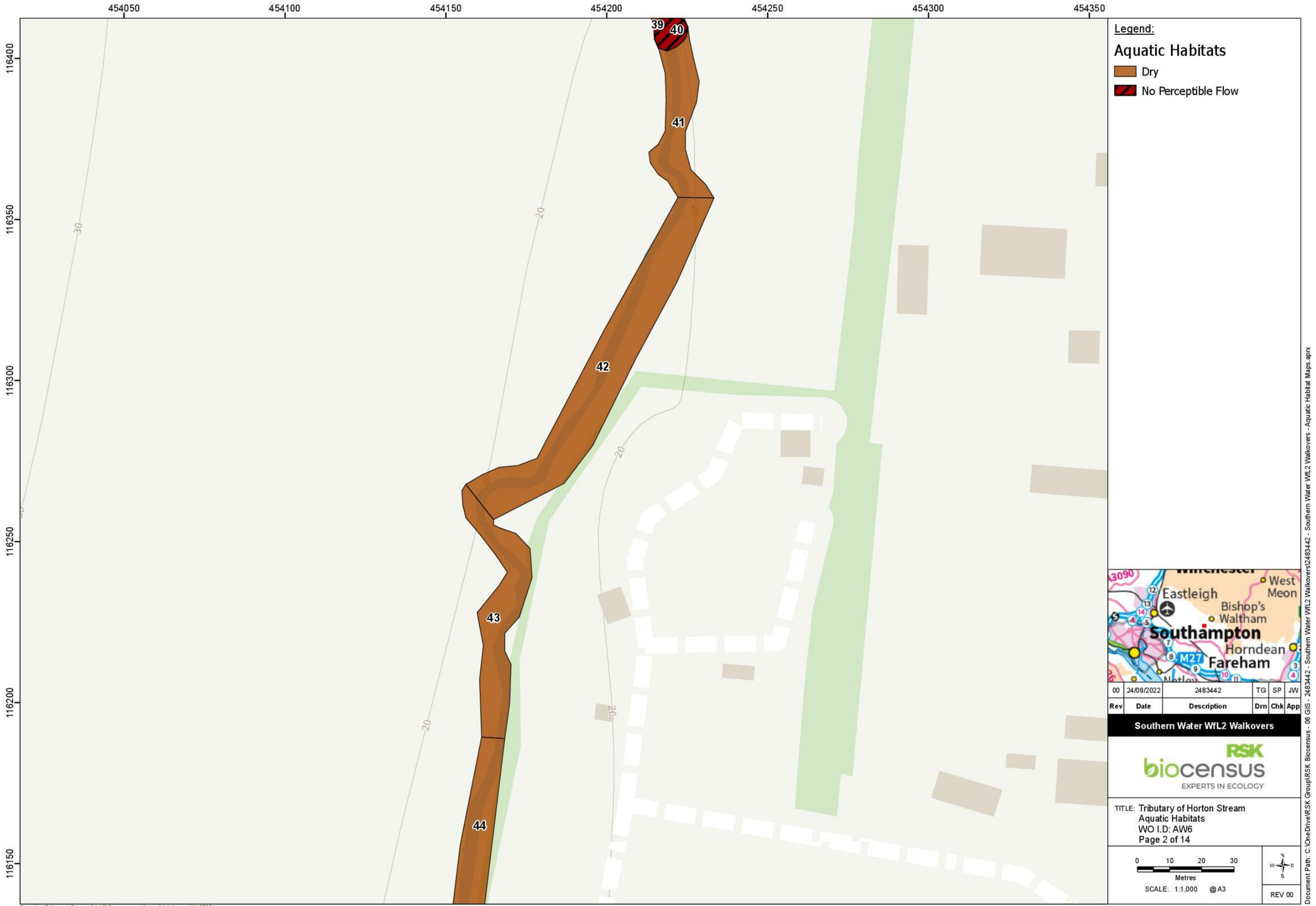

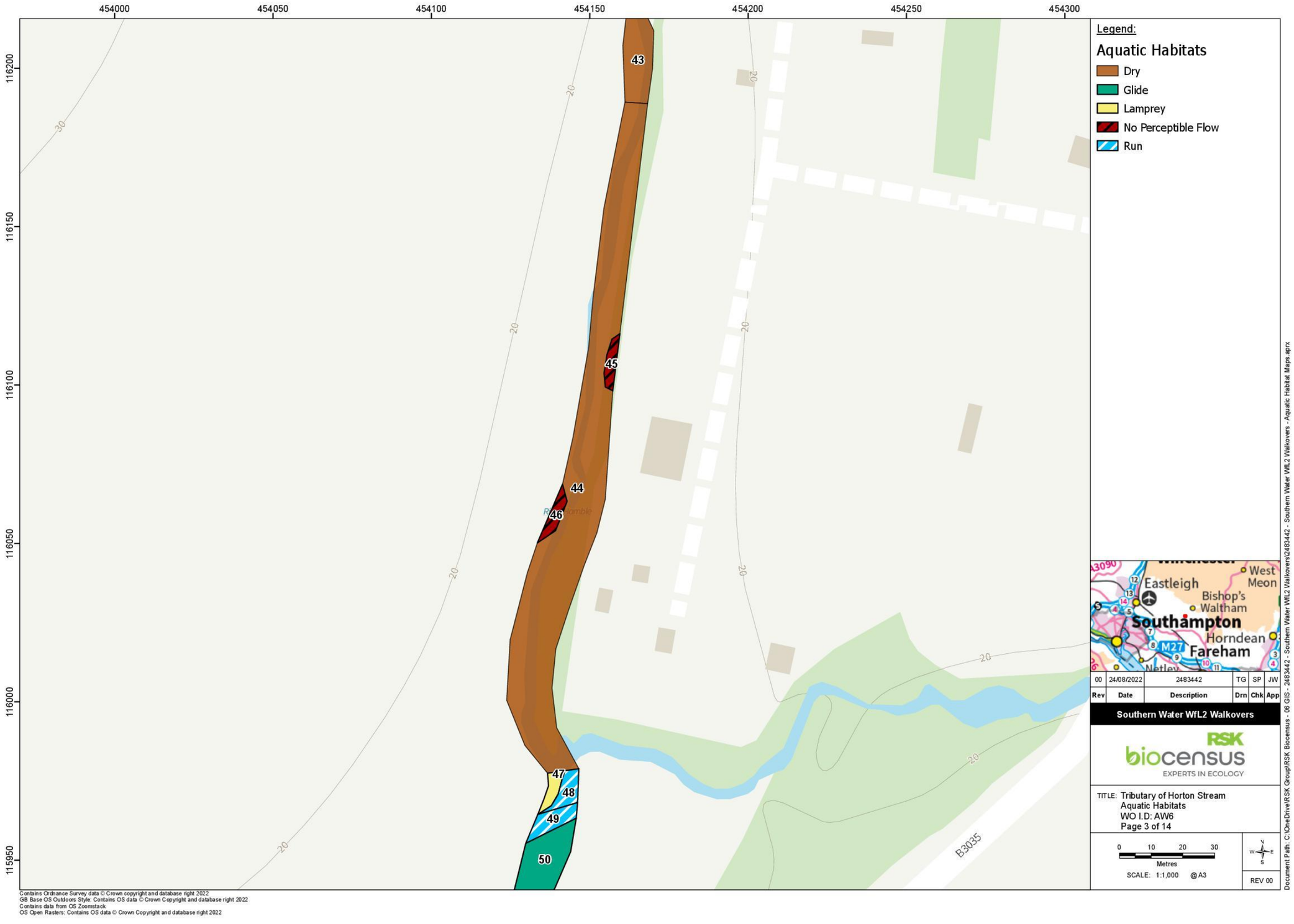
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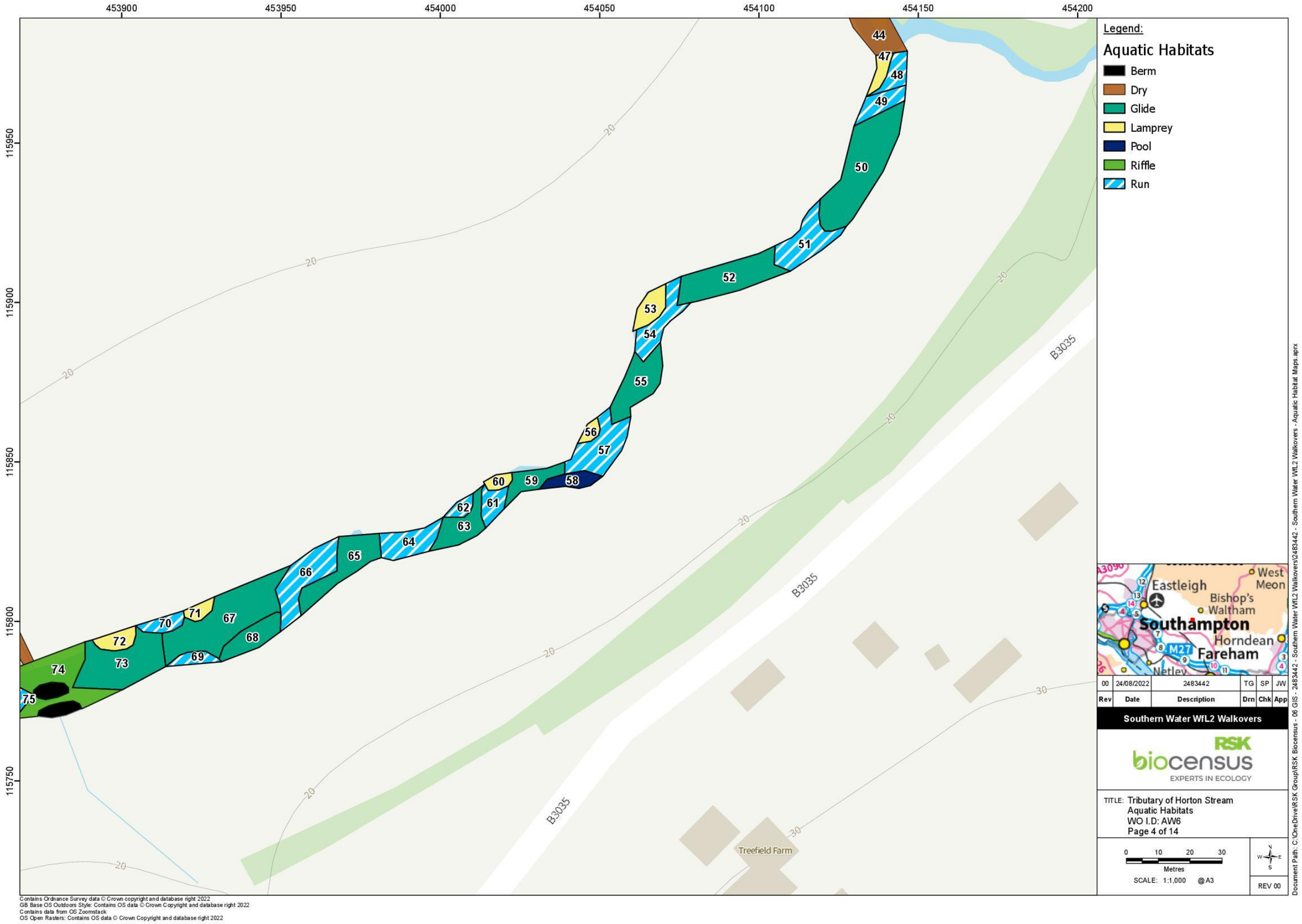
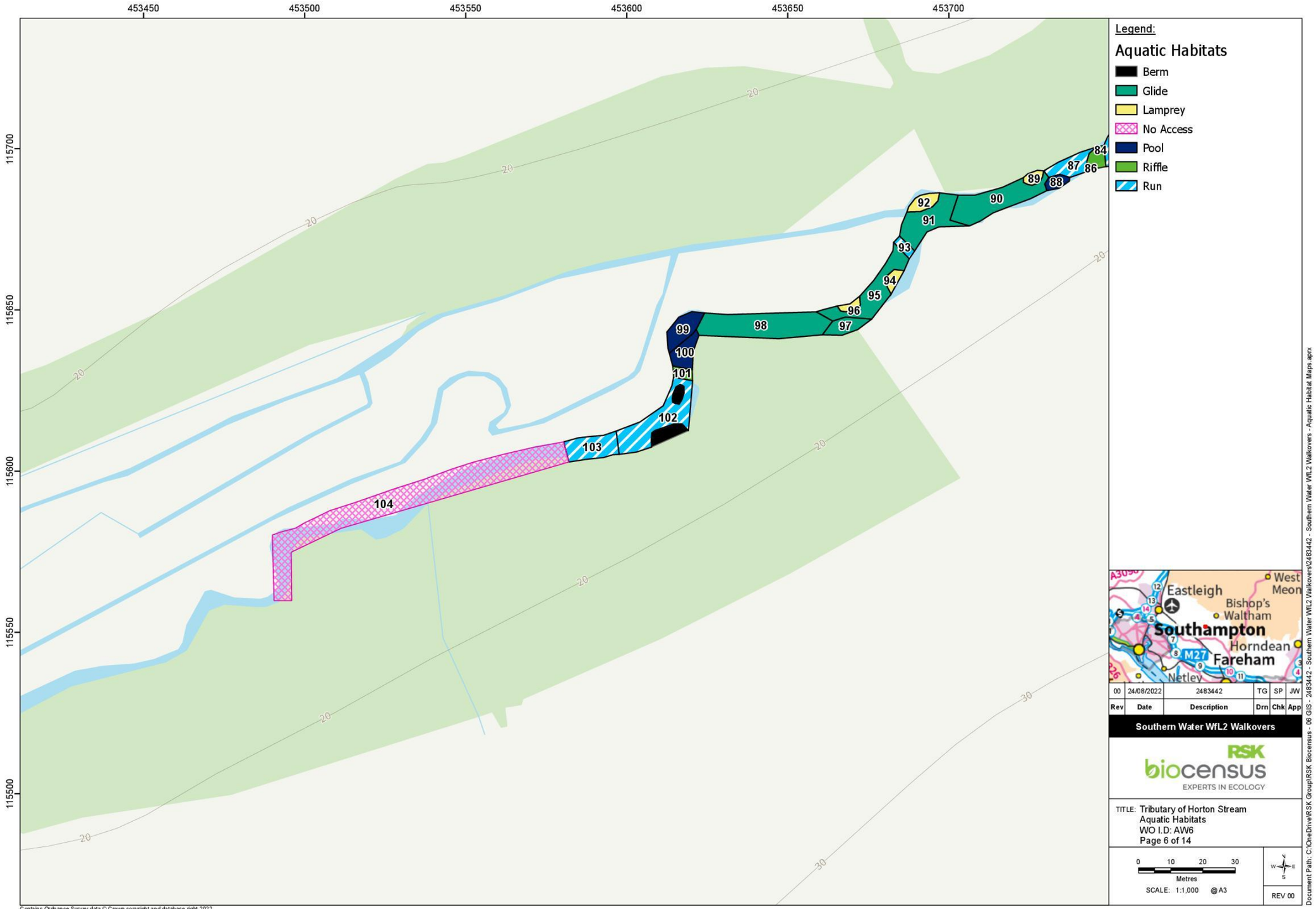
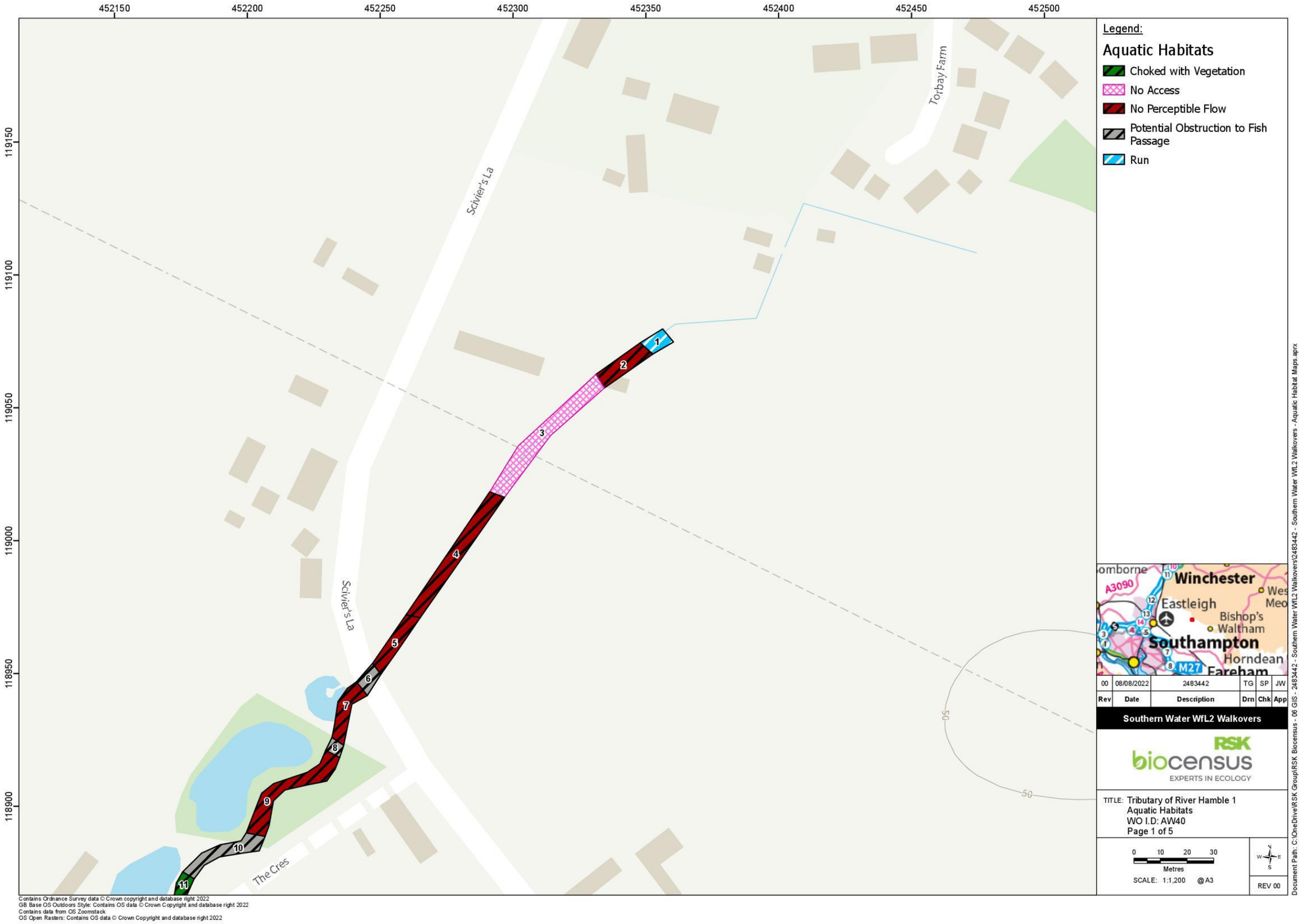
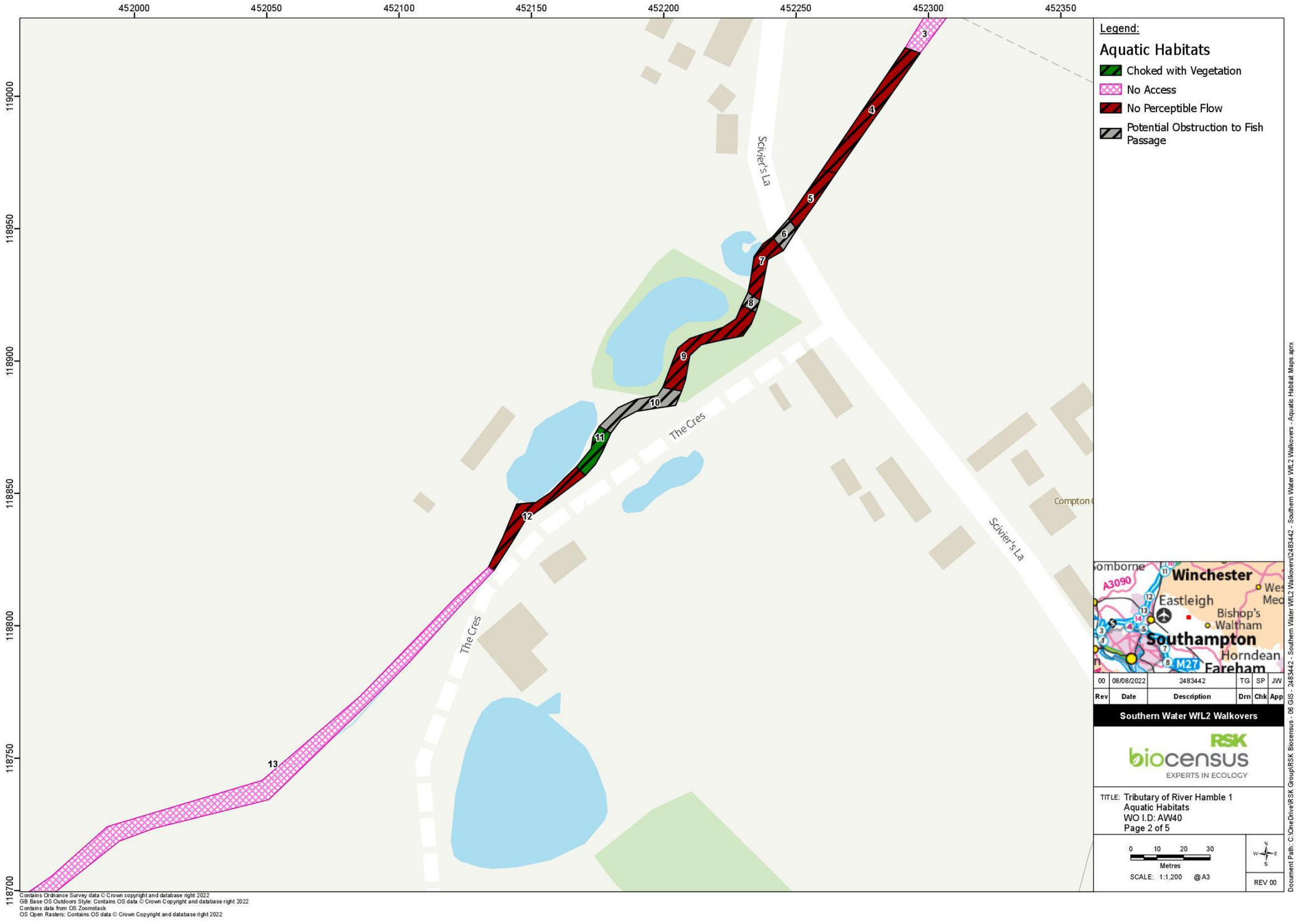




A.8 Horton Heath Stream

Graphic A-10 Tributary of River Hamble 1 aquatic habitats – Site AW40

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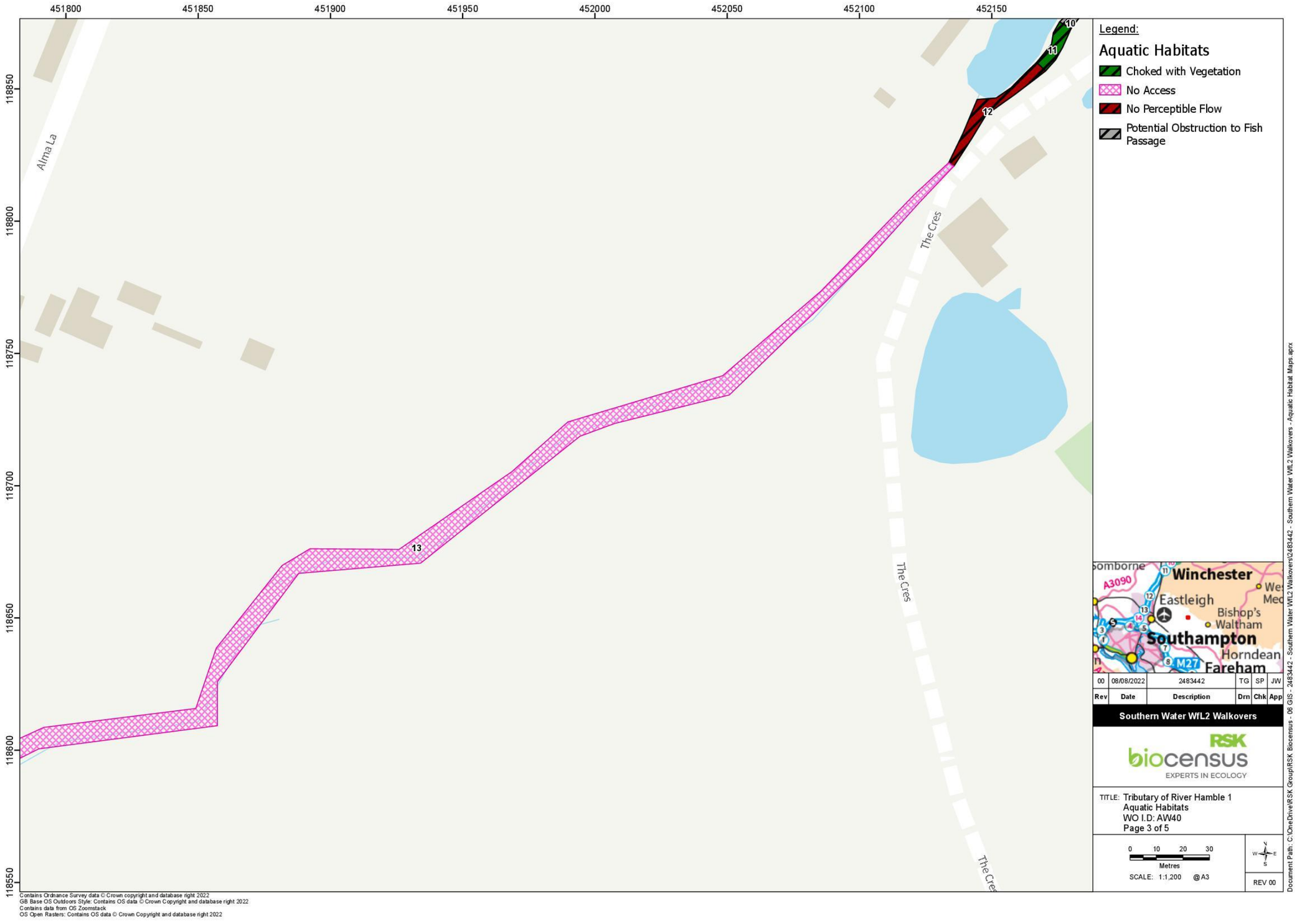
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Aquatic Habitats
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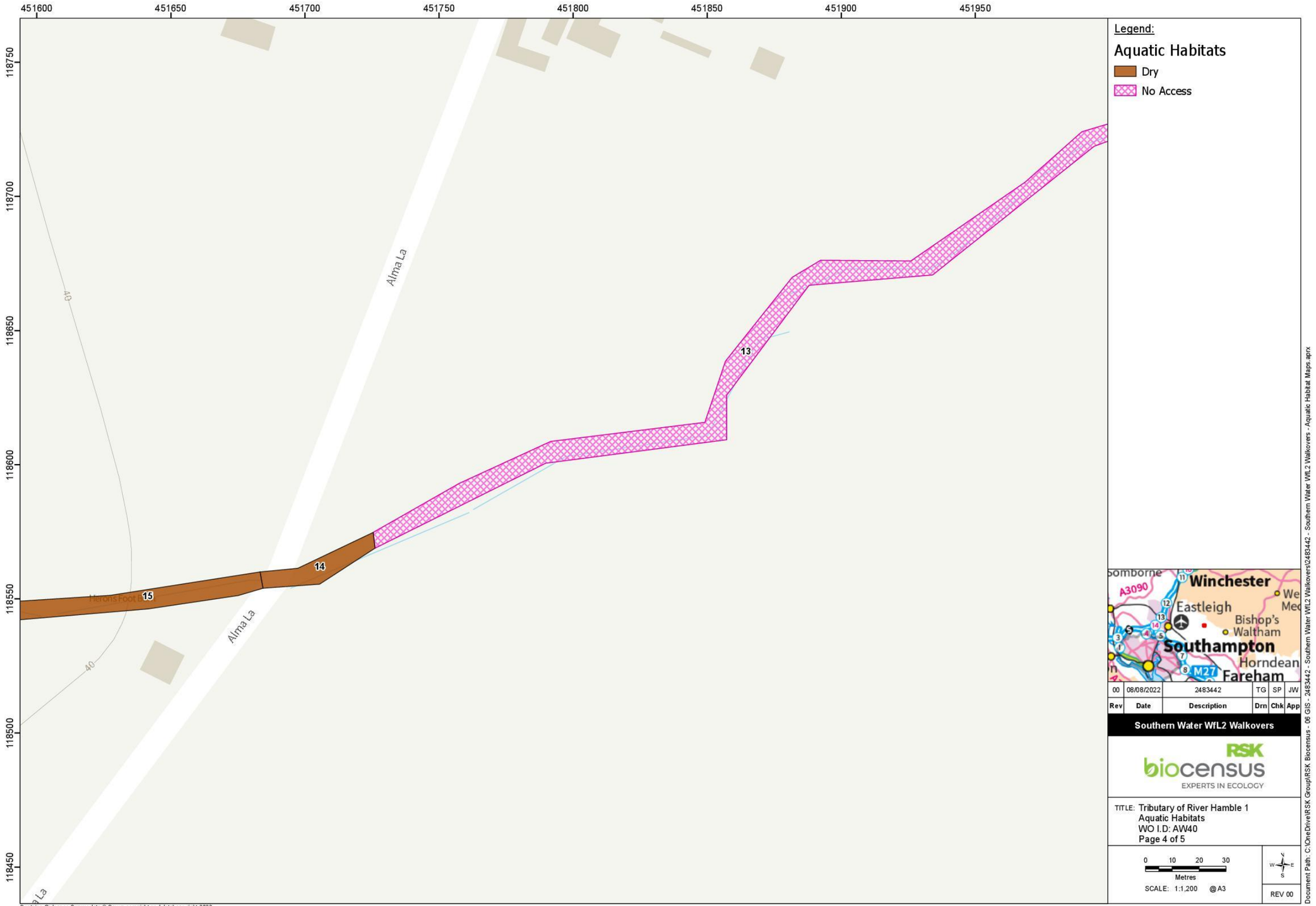
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No Access
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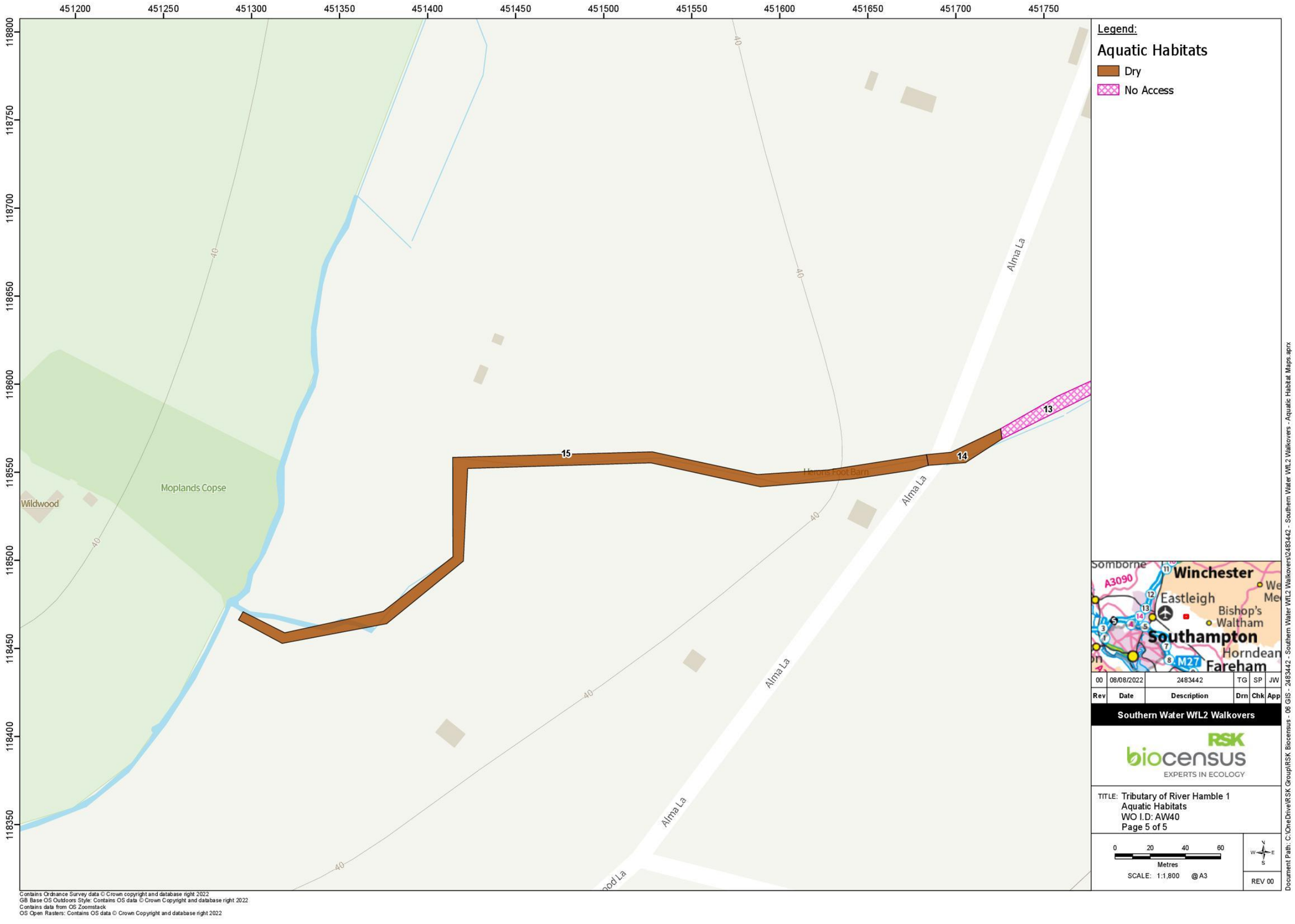
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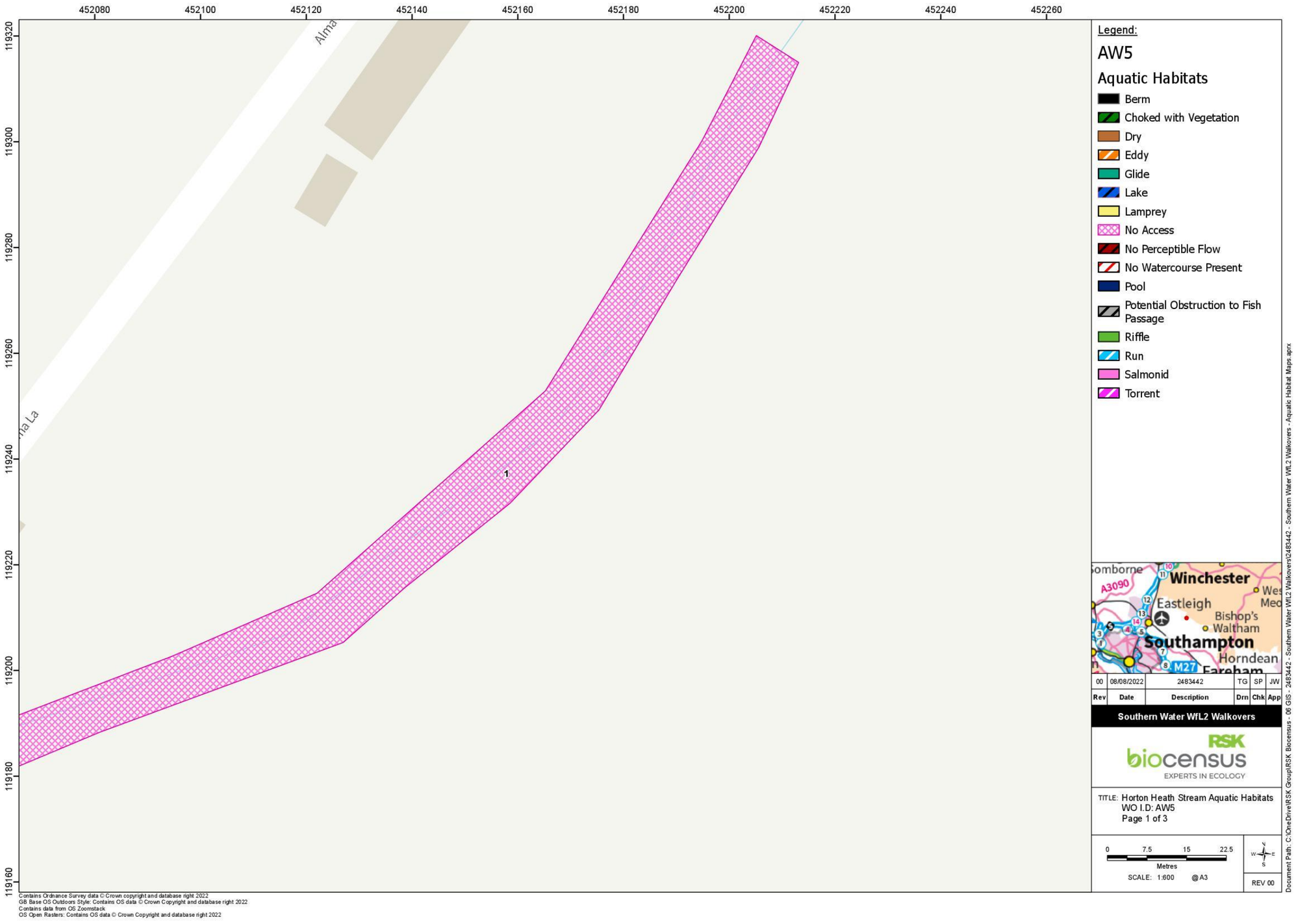
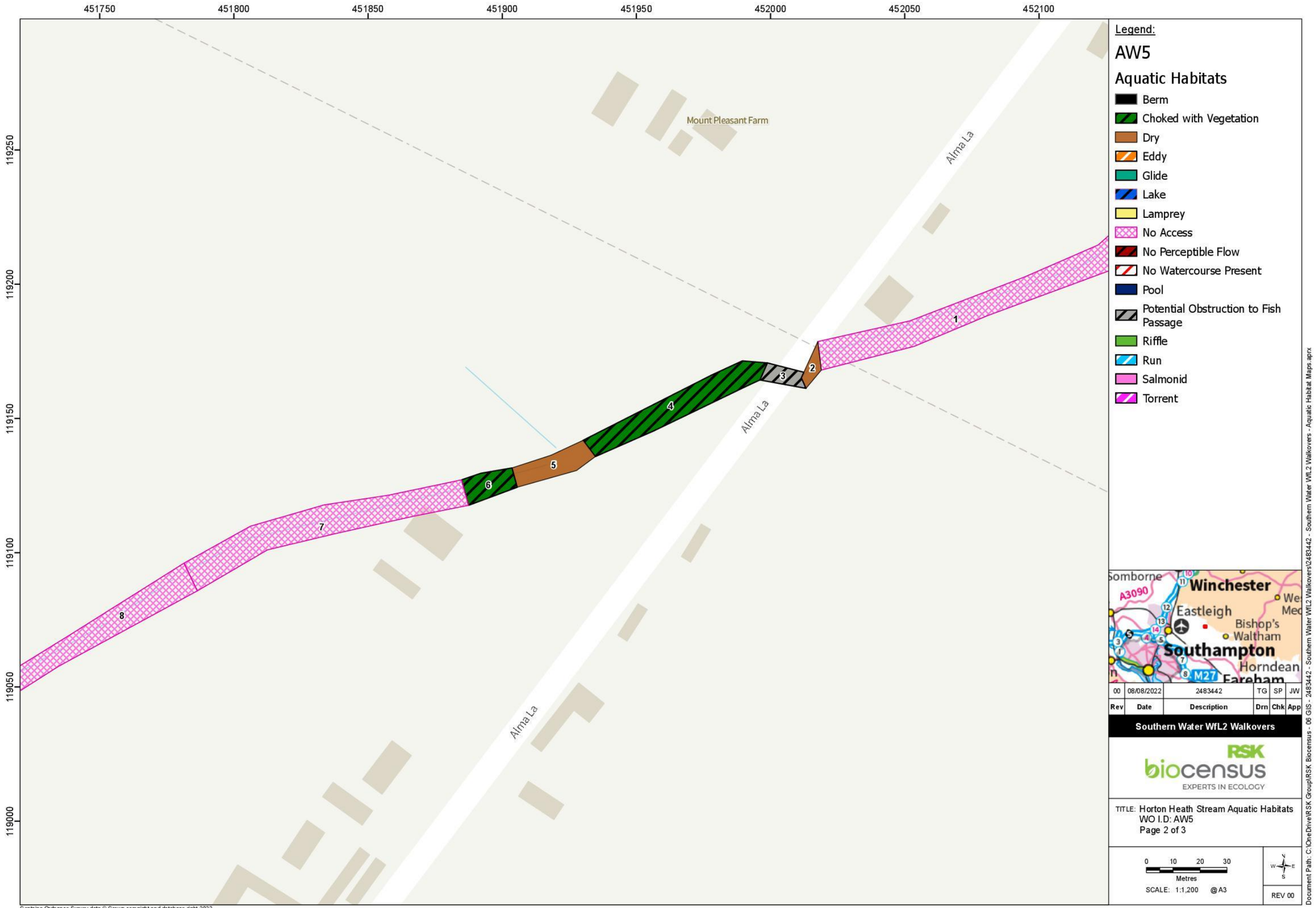
Graphic A-11 Horton Heath Stream aquatic habitats – Site AW5

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Legend:
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Aquatic Habitats
Berm
Choked with Vegetation
Dry
Eddy
Glide
Lake
Lamprey
No Access
No Perceptible Flow
No Watercourse Present
Pool
Potential Obstruction to Fish Passage
Riffle
Run
Salmonid
Torrent
Somborne
A3090
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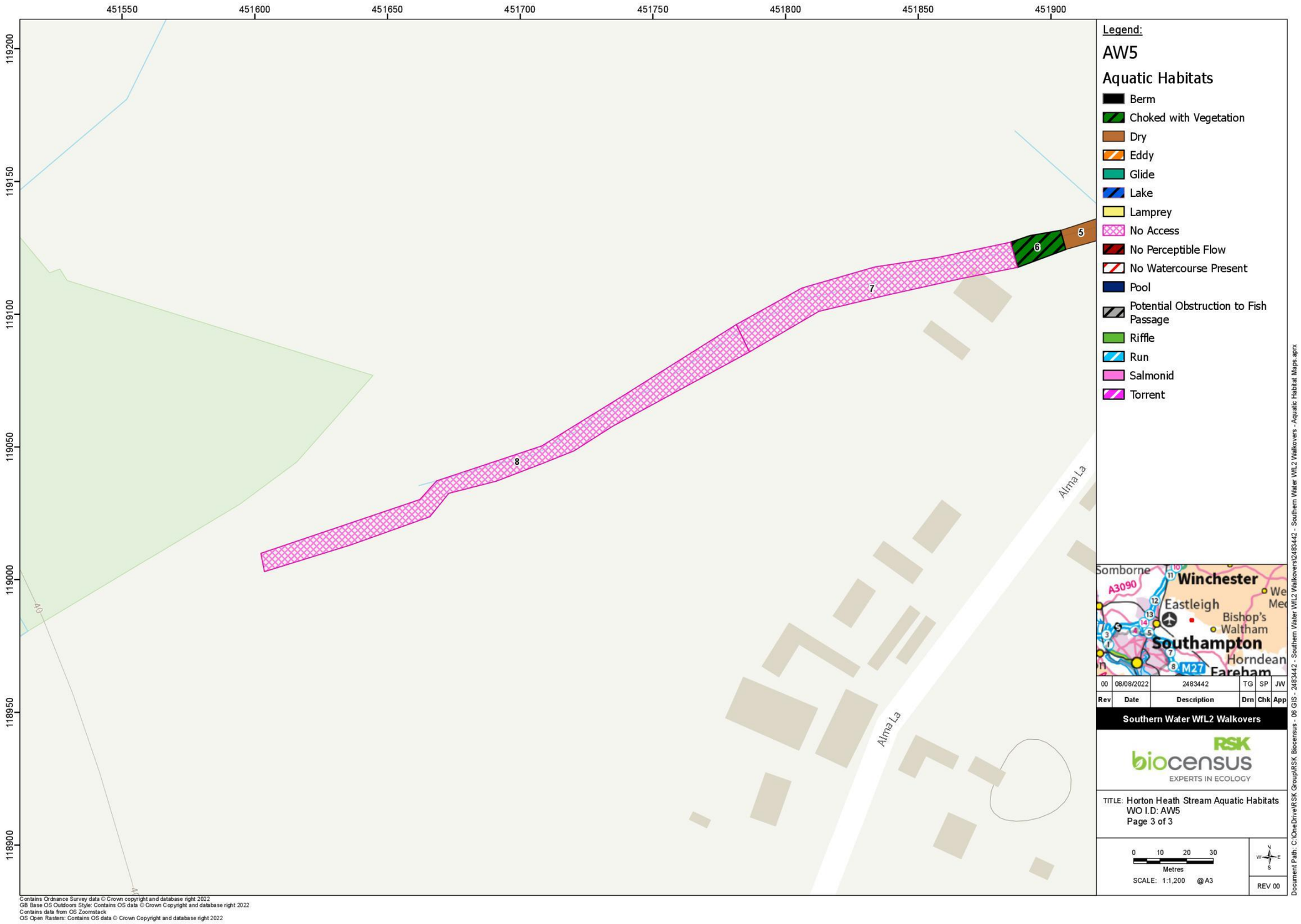
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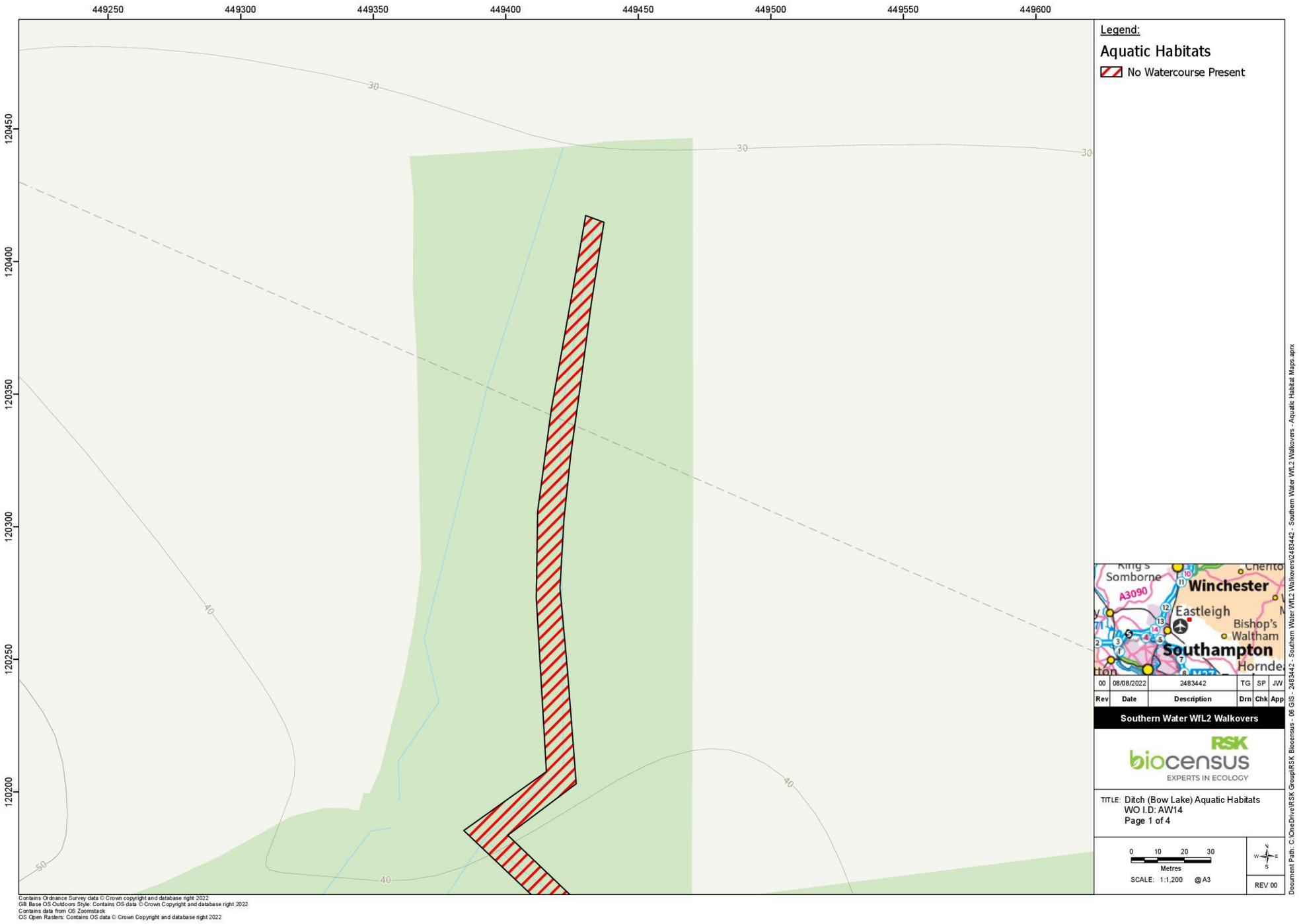
A.9 Bow Lake

Graphic A-12 Ditch (Bow Lake) aquatic habitats – Site AW14

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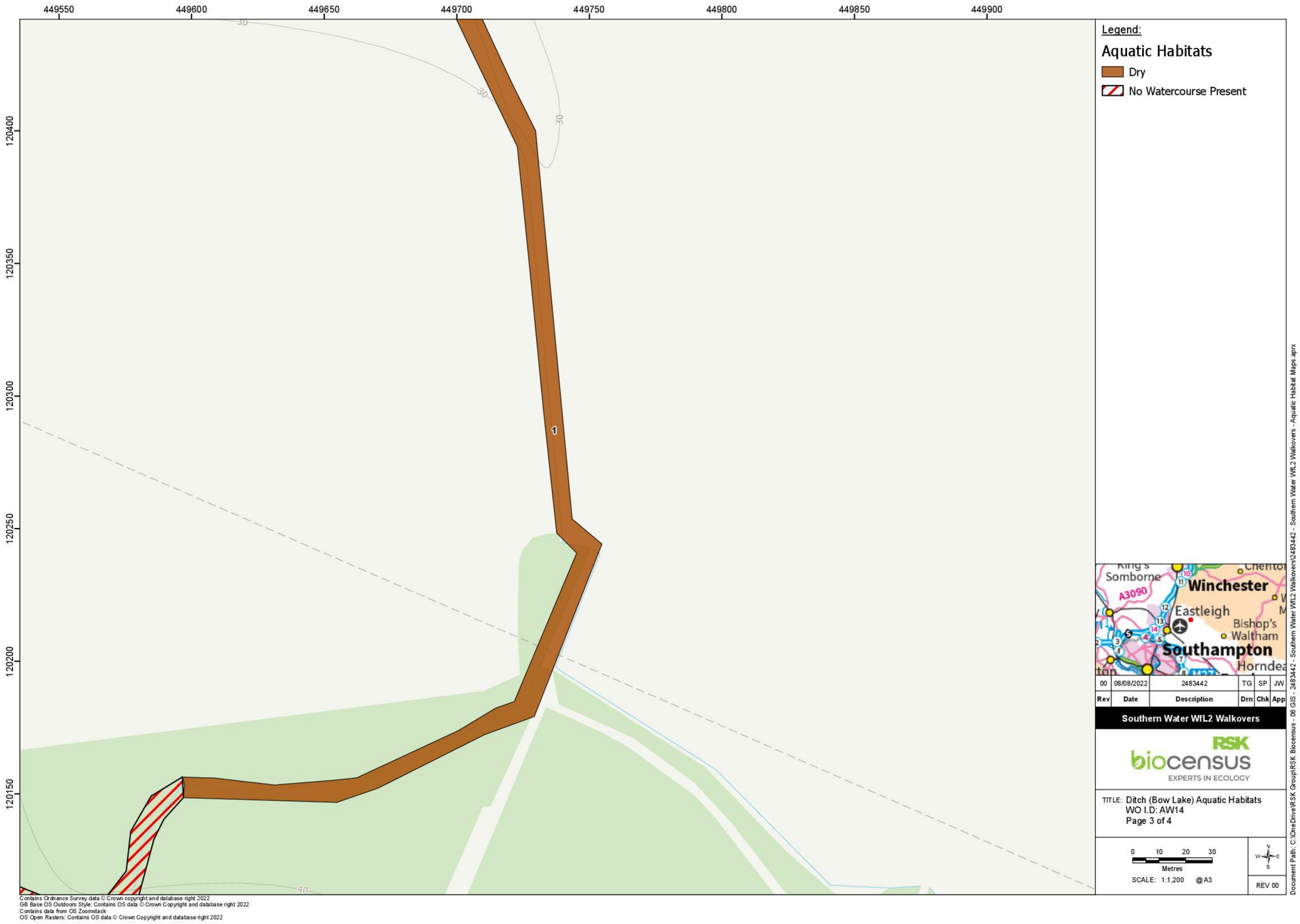
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TITLE: Ditch (Bow Lake) Aquatic Habitats
WO I.D: AW14
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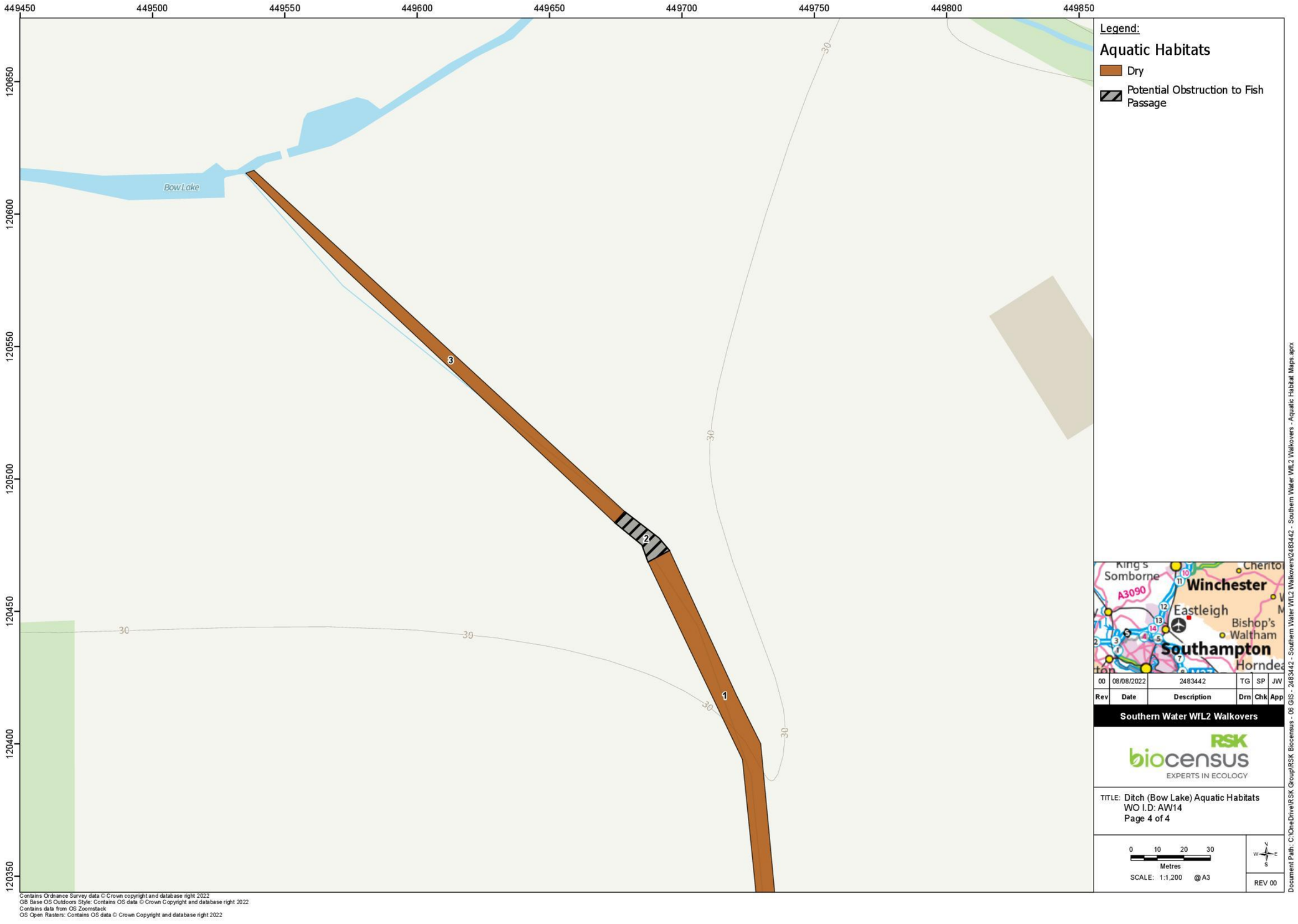
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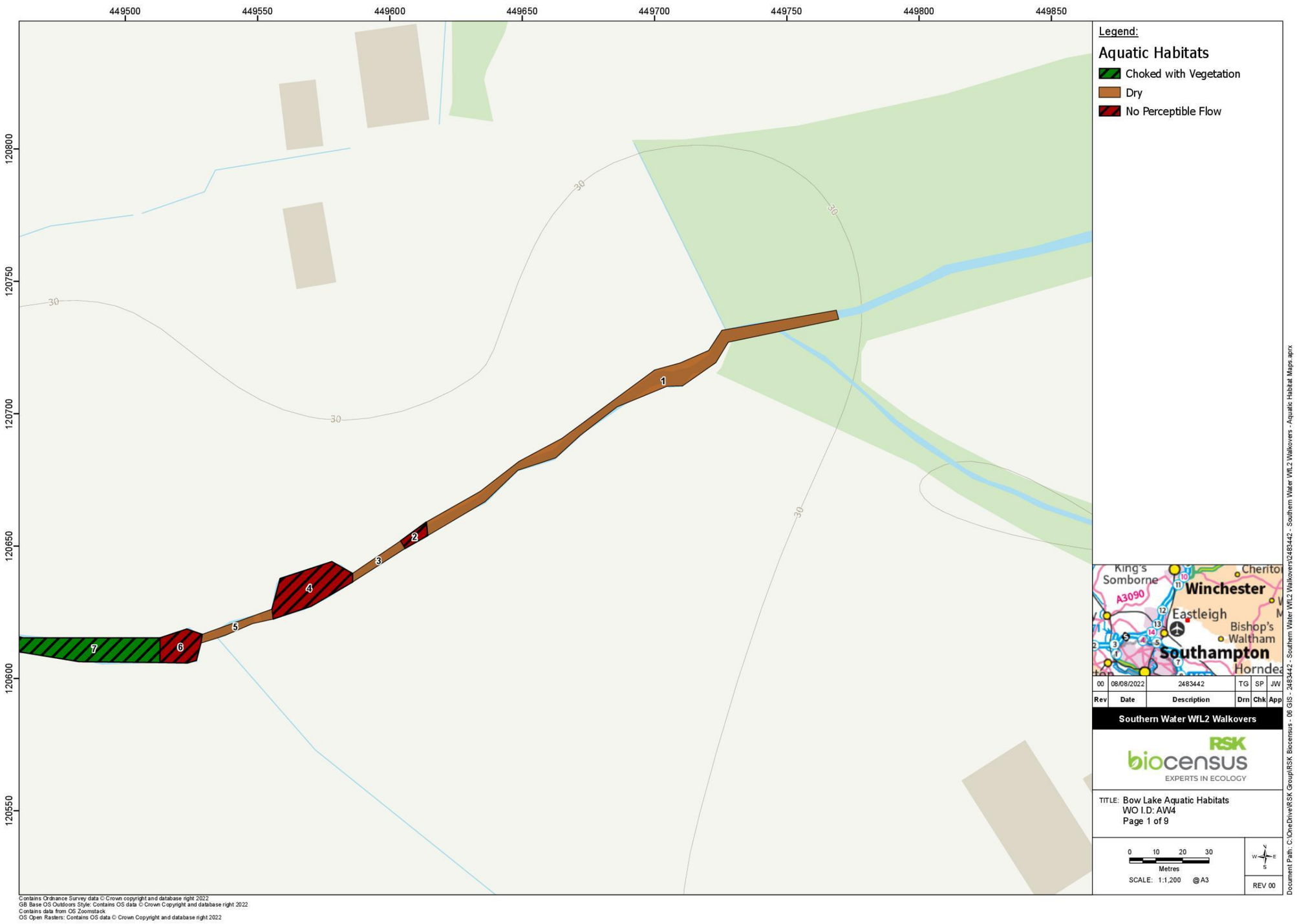
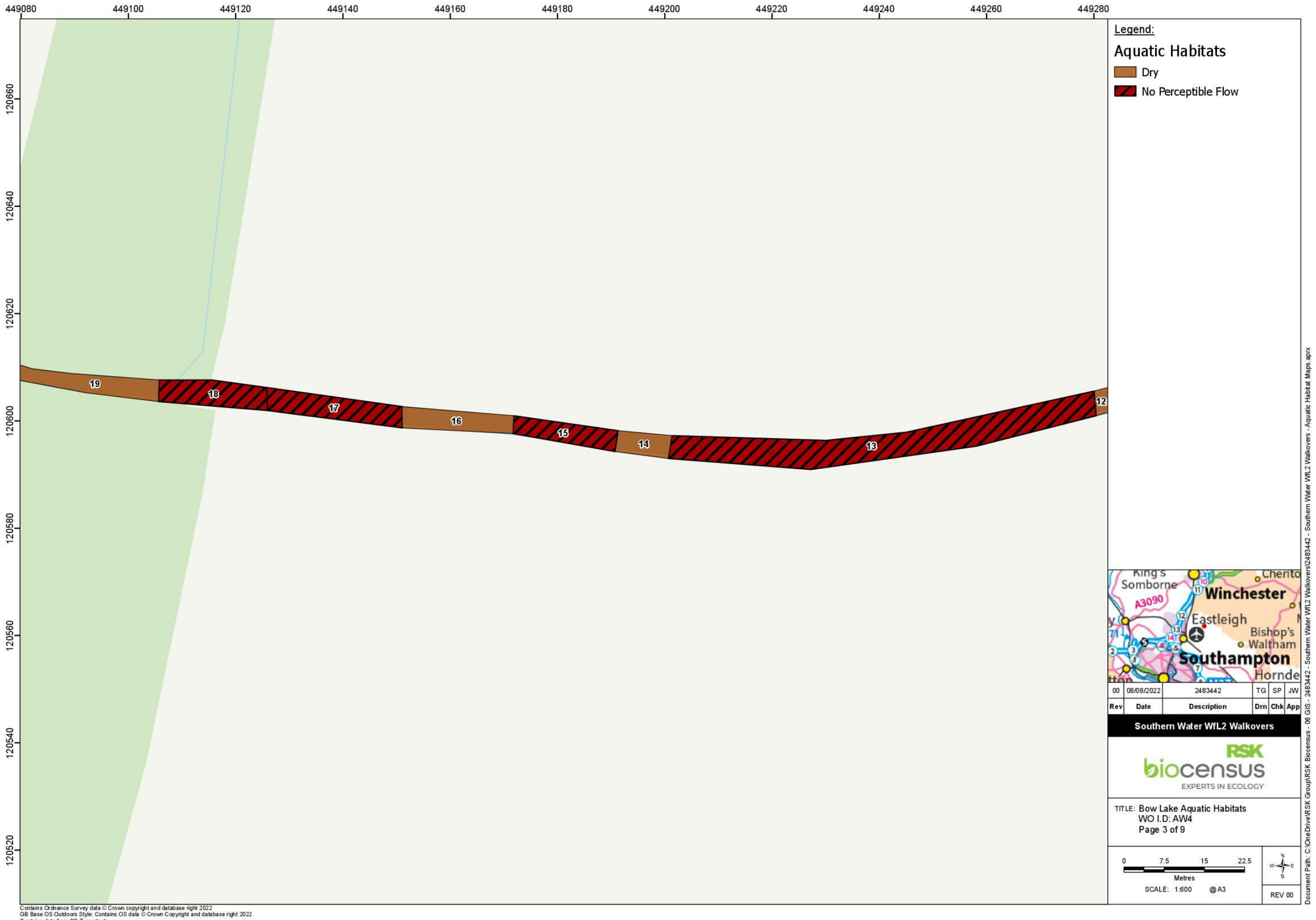
Graphic A-13 Bow Lake aquatic habitats – Site AW4

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Dry
No Perceptible Flow
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Winchester
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Southampton
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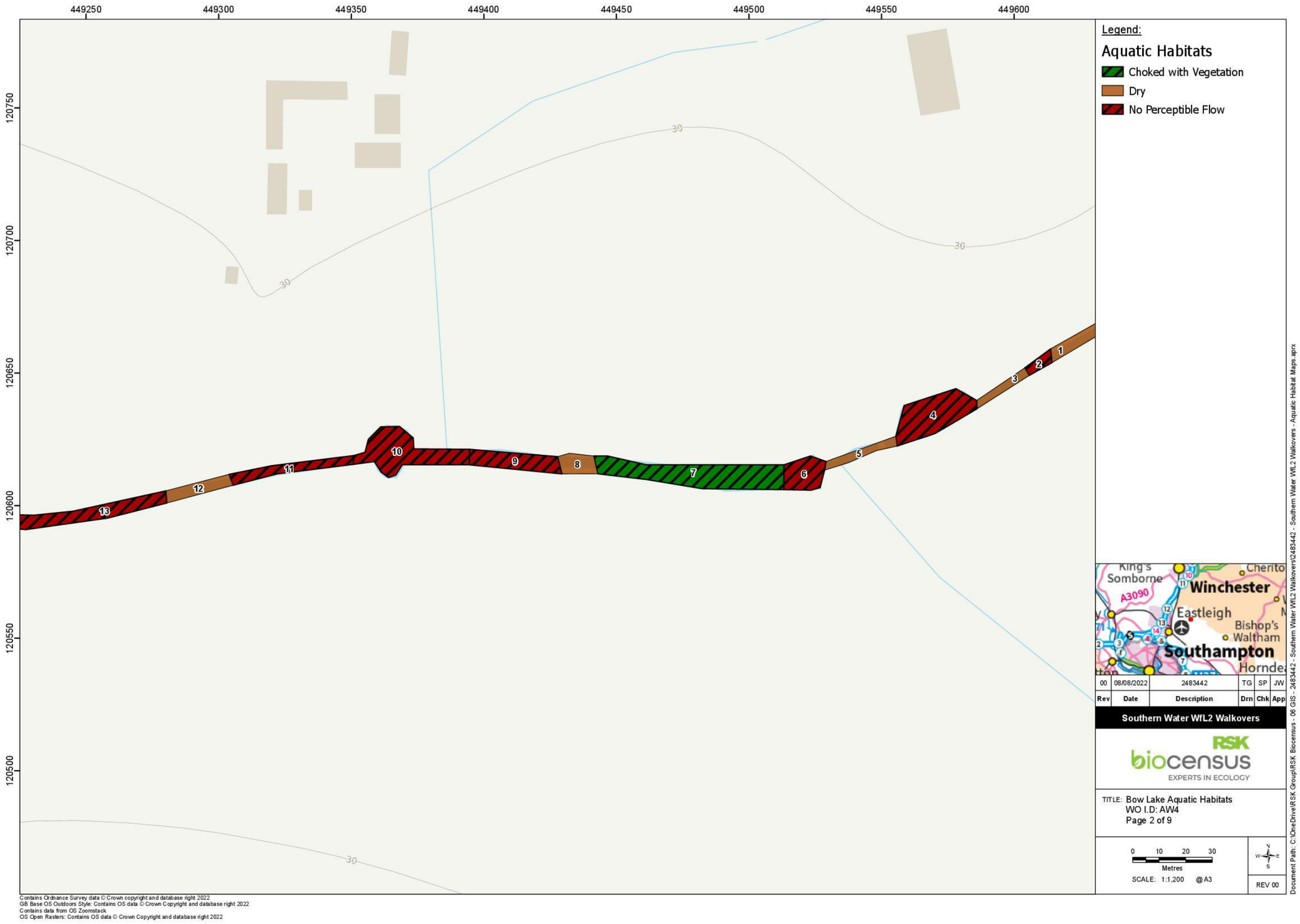
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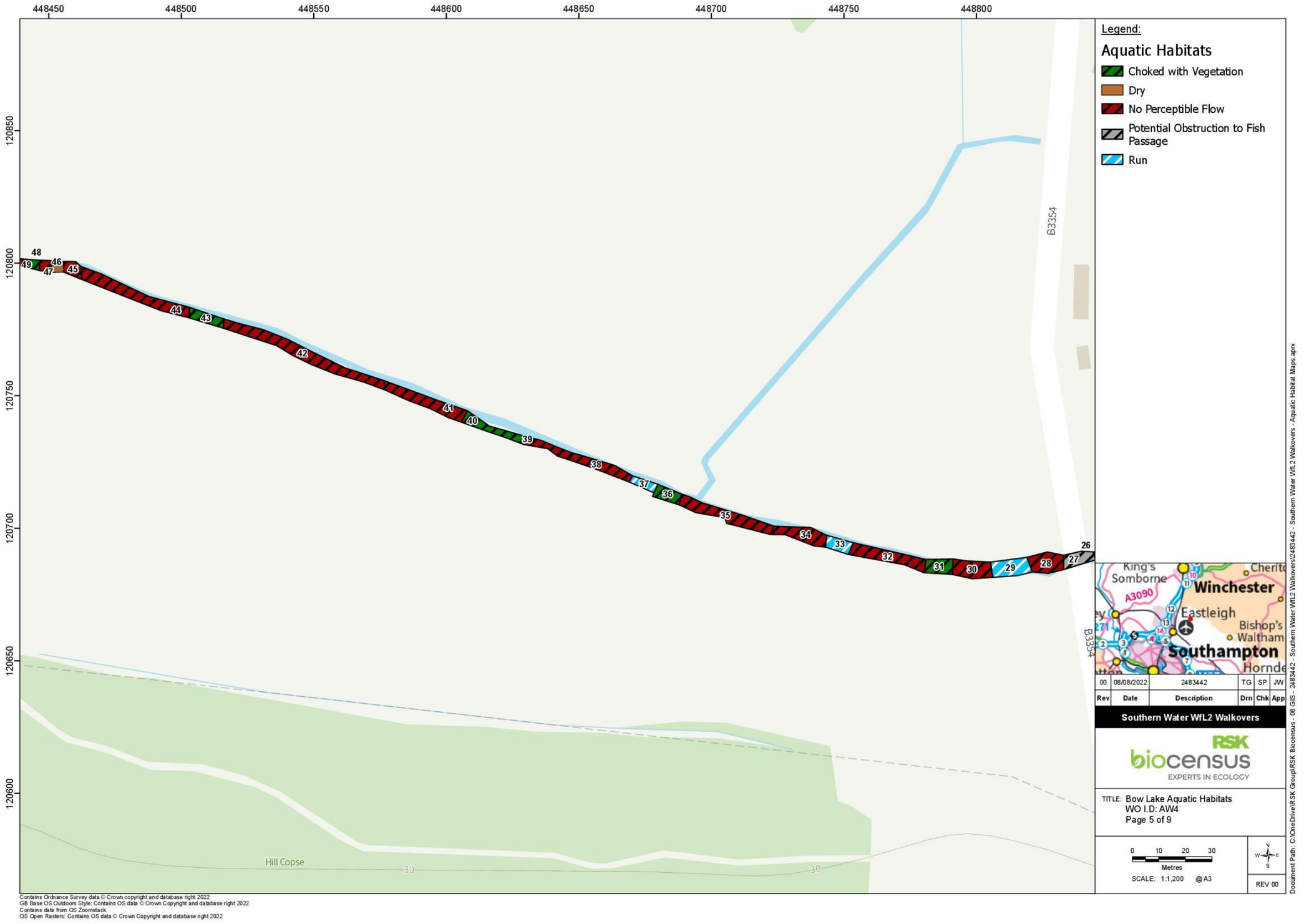
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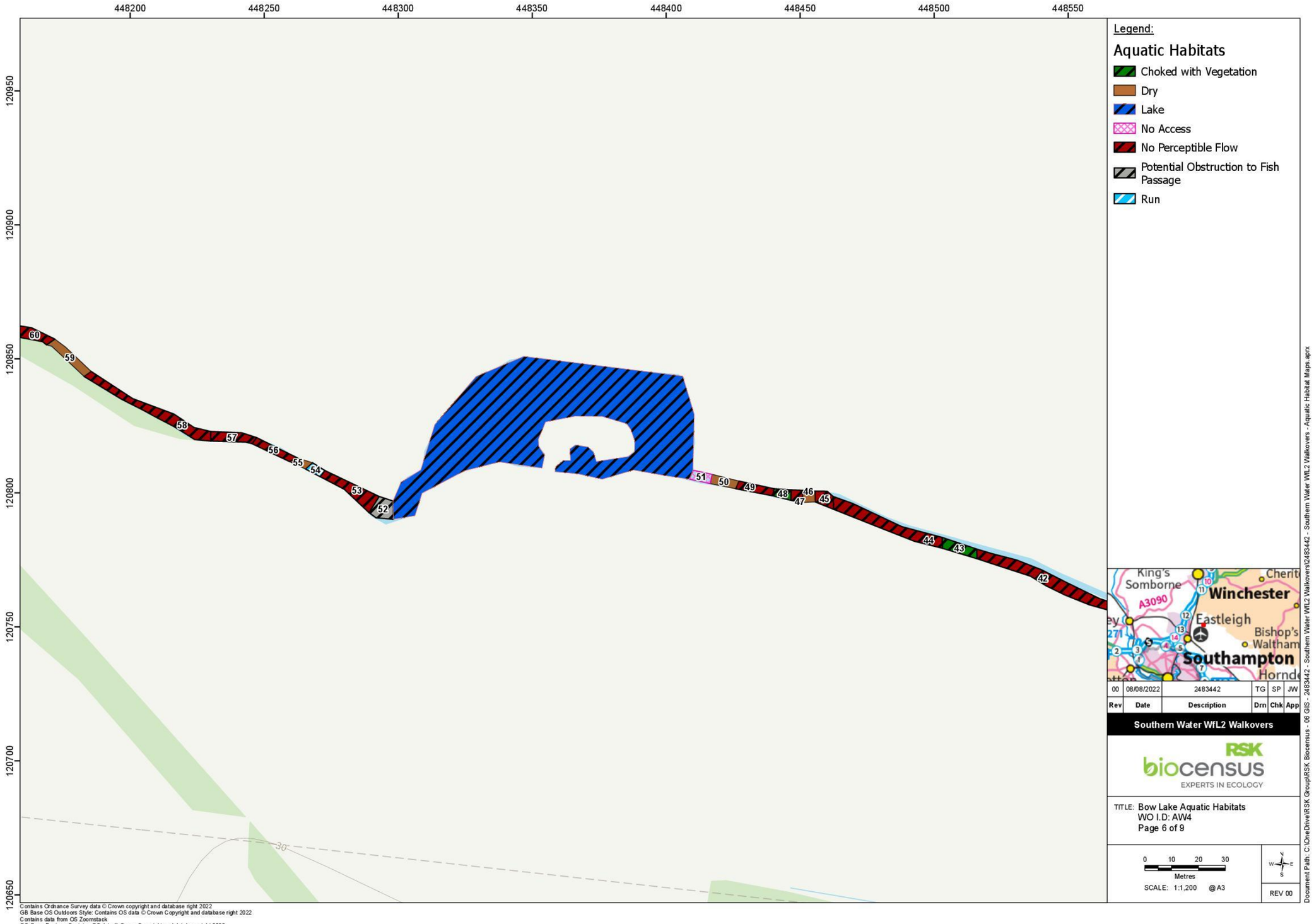
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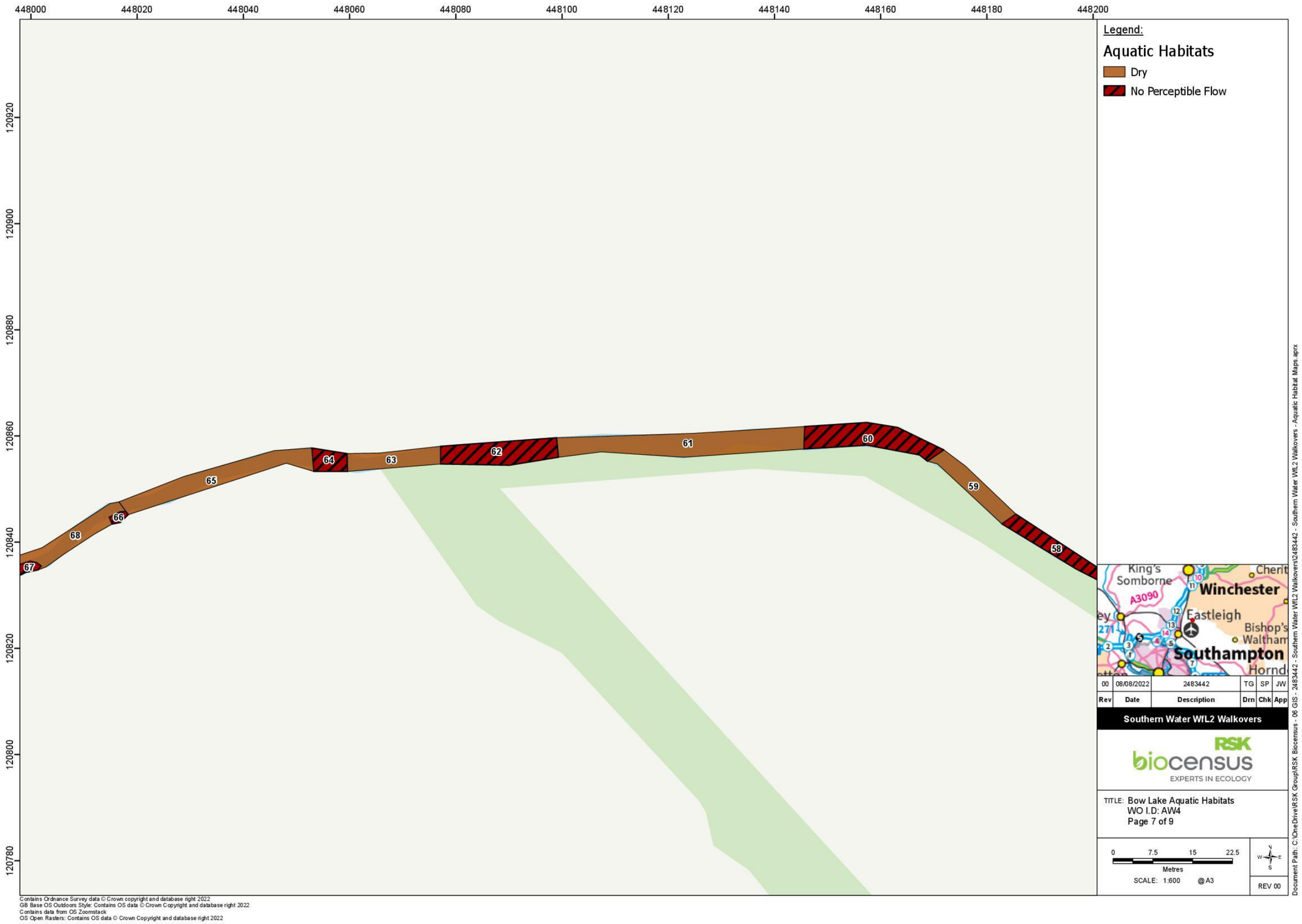
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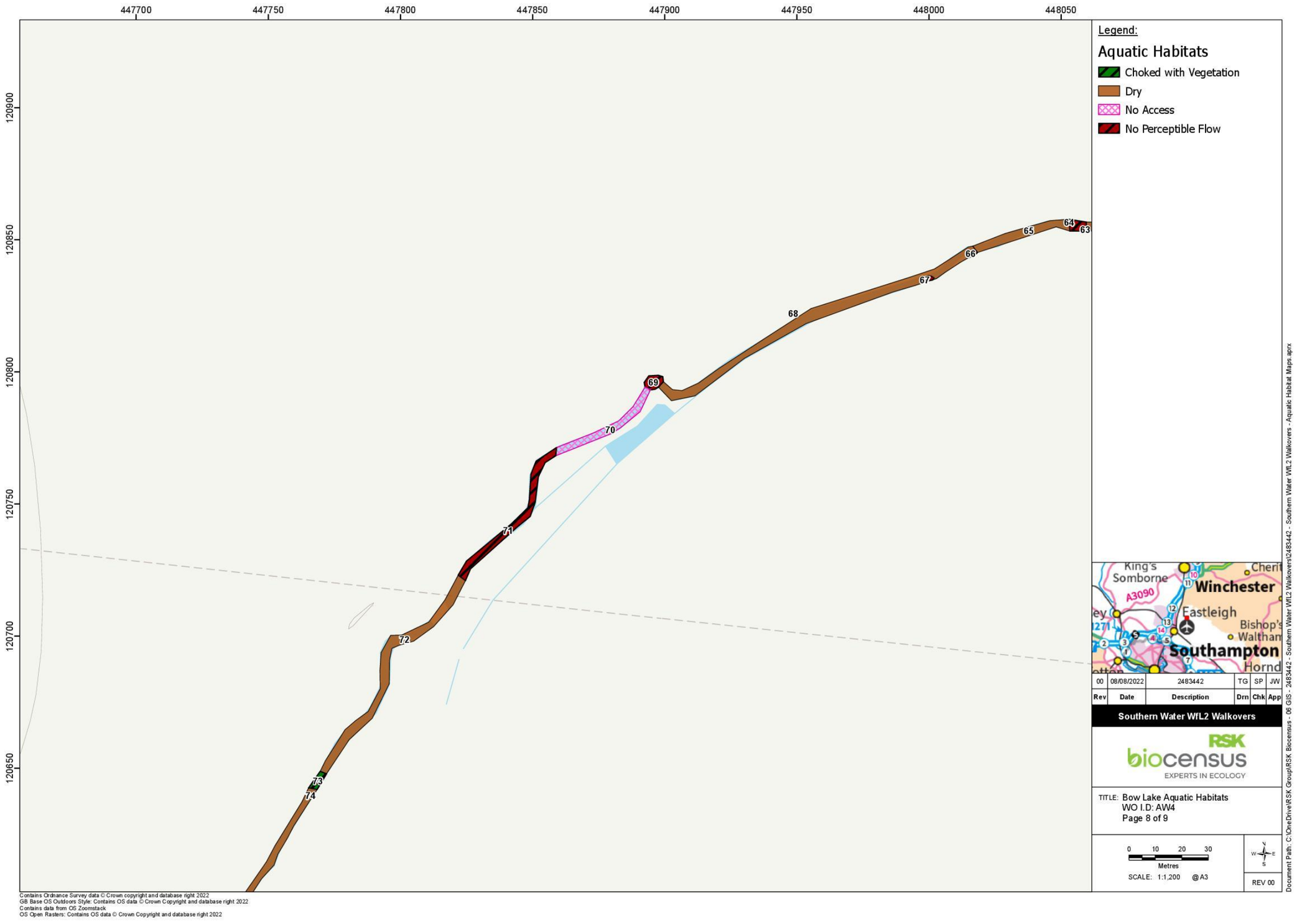
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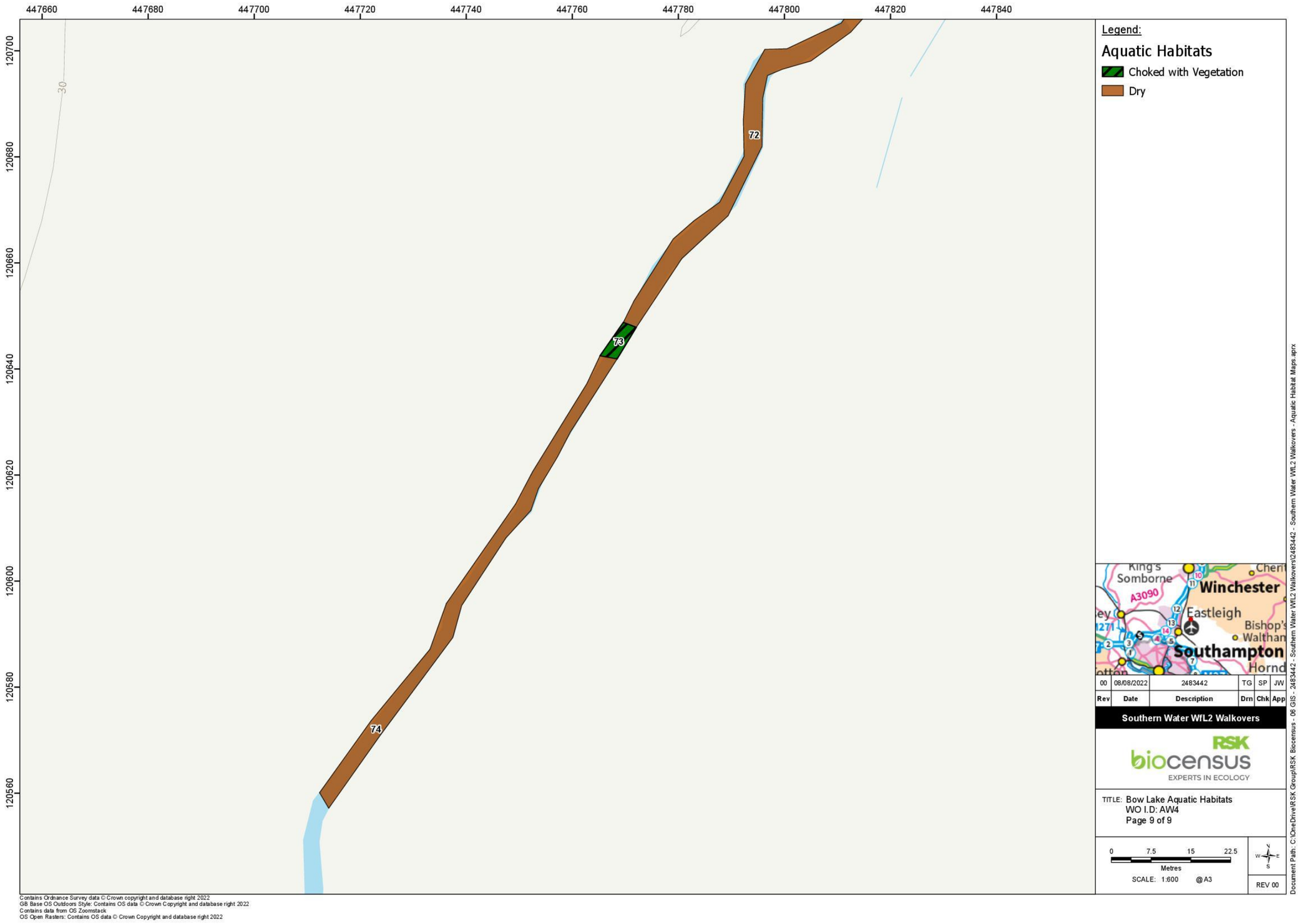
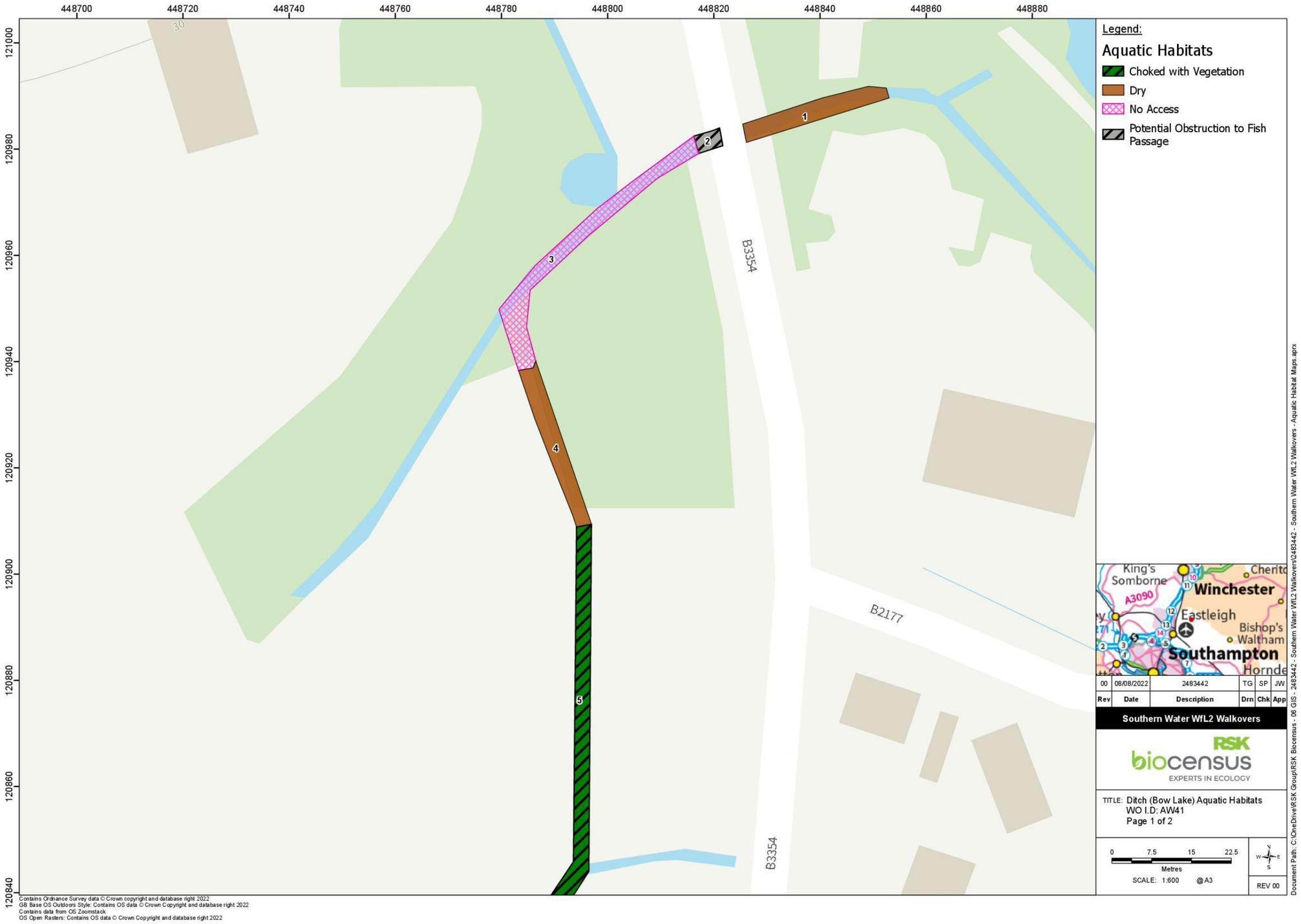
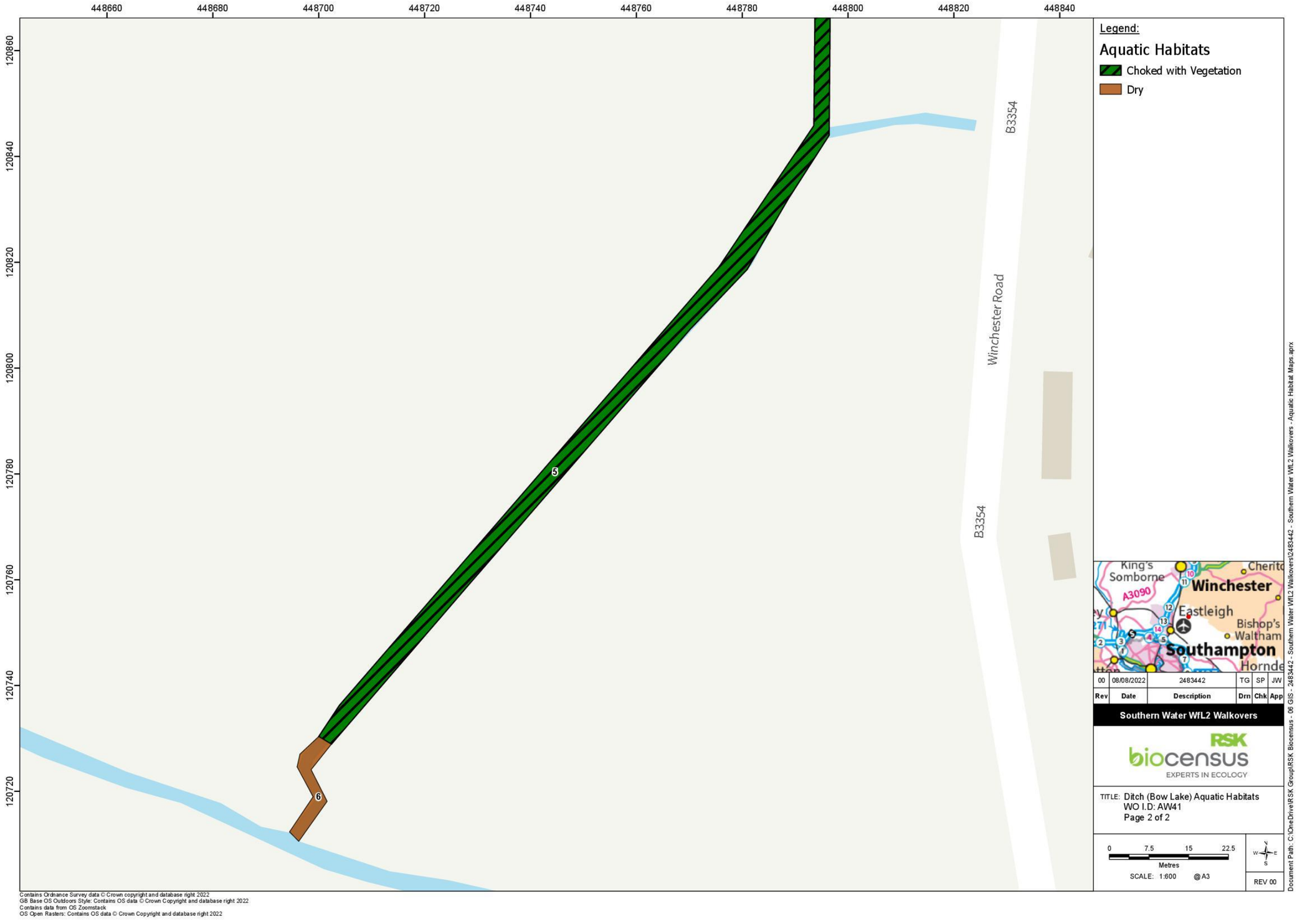


Graphic A-14 Ditch (Bow Lake) aquatic habitats – site AW41

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Legend:
Aquatic Habitats
Choked with Vegetation
Dry
King's Somborne
A3090
Winchester
Eastleigh
Bishop's Waltham
Southampton
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Rev Date Description Drn Chk App
Southern Water WfL2 Walkovers
RSK biocensus
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WO I.D: AW41
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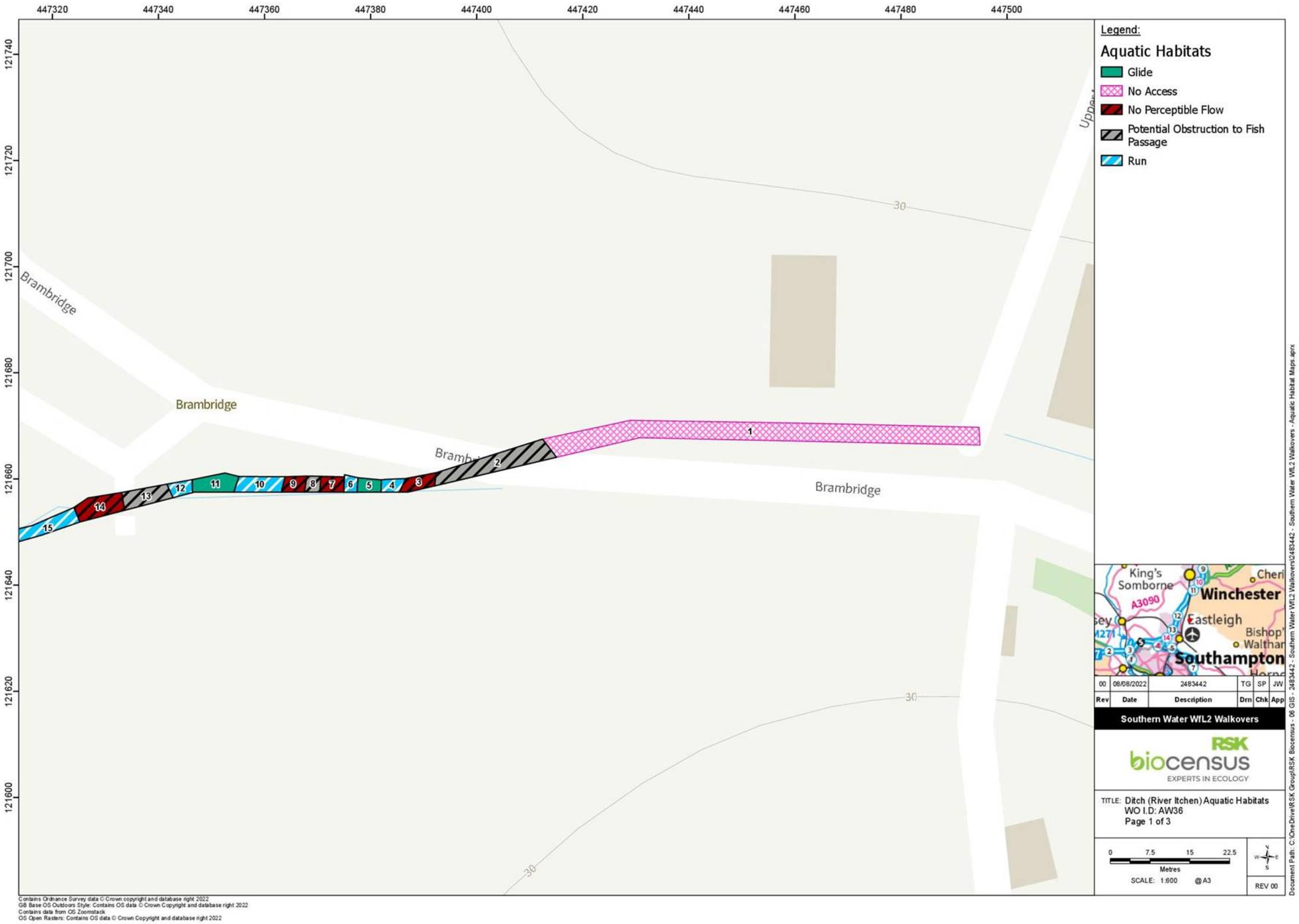
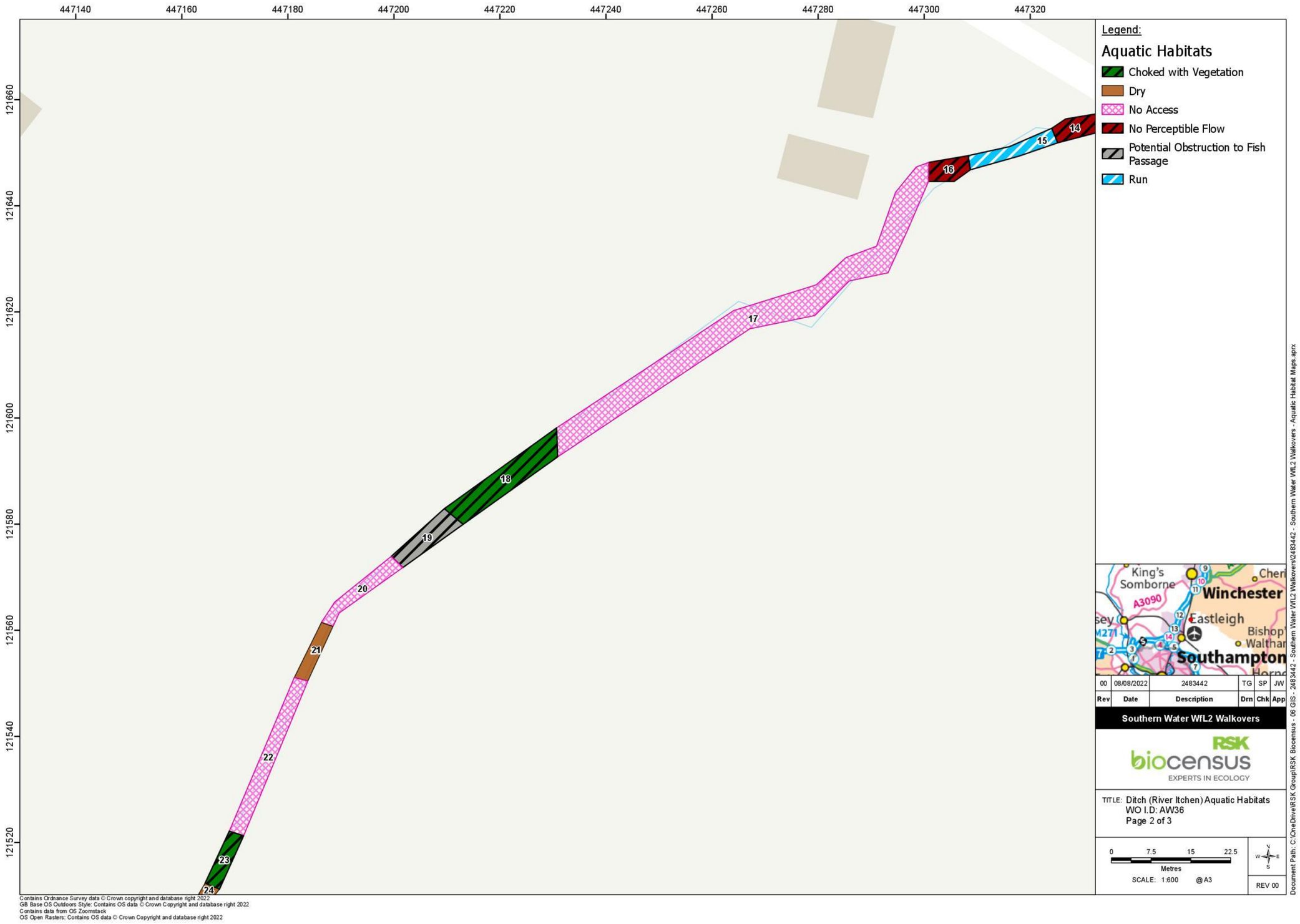
A.10 River Itchen and Itchen Navigation

Graphic A-15 Ditch (River Itchen) aquatic habitats – Site AW36

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Legend:
Aquatic Habitats
Choked with Vegetation
Dry
No Access
No Perceptible Flow
Potential Obstruction to Fish Passage
Run
King's Somborne
A3090
Winchester
Eastleigh
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RSK biocensus
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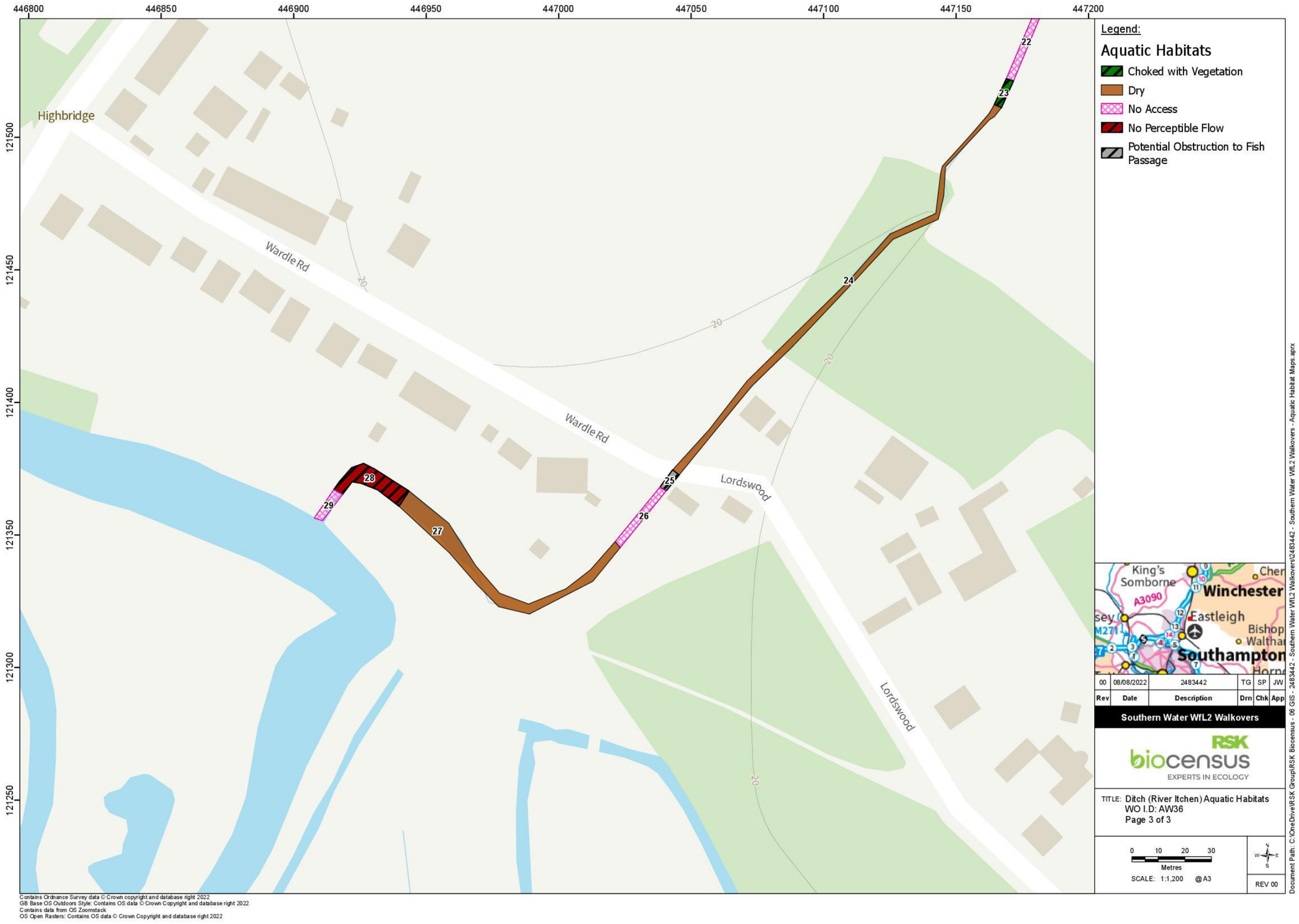
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Legend:
Aquatic Habitats
Choked with Vegetation
Dry
No Access
No Perceptible Flow
Potential Obstruction to Fish Passage
King's Somborne
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Winchester
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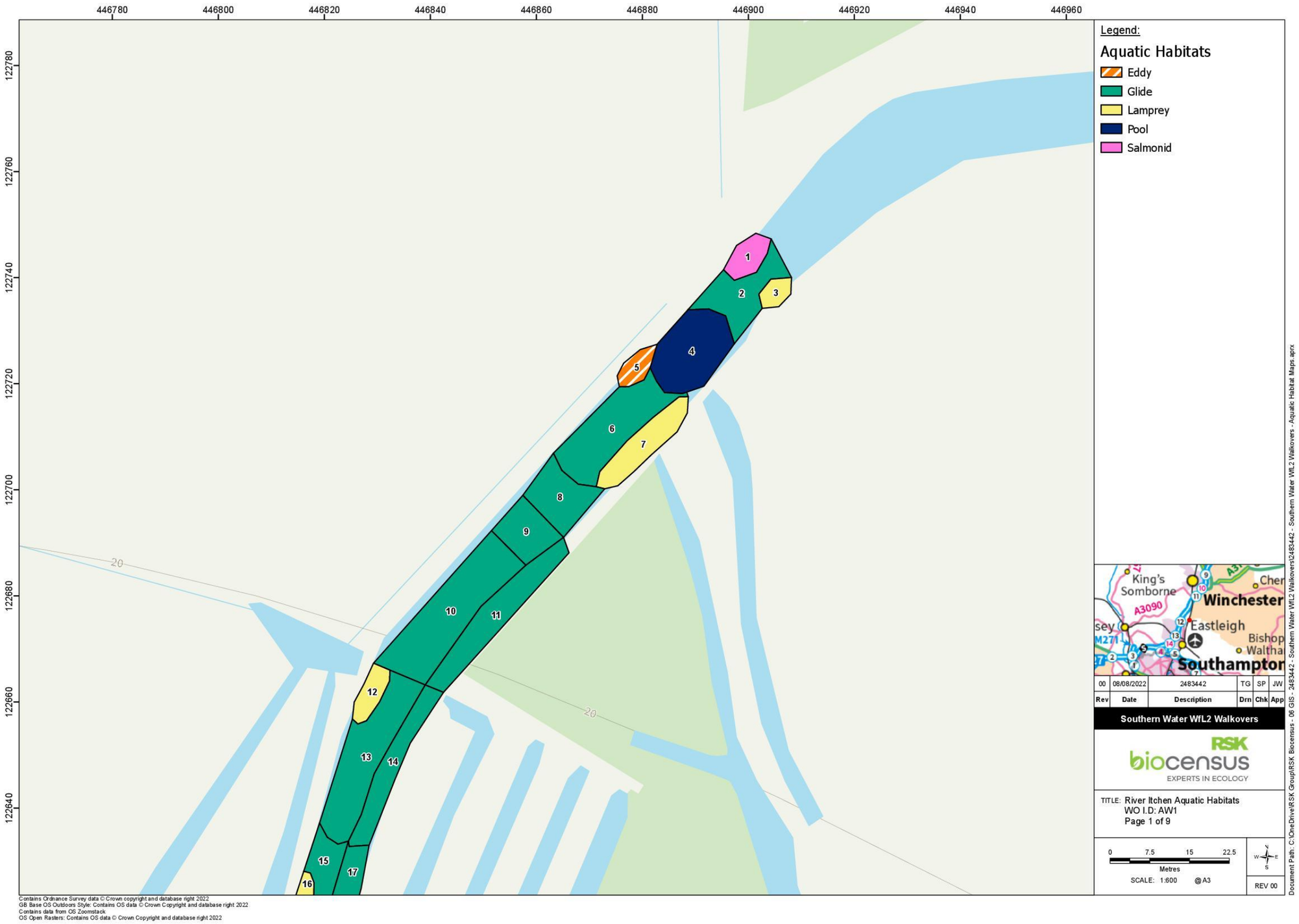
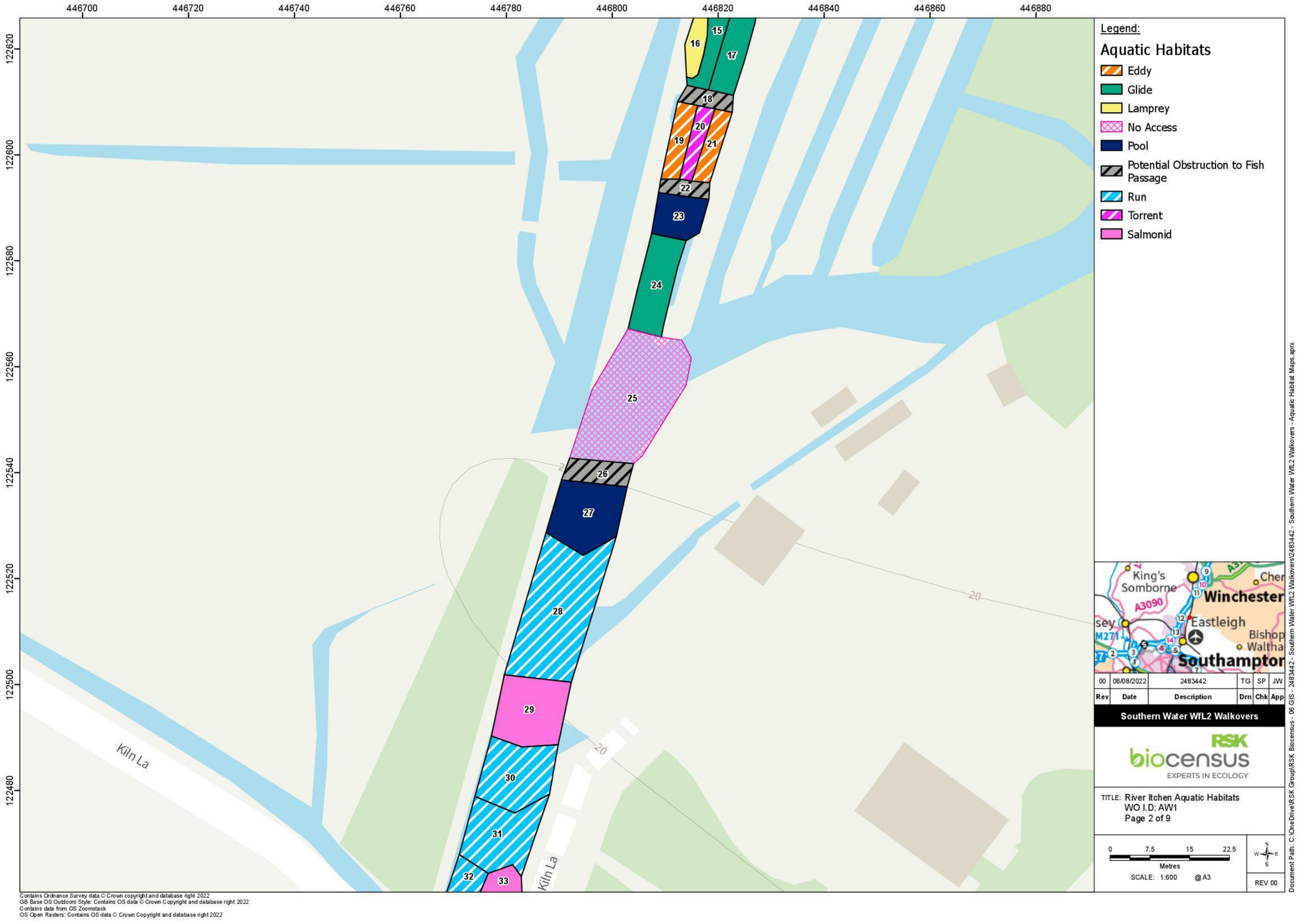
Graphic A-16 River Itchen aquatic habitats – site AW1

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Legend:
Aquatic Habitats
Eddy
Glide
Lamprey
No Access
Pool
Potential Obstruction to Fish Passage
Run
Torrent
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King's Somborne
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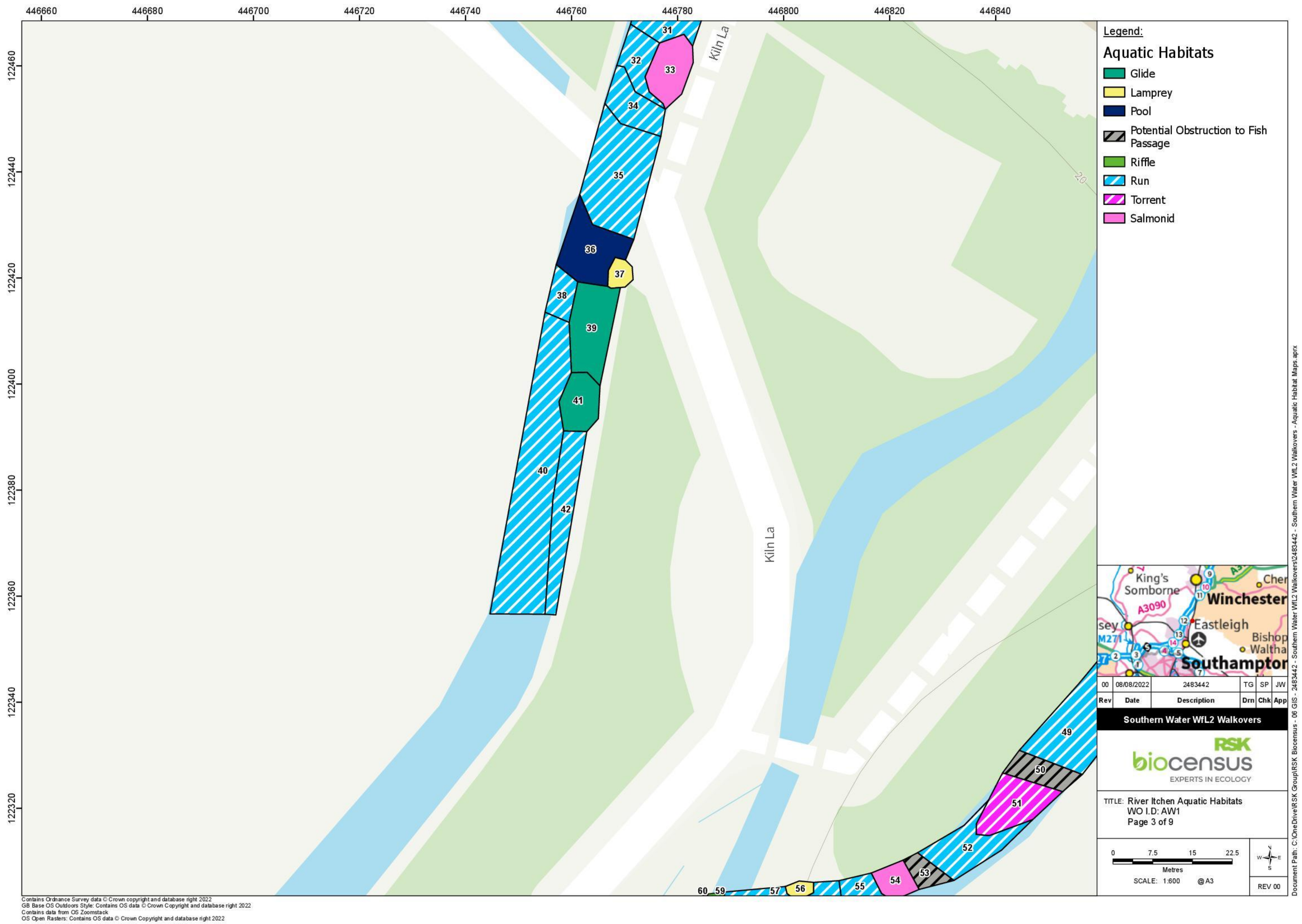
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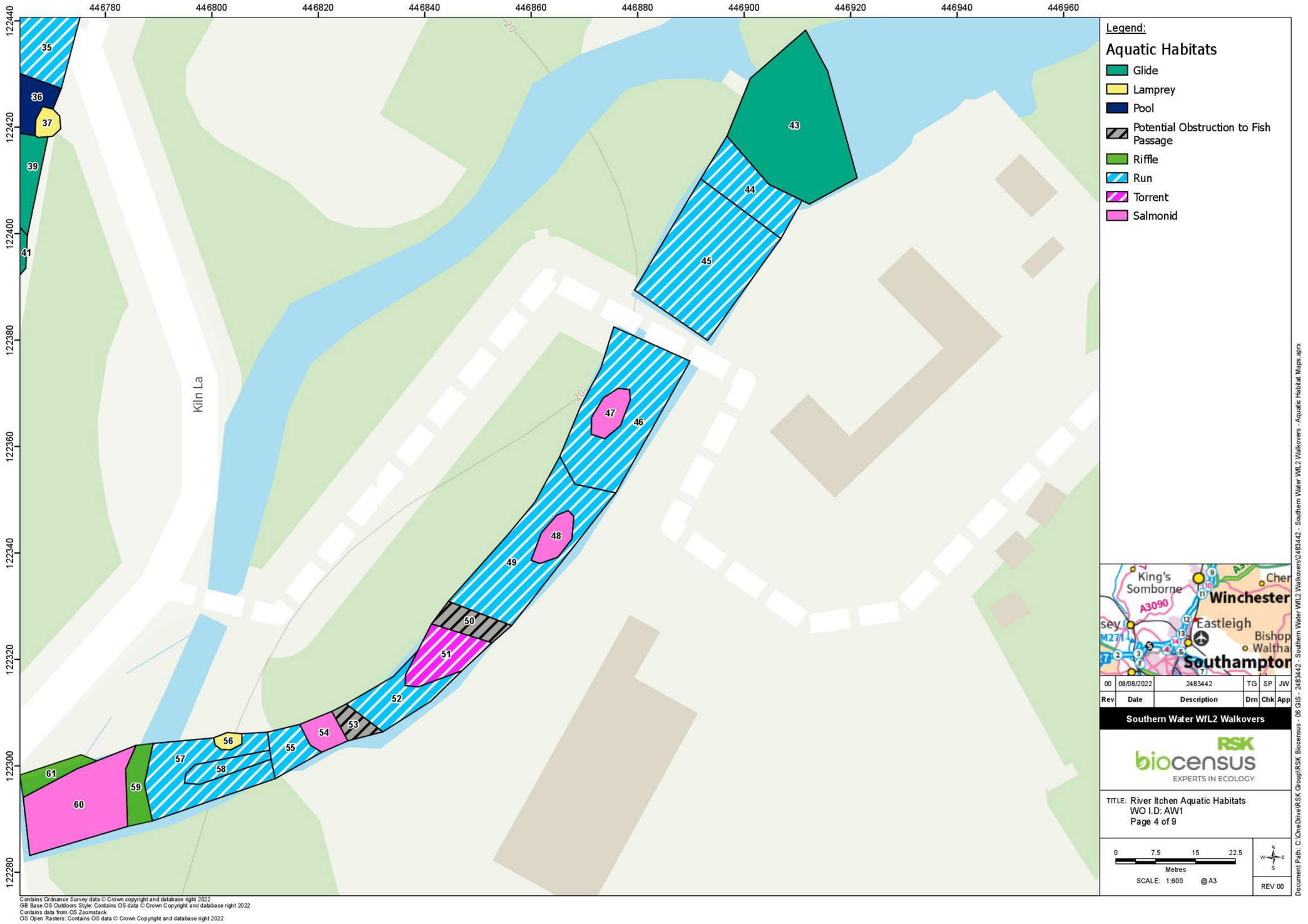
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Potential Obstruction to Fish Passage
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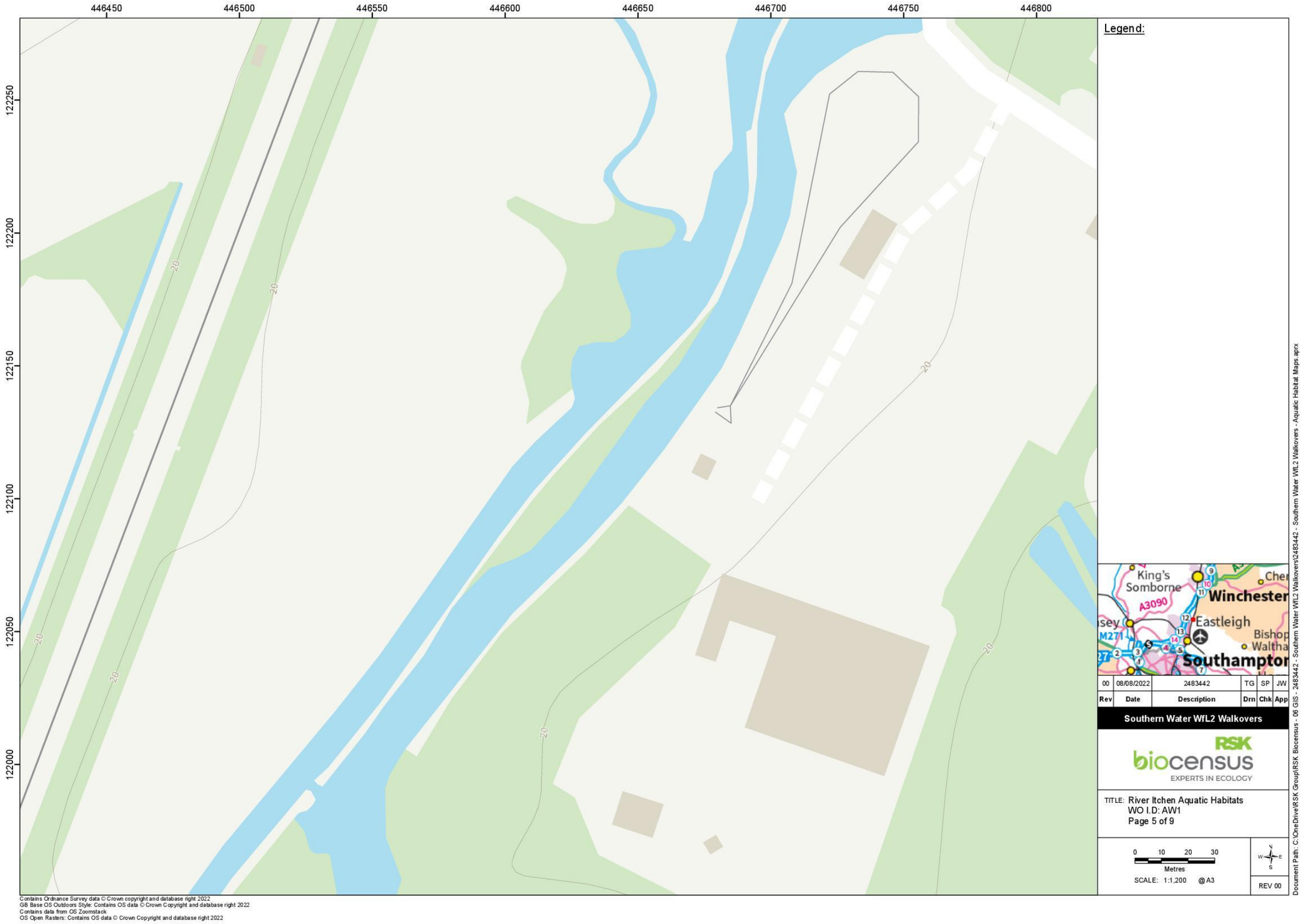
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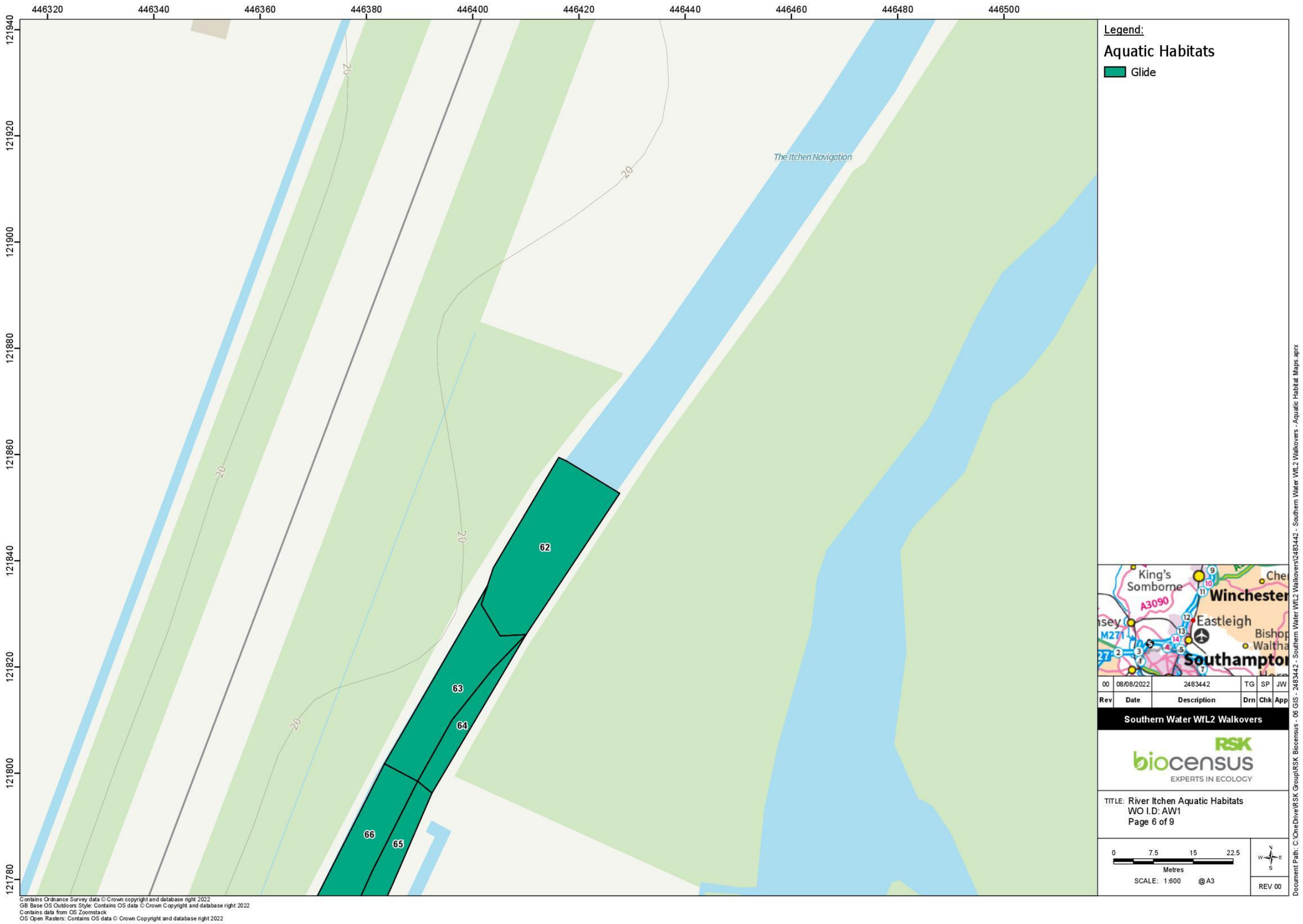
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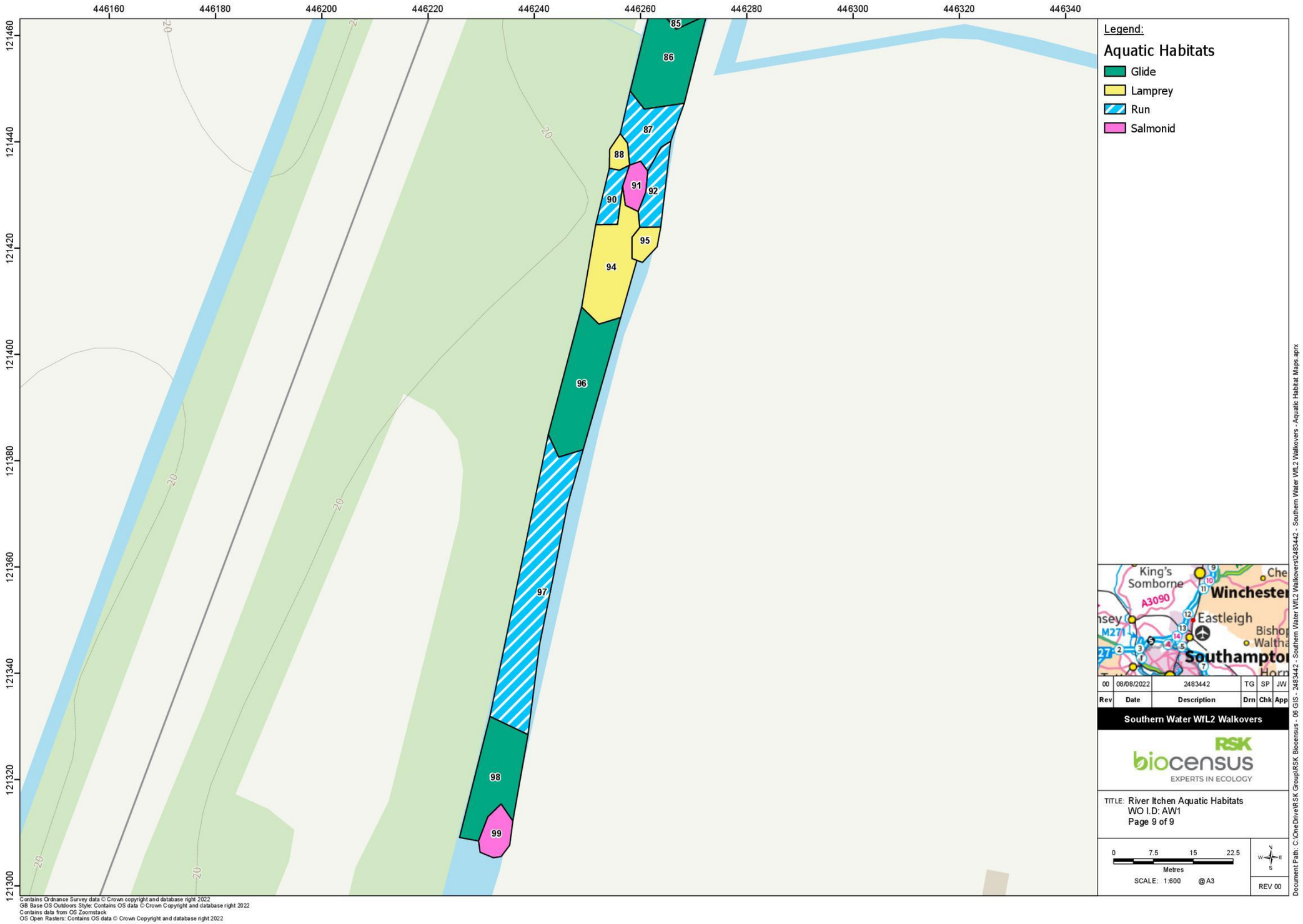
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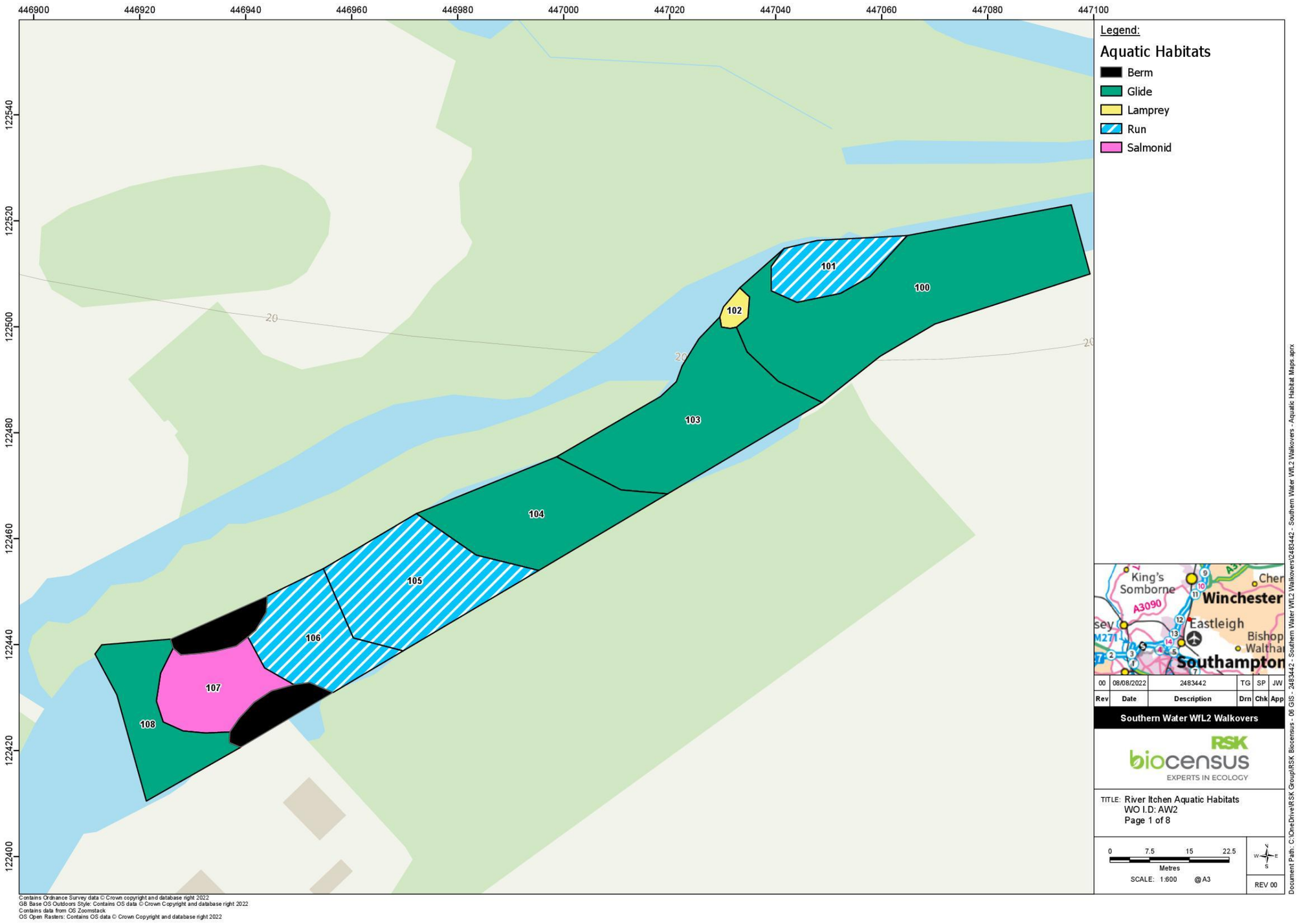
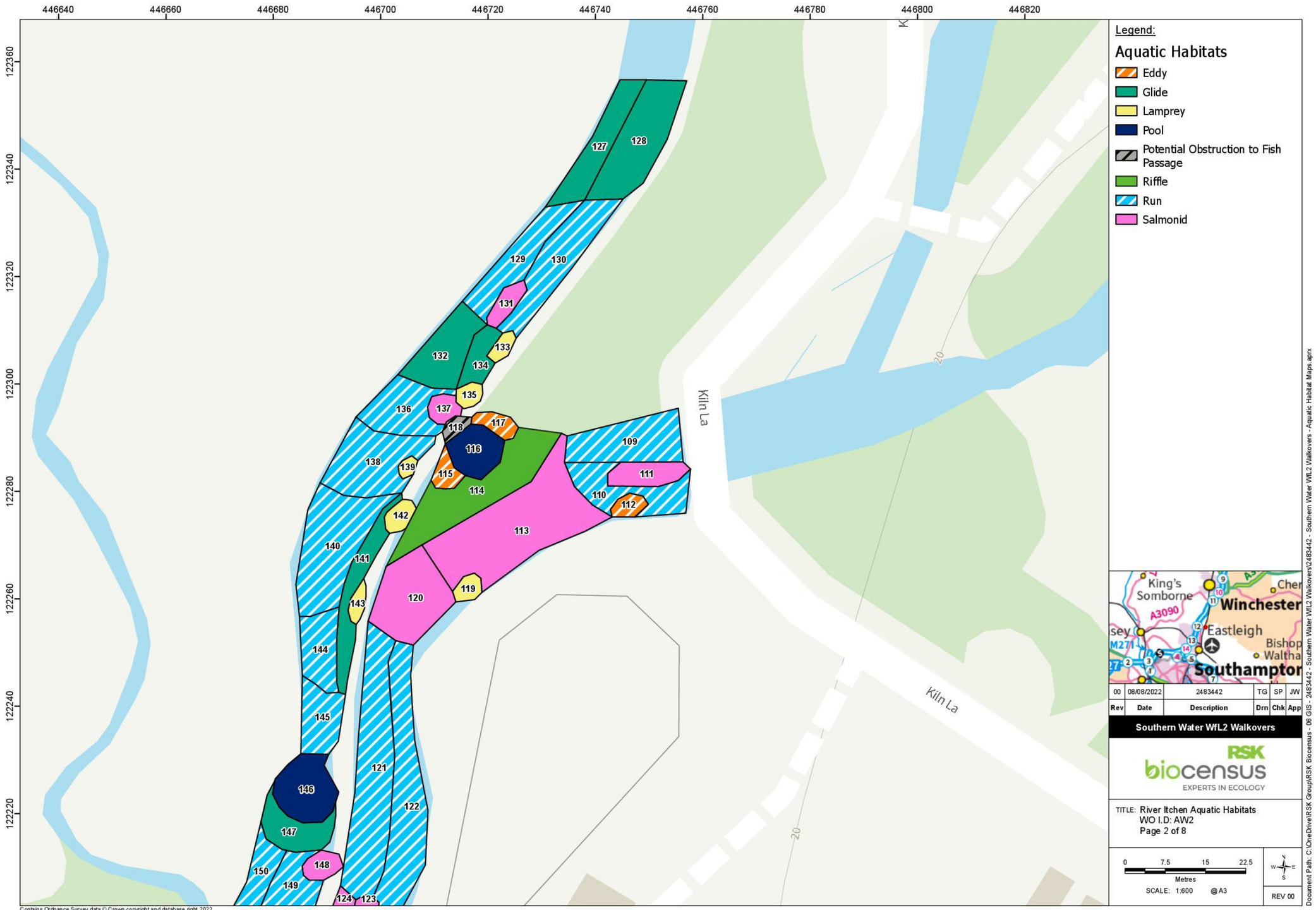
Graphic A-17 River Itchen aquatic habitats – site AW2

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Glide
Lamprey
Pool
Potential Obstruction to Fish Passage
Riffle
Run
Salmonid
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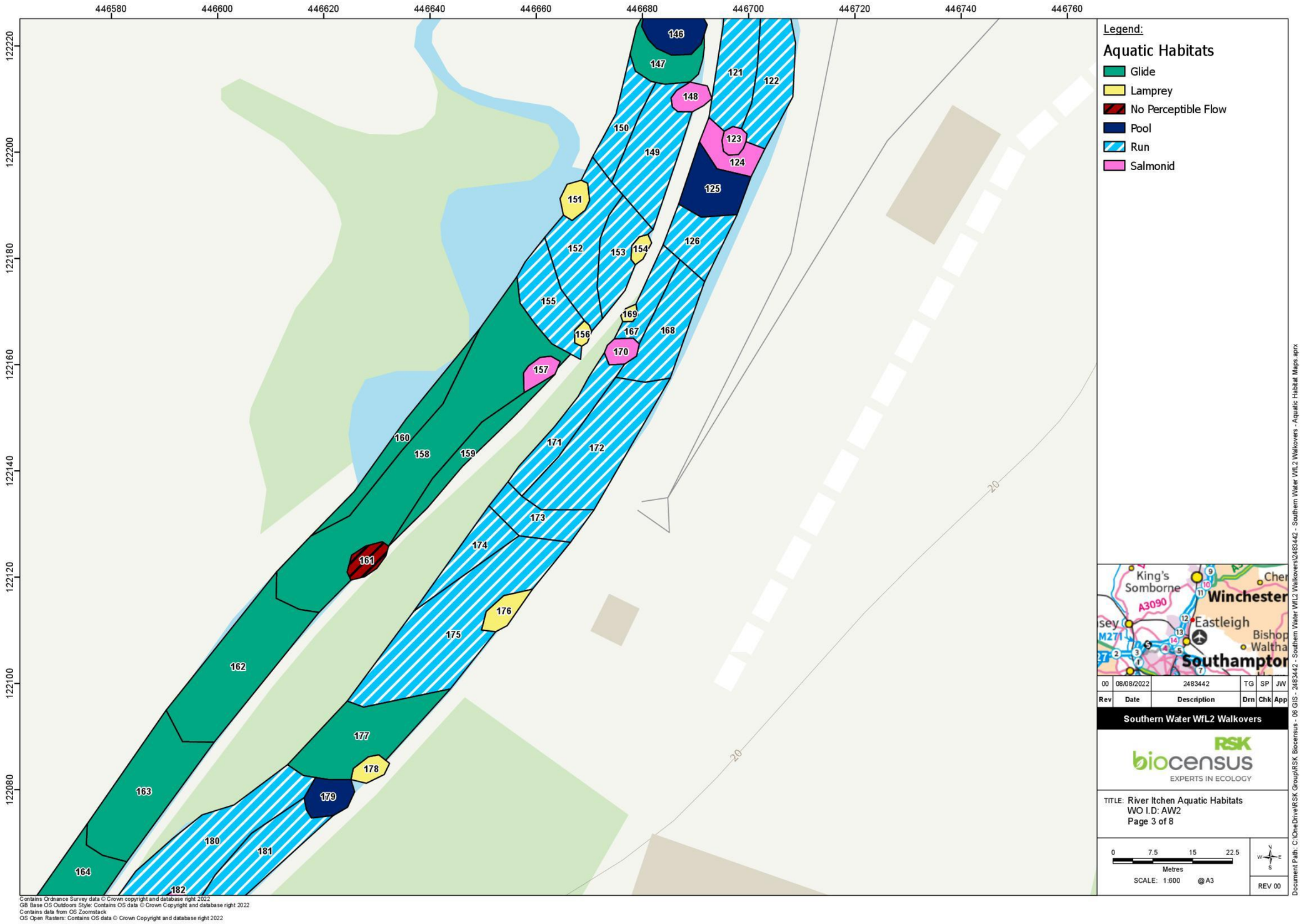

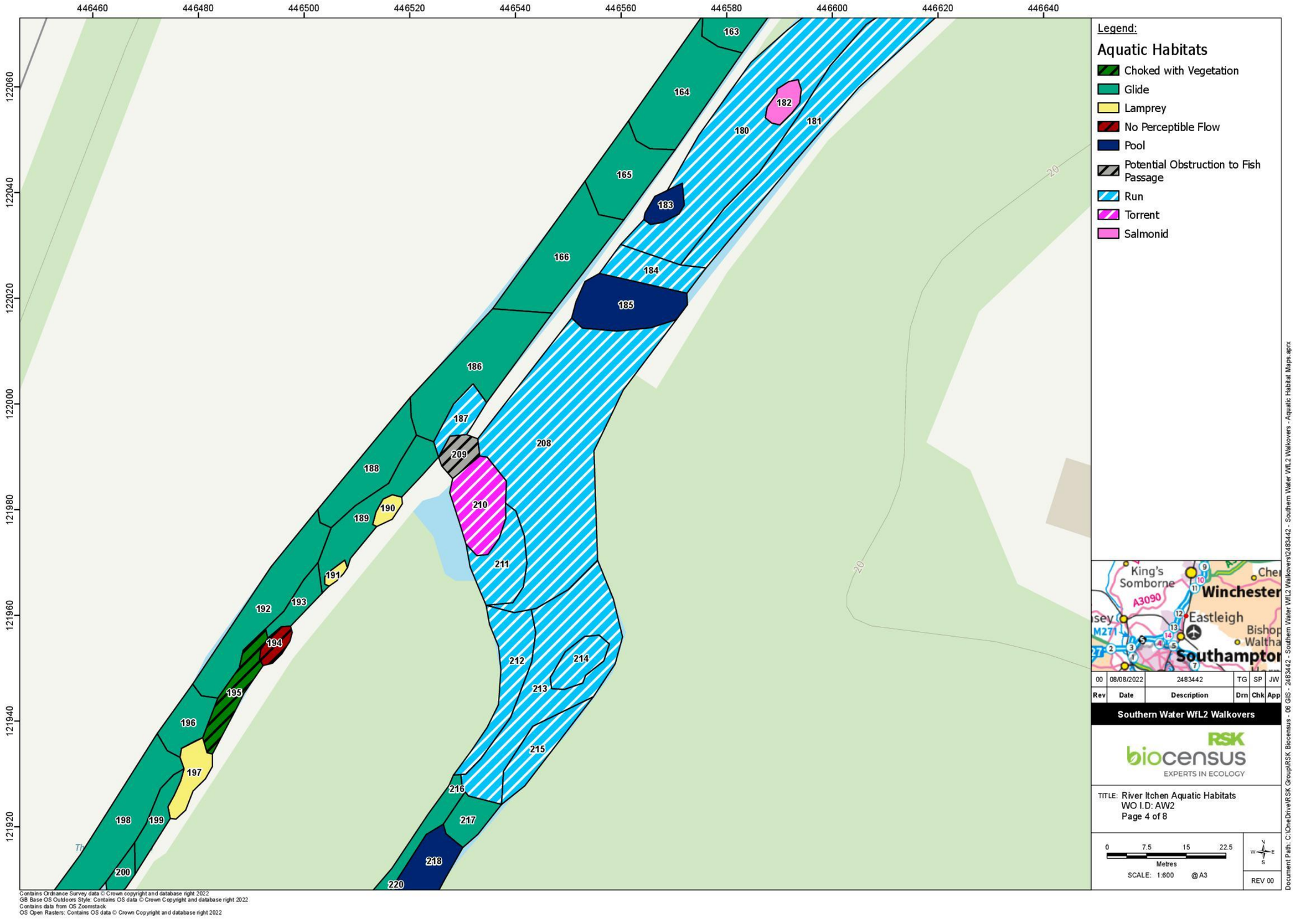
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Lamprey
No Perceptible Flow
Pool
Potential Obstruction to Fish Passage
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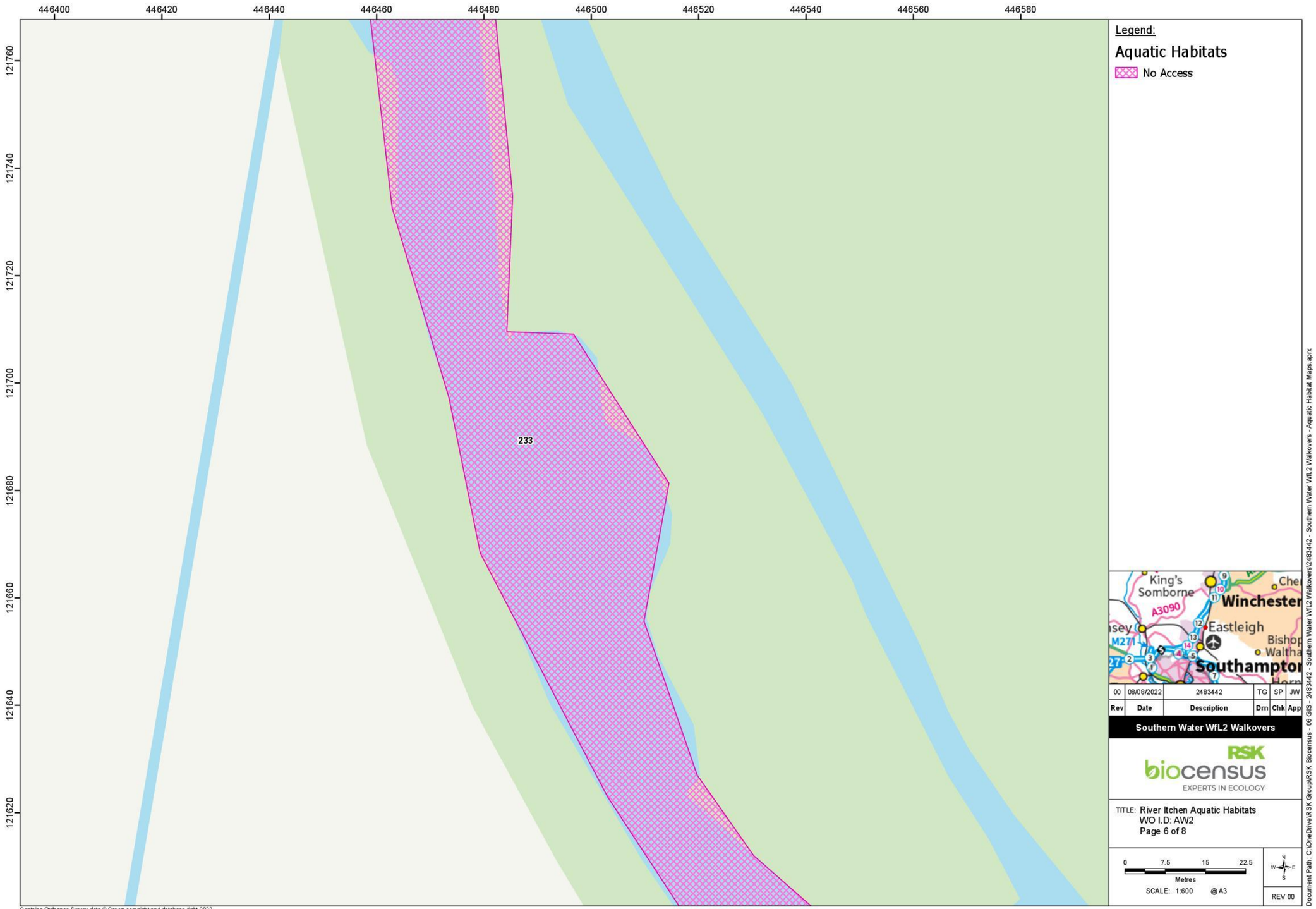
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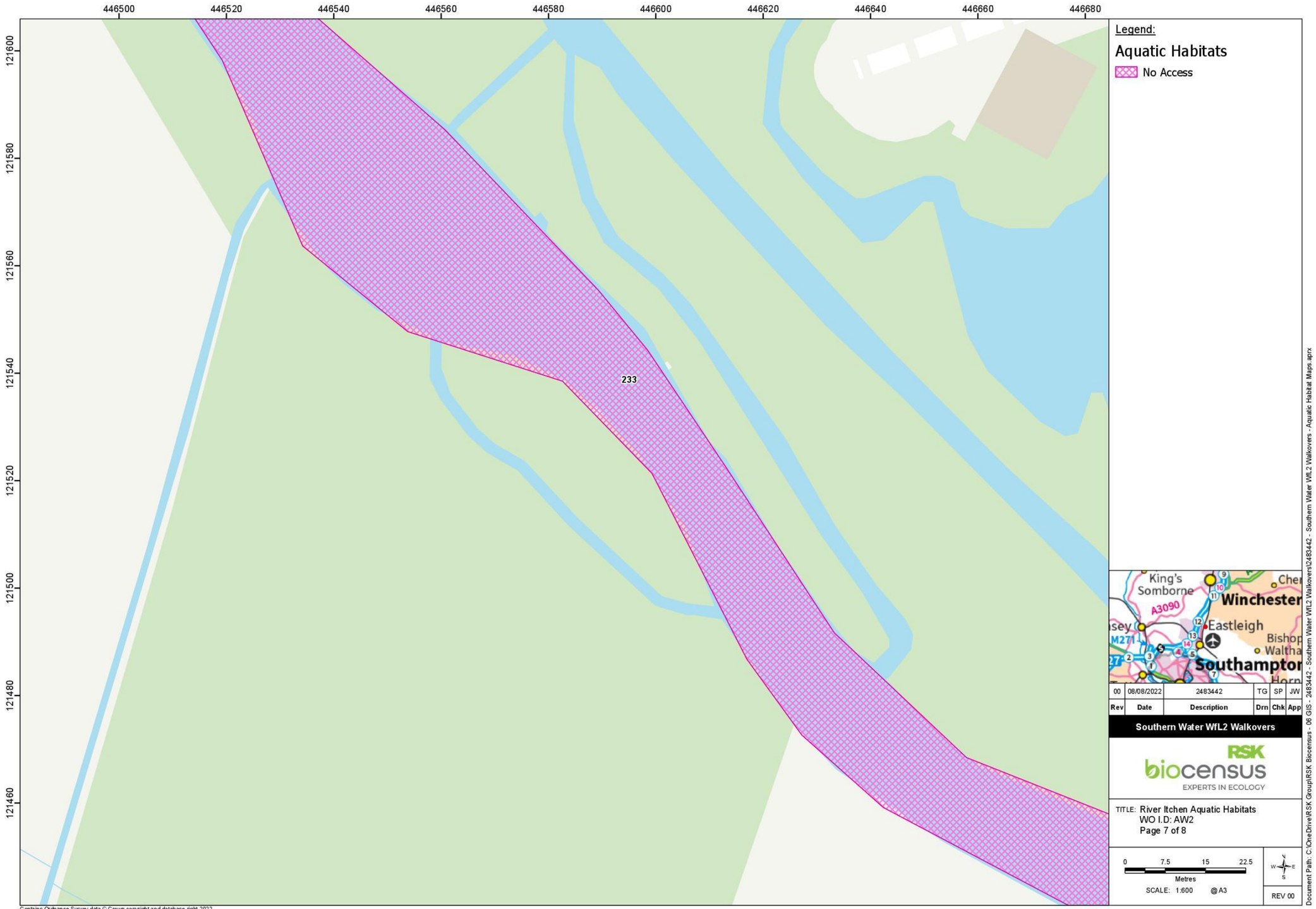
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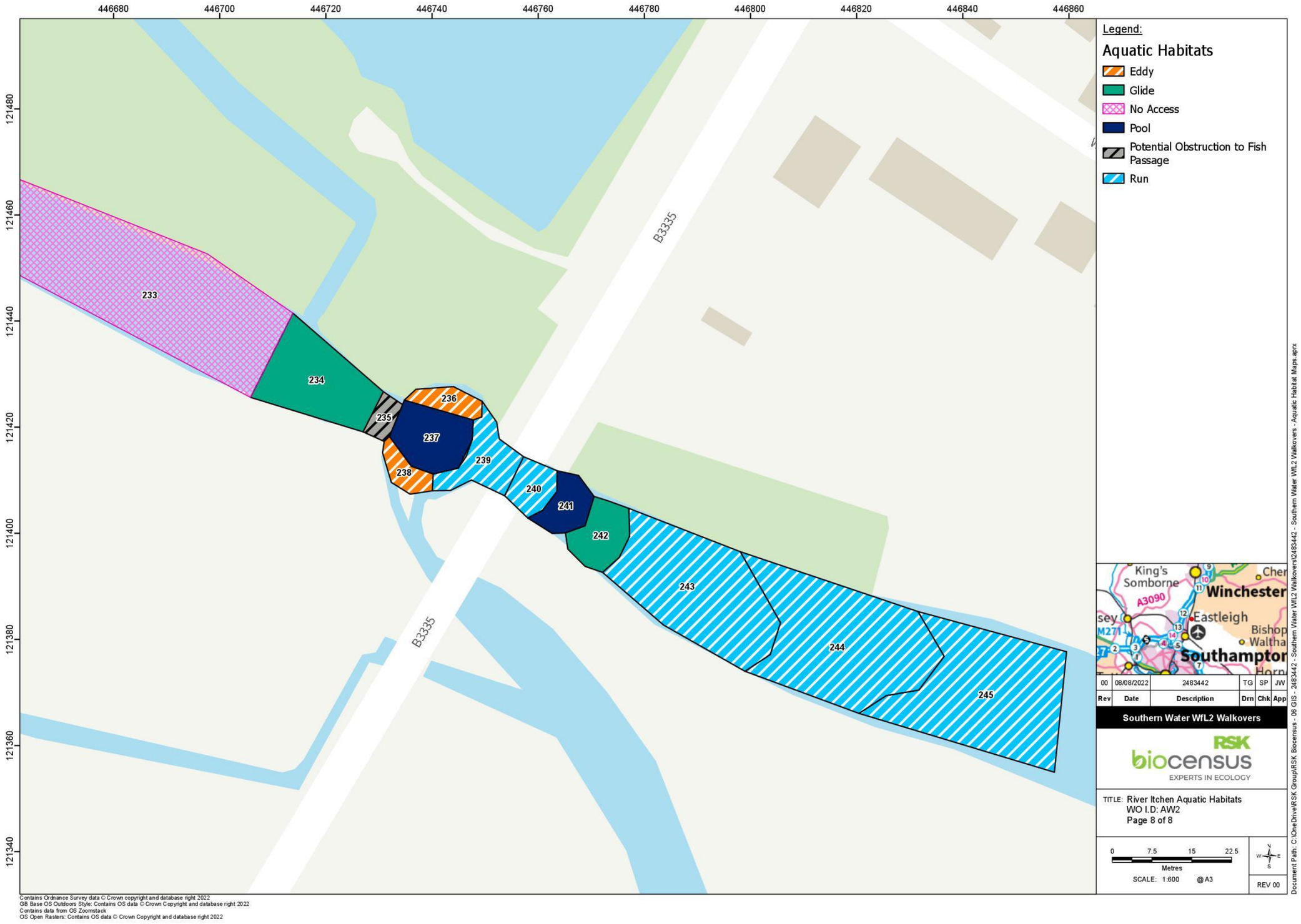
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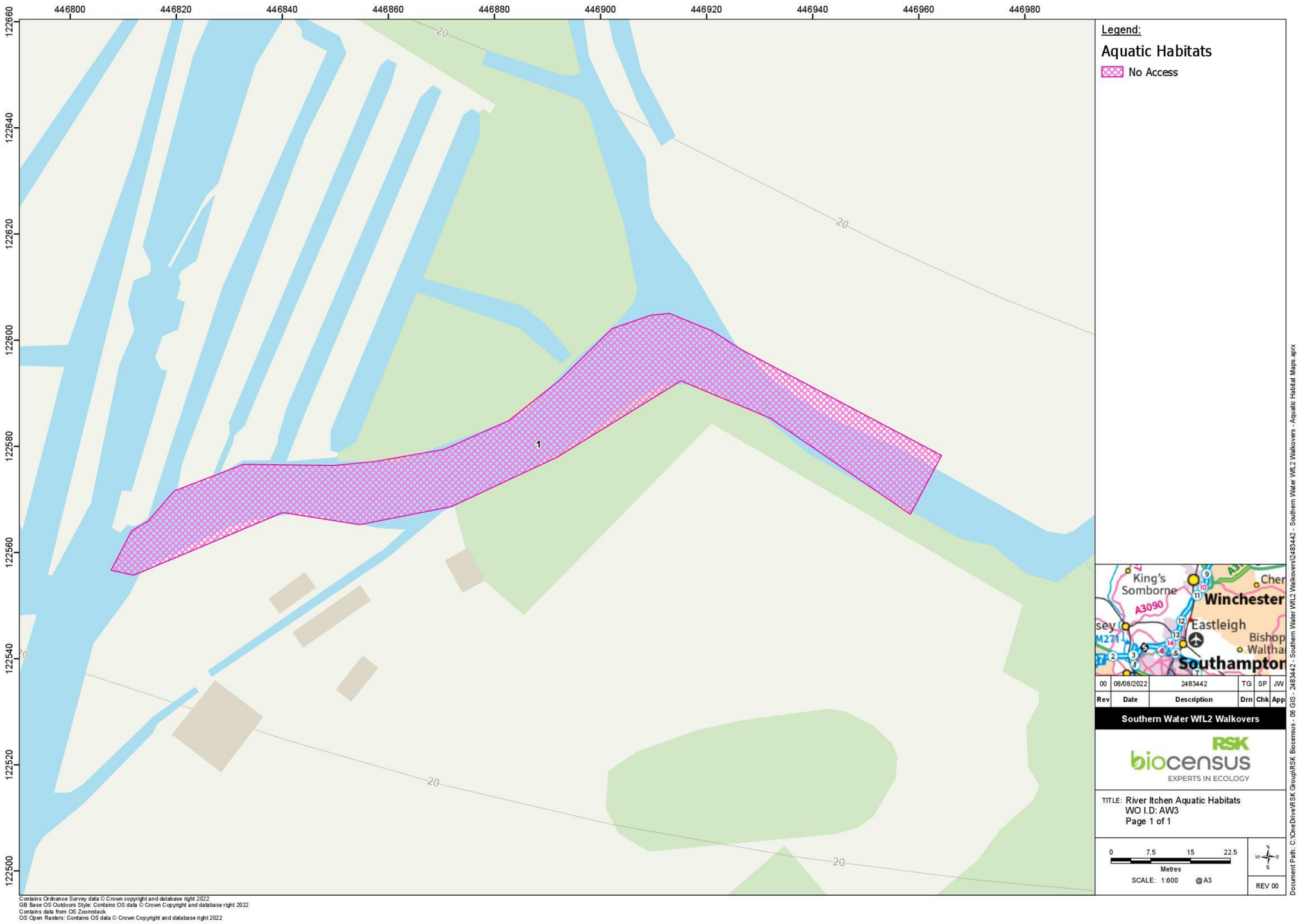
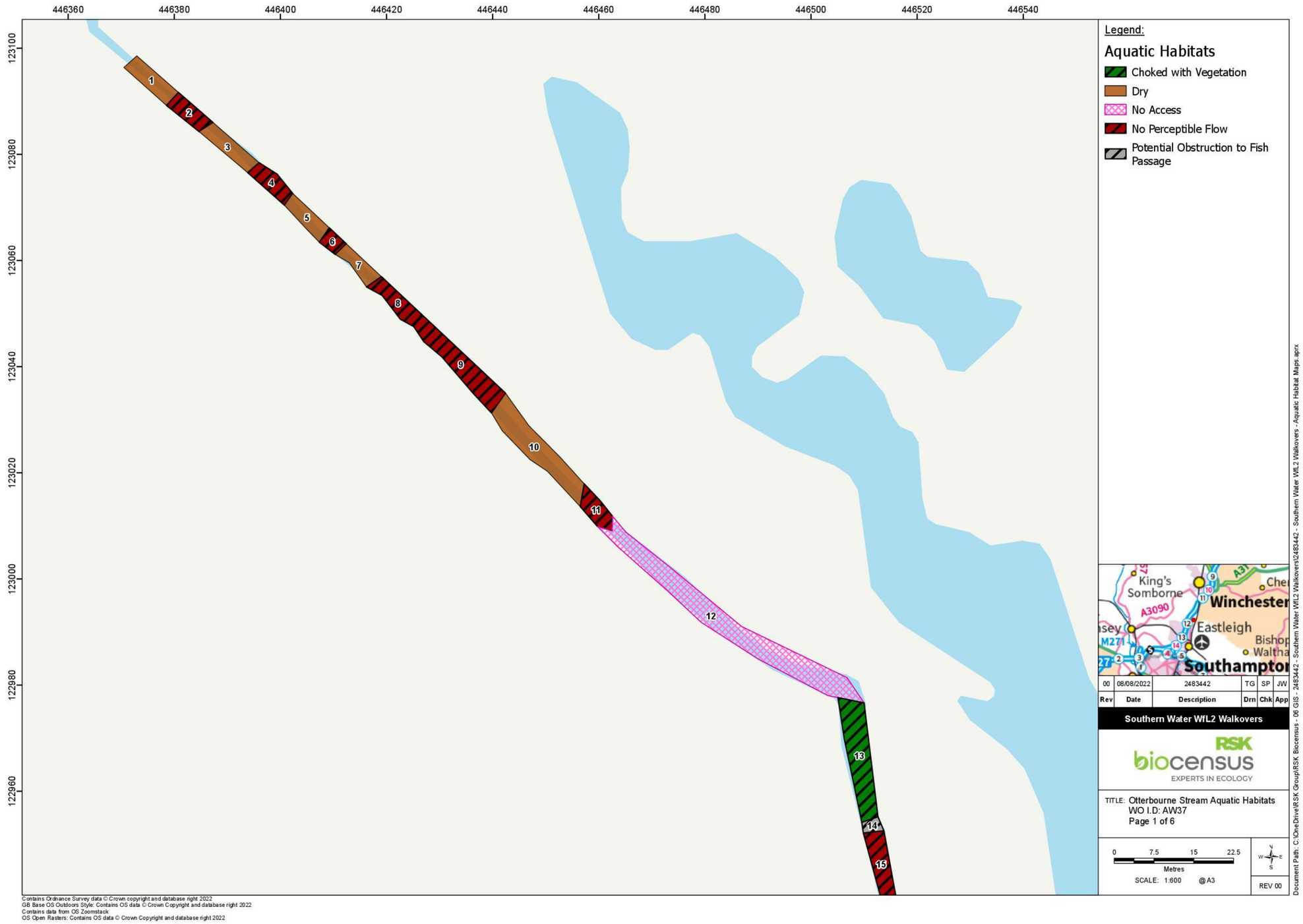
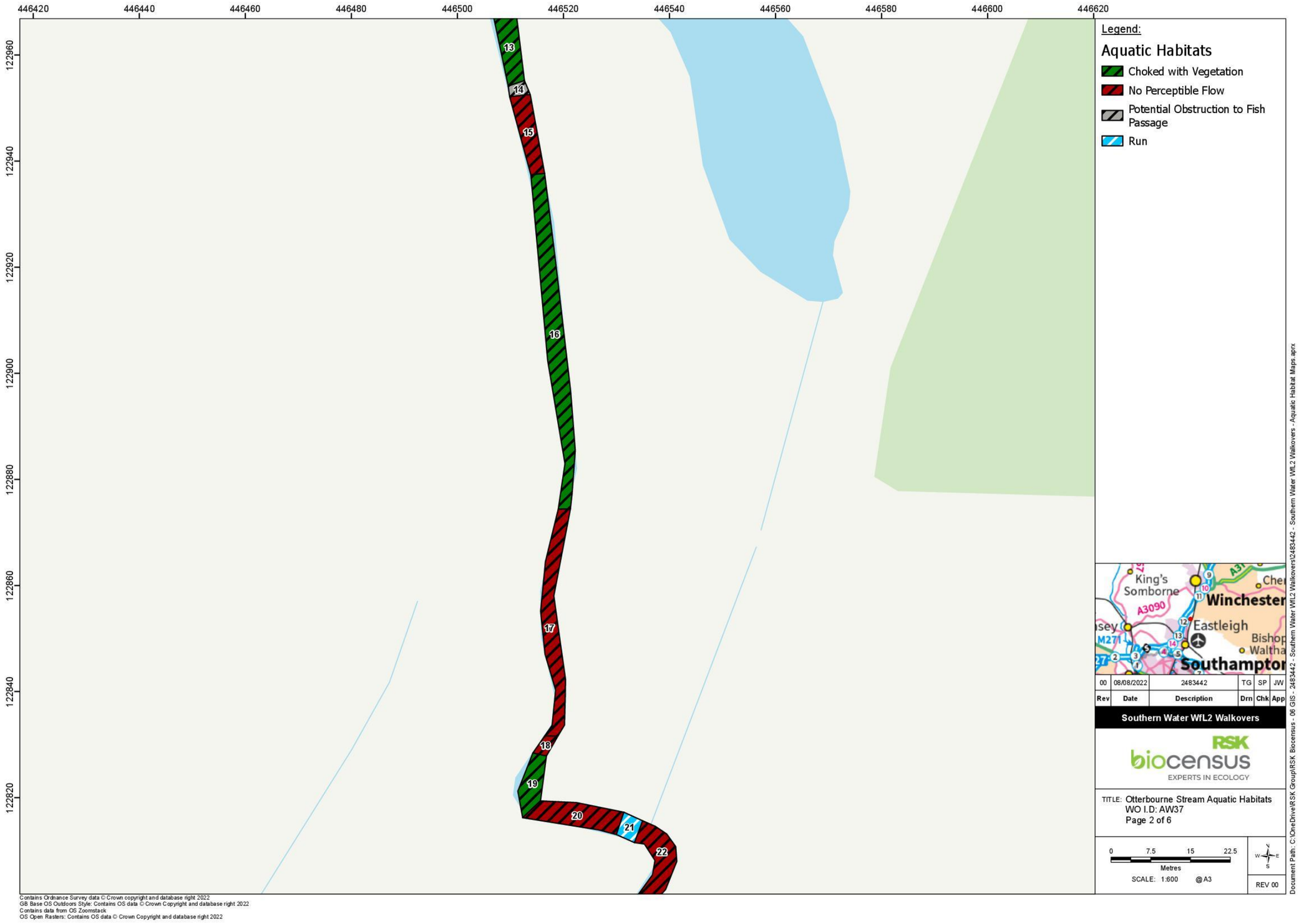
Graphic A-18 River Itchen aquatic habitats – Site AW3



A.11 Otterbourne Stream

Graphic A-19 Otterbourne Stream aquatic habitats – Site AW37

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Aquatic Habitats
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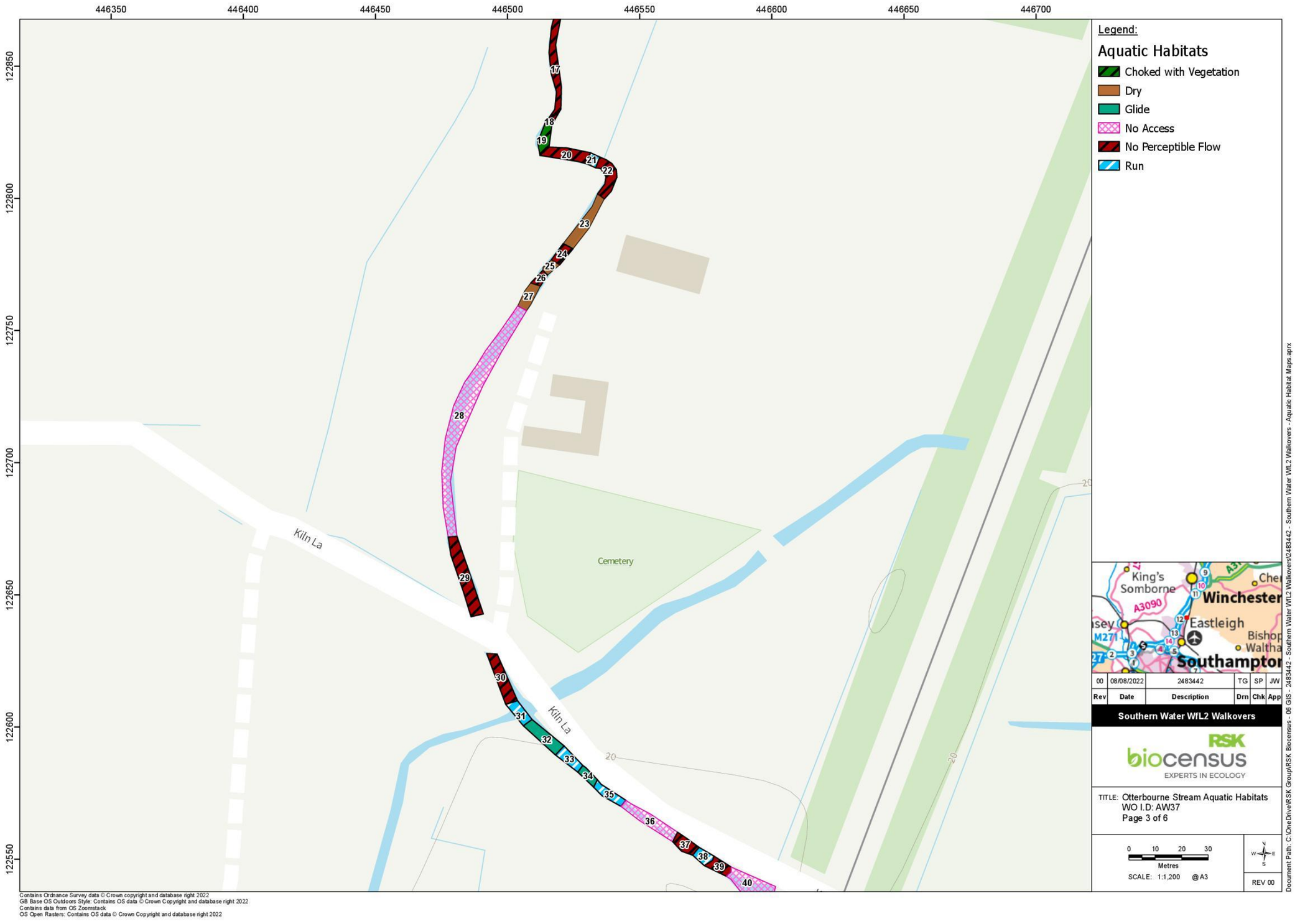
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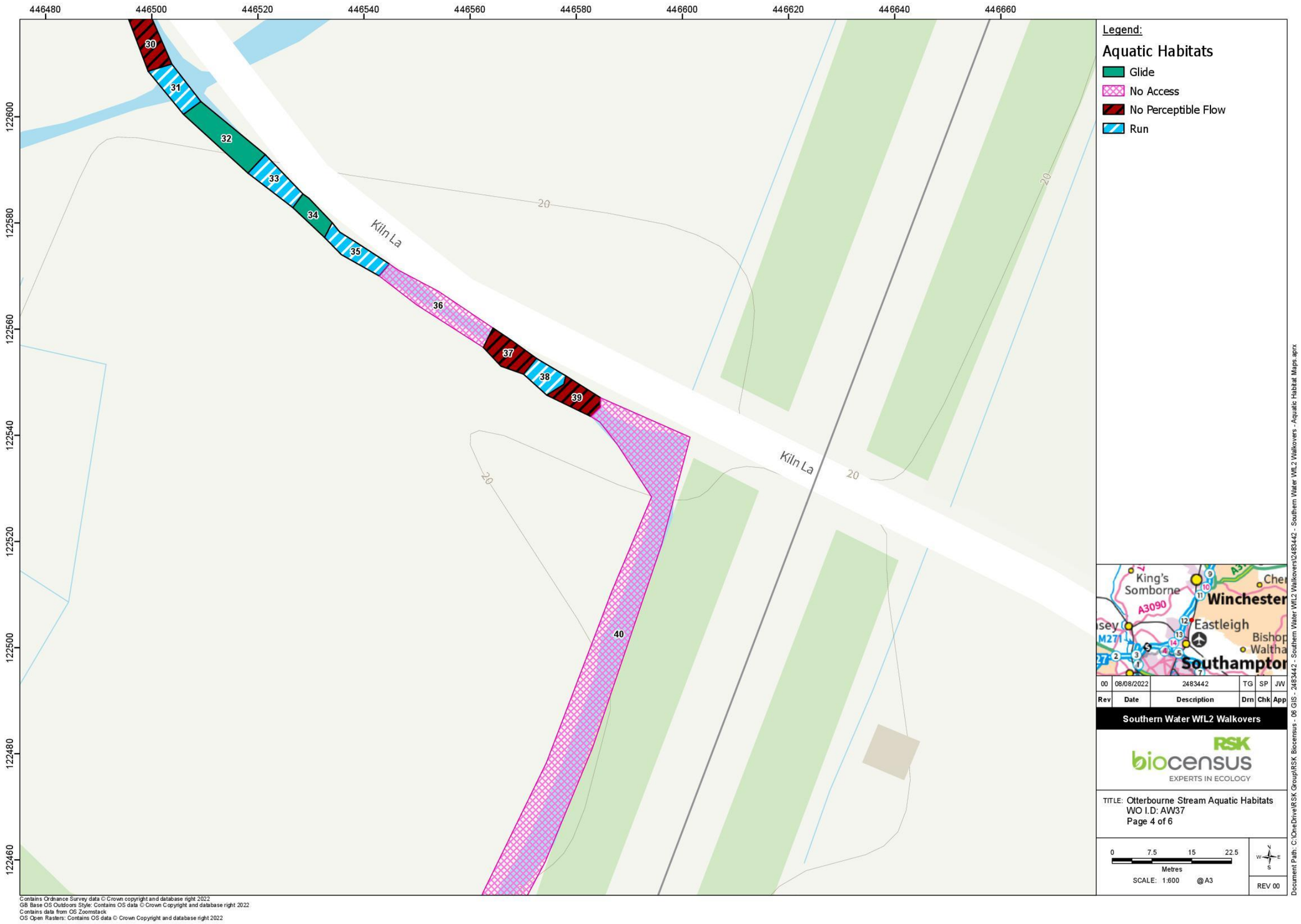
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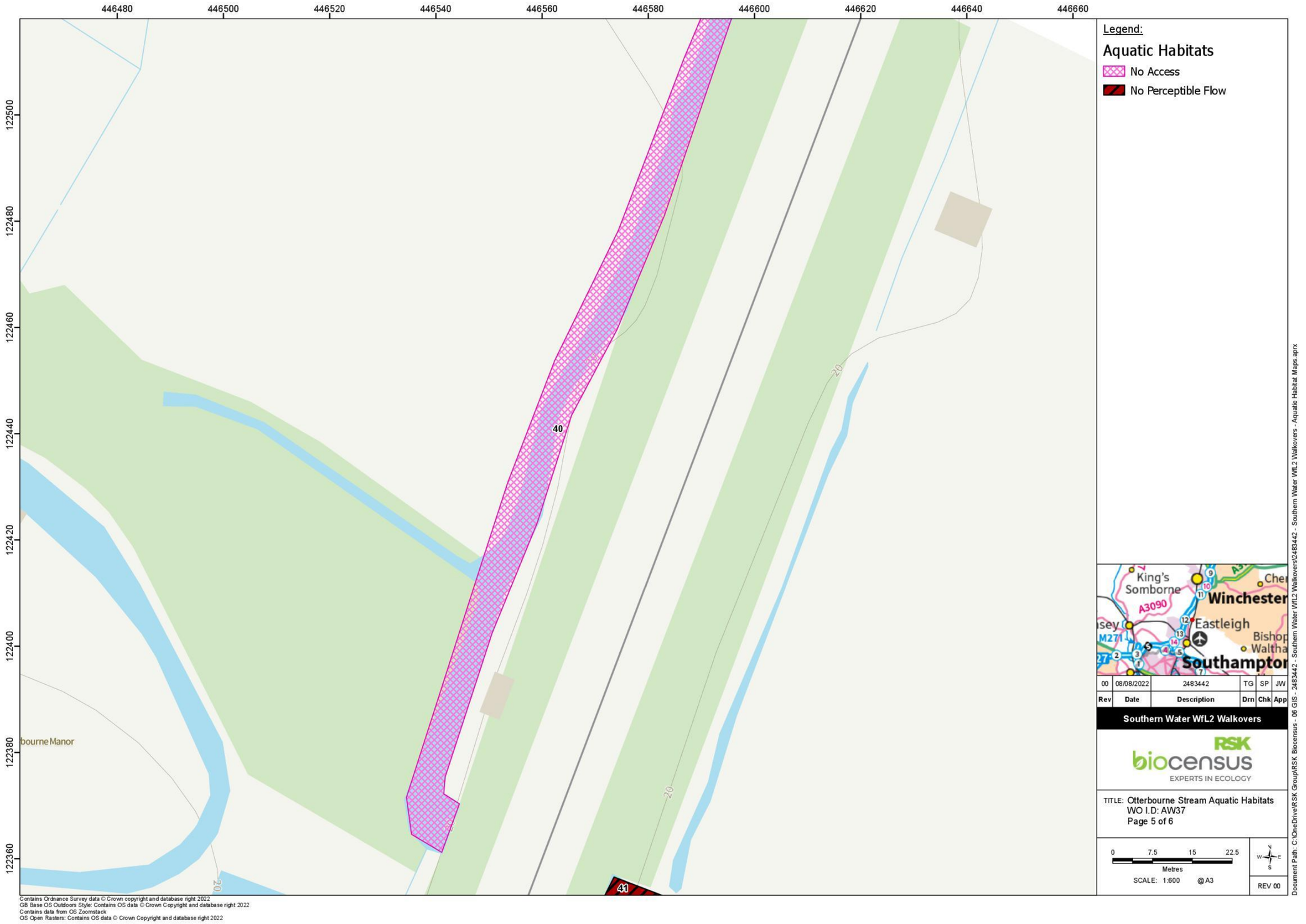
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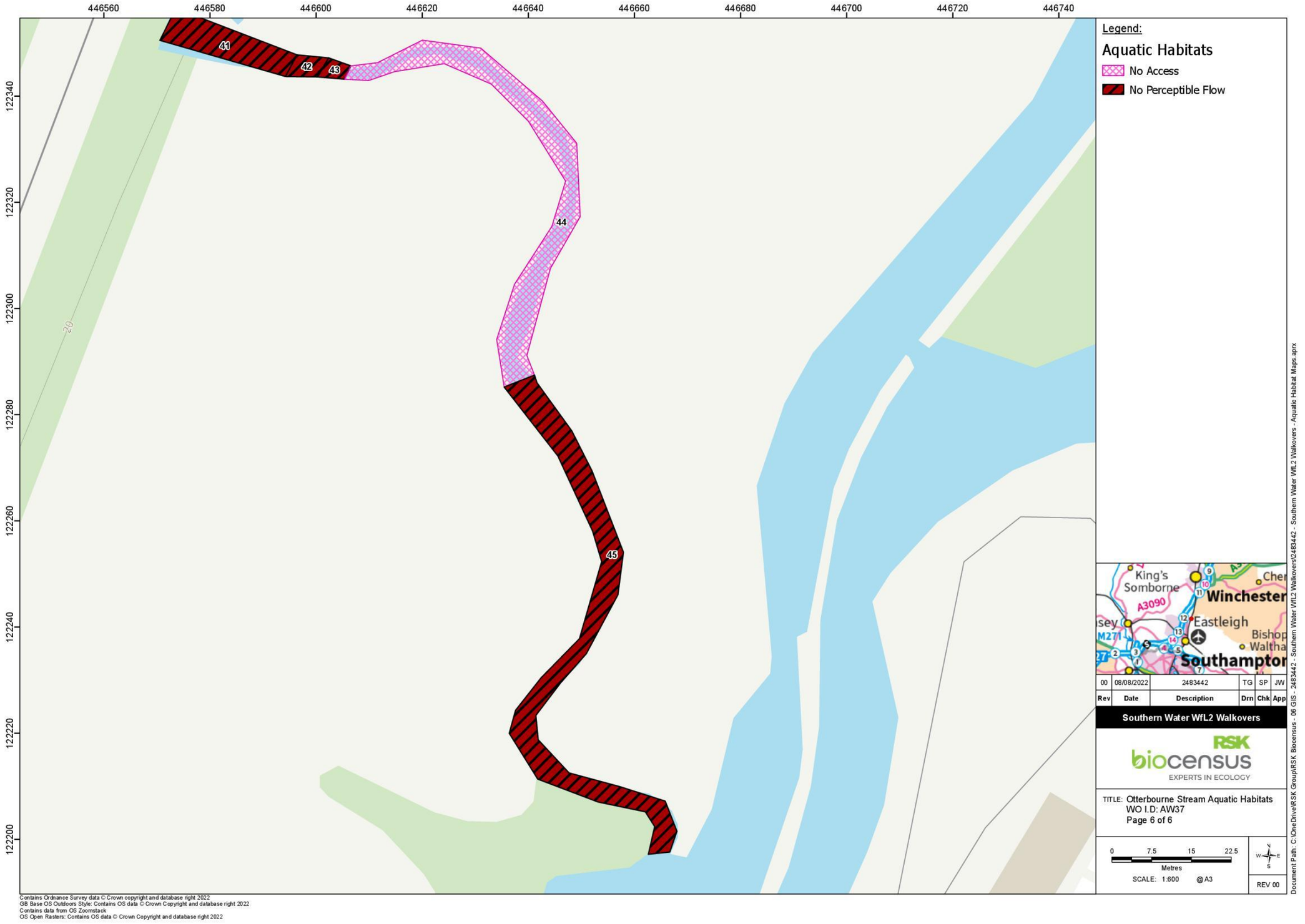
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Annex B Aquatic habitat survey data

B.1 Aquatic habitat classification abbreviations

Table B-2 Habitat classification abbreviations

Depth category	Depth (m)	Flow category	Velocity (m/s)	Substrate type/abbreviations		Vegetation type/abbreviations		Notable/species specific habitat		Other features	
A	0 - 0.1	0	0	BE	Bedrock	SFL	Submerged fine-leaved	Pr	Salmonid parr habitat	CWD	Coarse woody debris
B	0.1 - 0.25	1	0 – 0.1	BO	Boulder (> 256 mm)	SLL	Submerged linear-leaved	Fr	Salmonid fry habitat	DD	Debris dam
C	0.25 - 0.4	2	0.1 - 0.2	CO	Cobble (64 - 256 mm)	SBL	Submerged broad-leaved	Pr/Fr or Fr/PR	Mixed juvenile salmonid habitat	OVR	Overhanging terrestrial vegetation
D	0.4 – 1.0	3	0.2 – 0.3	GR	Gravel (2 - 64 mm)	ELL	Emergent linear-leaved	SPO	Rheophilic spawning habitat	INNS	Invasive Non-Native Species
E	>1.0	4	0.3 – 0.4	SA	Sand (< 2 mm)	EBL	Emergent broad-leaved	SPSO	Sub-optimal rheophilic spawning habitat	OBS	Obstruction
		5	>0.4	SI	Silt	FA	Filamentous algae	LO	Optimal juvenile lamprey habitat		
				CL	Clay	FL	Floating	LSO	Sub-optimal juvenile lamprey habitat		
				AR	Artificial	FLR	Floating-leaved rooted				
				NV	Not visible	CHO	Channel choked (veg)				

B.2 Aquatic habitat survey attributes tables

Table B-3 Riders Lane Stream (AW26) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Run	A	1	CO/SI/GR/PE			
2	Run	A	1	CO/SI/GR/PE			
3	Glide	A	1	CO/SI/GR/PE			
4	Glide	B	1	CO/SI/GR/PE			
5	Cascade	A	4	CO/SI/GR/PE			
6	Outfall	-	-				Outfall, most of the flow downstream of this point emanating from here
7	Culvert	-	-				On main channel, barely flowing, very little flow upstream of this point
8	Glide	A	1	CO/SI/GR/PE			
9	Run	A	1	CO/SI/GR/PE			
10	No perceptible flow	A	-	SI/CO/PE/GR			
11	Run	A	-	SI			
12	No perceptible flow	B	-	SI/CO			
13	No perceptible flow	A	-	SI/CO			
14	No perceptible flow	B	-	SI			
15	No perceptible flow	B	-	SI			
16	No perceptible flow	A	-	SI			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
17	Run	A	1	SI			
18	No perceptible flow	A	-	SI			
19	No perceptible flow	C	-	SI			Stickleback and tadpoles observed
20	No perceptible flow	A	-	SI/GR			
21	Run	A	1	SI/GR			
22	No perceptible flow	A	-	SI/GR			
23	Run	A	1	SI/GR/PE			
24	No perceptible flow	A	-	SI/GR/PE			
25	Run	A	1	PE/GR			
26	No perceptible flow	A	-	SI/GR/PE			
27	Run	A	1	SI/GR/PE			
28	Run	A	1	CO/GR/PE			
29	No perceptible flow	A	-	CO/GR/PE			
30	No perceptible flow	A	-	CO/GR/PE			
31	Run	A	1	CO/GR/PE			
32	Run	A	1	PE/GR/CO/SI			
33	Debris dam	-	-				Coarse woody debris dam
34	No perceptible flow	A	-	PE/GR/CO/SI			
35	No perceptible flow	A	-	PE/GR/CO/SI			
36	No perceptible flow	A	-	PE/GR/CO/SI			
37	Outfall	-	-	No flow			
38	Logger	-	-				Logger - dry
39	No perceptible flow	A	-	SI/GR/PE/CO			
40	No perceptible flow	A	-	SI/GR/PE/CO			
41	No perceptible flow	B	-	SI/GR/PE/CO			
42	Culvert	-					Pipe, slight trickle over plinth, impassable
43	No perceptible flow	A	-	GR/PE/SI/CO			
44	Tipped debris	-	-				Lots of tipped debris from houses along bank and in-channel
45	Dry	-	-				
46	Dry	-	-				

Table B-4 Riders Lane Stream (AW27) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry	1	Dry				Dry or ponded water - no functional fish habitat
2	Dry	2	Dry				Dry or ponded water - no functional fish habitat

Table B-5 Hermitage Stream (AW25) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Glide	A	1	AR	ALG (dense)		Concrete bed
2	Run	A	2	AR	ALG (dense)		Concrete bed
3	Run	A	2	AR	ALG (dense)		Concrete bed
4	Glide	A	1	AR	ALG		Concrete bed
5	Glide	A	1	AR	ALG		Concrete bed
6	Run	A	1	AR	ALG		Concrete bed
7	Weir						Wooden sleeper 'weirs' over concrete bed, mostly submerged
8	Glide	A	2	AR			
9	Run	A	2	AR			
10	Run	A	1	CO	ALG		
11	Run	A	2	CO	ALG		
12	Run	A	3	CO			Eroded/undermined bank
13	Fungus						
14	Glide	B	1	CO/PE/GR/SI	ALG		
15	Lamprey					Sub optimal	
16	Outfall						Trickle flow
17	Run	A	2	CO/GR/SI/PE			
18	Run	A	2	CO/GR/PE/SI	ALG		
19	Run	A	3	CO/GR/PE/SI	ALG		
20	Riffle	A	2	CO/GR/PE/SI	ALG		
21	Run	A	3	CO/GR/PE/SI	ALG		
22	Glide	B	1	CO/GR/PE/SI	ALG		
23	Run	A	2	CO/GR/PE/SI	ALG		
24	Glide	B	1	CO/GR/PE/SI	ALG		
25	Lamprey			CO/GR/PE/SI	ALG	Optimal	
26	Run	A	2	CO/GR/PE/SI	ALG		
27	Run	B	2	CO/GR/PE/SI	ALG		
28	Lamprey			CO/GR/PE/SI	ALG	Optimal	
29	Run	B	2	CO/GR/PE/SI	ALG		
30	Run	A	2	CO/GR/PE/SI	ALG		
31	Lamprey			CO/GR/PE/SI	ALG	Sub optimal	
32	Riffle	A	2	CO/GR/PE/SI	ALG		
33	Glide	A	1	CO/GR/PE/SI	ALG		
34	Run	A	2	CO/GR/PE/SI	ALG		
35	Glide	A	1	PE/GR/SI			
36	Riffle	A	2	PE/GR/SI			
37	Run	A	2	PE/GR/SI			
38	Glide	B	1	PE/GR/SI			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
39	Outfall			PE/GR/SI			
40	Run	A	3	AR/CO	ALG		
41	Glide	B	1	AR/CO	ALG		
42	Lamprey					Sub optimal	
43	Outfall						
44	Run	A	2	AR/CO	ALG		
45	Outfall						
46	Run	A	2	GR/PE/SI			
47	Mature island				ELL / EBL		Mature island
48	Run	A	2	AR/GR			
49	Outfall						
50	Glide	A	1	GR/SI/PE	ALG		
51	Run	A	2	AR/GR/SI/PE			
52	Pool	B	-	Point bar			
53	Run	A	1	AR/CO/GR	ALG		

Table B-6 Tributary of Potwell Trib 2 (AW38) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Tunnel vegetation						Tunnel veg, willow scrub, dense and inaccessible
2	Run	A	2				
3	Lamprey					Sub optimal	
4	Run	A	1	CO/PE/GR			
5	Glide	A	1	SI/CO/PE/GR		Lamprey optimal	
6	Run	A	2	CO/PE/GR			
7	Run	A	2	SI/GR/PE			
8	Run	A	3	GR/PE			
9	Run	A	3	GR/PE			Very overgrown
10	Culvert						
11	Run	A	3	PE/GR/CO			
12	Run	A	2	PE/CO/GR	EBL (dense)		
13	Run	A	2	PE/CO/GR			
14	Run	A	2				Flow split either side of dense hedge, impenetrable
15	Run	A	3				
16	Run	A	2	SA/SI			
17	Run	A	1				
18	Lamprey					Optimal	
19	Run	A	2	GR/PE			
20	Run	A	2	GR/PE/CO	EBL		
21	Run	A	2	GR/PE/CO	EBL		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
22	Run	A	3	CO/GR/PE			
23	Glide	A	1				Within dense hedge - visibility poor
24	Glide	A	1	SI			Ford
25	Glide	A	1				Within dense hedge - visibility poor
26	Glide	A	1				Within dense hedge - visibility poor

Table B-7 River Wallington (AW20) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Riffle	A	2	CO/PE/GR/SI			
2	Glide	A	1	CO/PE/GR/SI			
3	Glide	B	0	CO/PE/GR/SI			Barely perceptible flow
4	Glide	C	0	CO/PE/GR/SI			Barely perceptible flow
5	Glide	C	1	CO/PE/GR/SI			
6	Ell			MACROPHYTE	ELL		
7	Glide	B	0	CO/GR/SI			Barely perceptible flow
8	Run	A	2	CO/GR/SI			
9	Glide	B	1	CO/GR/SI			
10	Run	A	2	GR			Gr likely over concrete bed, lots of exposed gravel bars
11	Glide	C	0	SI/ALG/CO	ALG		
12	Glide	A	1	SI/ALG/CO	ALG		
14	Lamprey					Sub optimal	
15	Glide	B	1				
16	Run	A	2				
17	Glide	D	1				
18	Riffle	A	2				
19	Riffle	A	2				
20	Run	A	2				
21	Run	A	2	GR/PE/ALG			Ford
22	Glide	B	2				
23	Riffle	A	2				
24	Glide	C	1				
25	Glide	D	1				
26	Weir						EA gauging weir w/eel pass
13	Riffle	A	2				
27	Glide	C	1				
28	Glide	C	1				Poor access - barley flowing
29	Run	A	2				
30	Glide	D	1				
31	Glide	B	1				

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
32	Run	B	2				
33	Riffle	A	2				
34	Glide	A	1	GR/PE/SI/CO			
35	Glide	A	1	CO/GR/PE/SI			
36	Run	A	2	CO/PE/SI			
37	Glide	A	1	SI/PE/GR			
38	Glide	A	1				
39	Lamprey					Optimal	
40	Glide	D	1				
41	Pool	D	0	Pool			
42	Riffle	A	2	ALG (DENSE)			
43	Run	A	2	ALG (DENSE)			
44	Pool	D	0	Pool			
45	Run	A	1	AR			Concrete
46	Ell				ELL	Macrophyte	
47	Glide	A	1				
48	No access						Cattle field in full view of farm and no access agreed
49	Run	A	2				
50	Pool	D	0				
51	Weir						0.1m vertical face with shallow horizontal concrete plinth
52	Glide	D	0	Choked channel			Very overgrown, steep banks
53	Glide	C	1				Very overgrown, steep banks
54	No perceptible flow	D	-				Very overgrown, steep banks
55	No perceptible flow	D	-				
56	Pool	B	0	Point bar			
57	Glide	C	0				
58	Lamprey					Optimal	
59	Glide	B	1				
60	Glide	D	0				
61	Run	A	2	GR/SI			
62	Choked						
63	Glide	D	0				
64	Run	B	2				
65	Glide	C	1	SI			
66	Run	A	3	GR/CO/PE/SI			
67	Run	B	2	GR/CO/PE/SI			
68	Run	B	2				
69	Glide	B	1				
70	Glide	D	0				

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
71	Run	B	1				
72	Run	B	1	SI/GR/PE			
73	Lamprey					Optimal	
74	Glide	D	1				
75	Glide	A	1				
76	Eddy						
77	Run	A	3				
78	Glide	A	1				
79	Glide	D	0				
80	Glide	D	1				
81	Glide	D	0				
82	Ell			Macrophyte	ELL		

Table B-8 River Meon (AW33) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Side channel			NPC/CO/GR/SI			
2	Glide	C	3	N/A			
3	Glide	A	3	CO/GR/SA			
4	Glide	C	3	CO/GR/SA			
5	Riffle	N/a	N/a	N/a			
6	Riffle	A	3	GR/CO/SA			
7	Run	C	3	GR/CO/SA			
8	Run	B	3	GR/CO/SA			
9	Riffle	A	3	GR/CO/SA			
10	Pool	C	0	CO/SI/GR			
11	Riffle					Fry	
12	Run	C	3	GR/CO/SI			
13	Glide	B	2	GR/SI/CO			
14	Lamprey					Sub-optimal	
15	Run	A	3	GR/CO/SI			
16	Glide	C	2	GR/SI/SA			
17	Run	A	3	GR/SI/SA			
18	Pool	Depth	1	GR/SI/SA			
19	Glide	B	1	GR/SI/SA			
20	Run	C	3	GR/SI/SA			
21	Glide	C	3	GR/CO/SI			
22	Glide	D	2	GR/CO/SI			
23	Glide	D	2	GR/SA/SI			
24	Glide	B	2	GR/CO/SI			
25	Run	B	2	GR/SA/SI			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
26	Glide	B	2	GR/CO/SI			
27	Glide	B	2	GR/CO/SI			
28	Lamprey					Sub-optimal	
29	Lamprey					Sub-optimal	

Table B-9 Tributary of Curbridge Creek (AW34) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	No perceptible flow	A		CL/CO/GR			
3	Dry						

Table B-10 Tributary of River Hamble 2 (AW9) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	Pool	A	0	CO/GR/SI			
3	Dry						
4	Pool	A	0	CO/GR/SI			
5	Pool	B	0	SI/CL/GR			
6	Dry						
7	Pool	A	0	SI/CL/GR			
8	Dry						
9	Pool	A	0	SI/CL/GR			
10	Dry						
11	Pool	A	0	SI/CL/GR			
12	Dry						
13	Pool	A	0	SI/CL/GR			
14	No perceptible flow	B		SI/CL/GR			
15	Run	A	1	GR/CO/SI			
16	No perceptible flow	B		SI/CL/GR			
17	No perceptible flow	A		SI/GR/CO			
18	Dry						
19	No perceptible flow	A		SI/GR/CO			
20	No perceptible flow	A		GR/SI/CO			
21	Dry						
22	Dry						
23	No perceptible flow	A		GR/SI/CO			
24	Dry						
25	No perceptible flow	A		GR/SI/CL			
26	Dry						
27	No perceptible flow	A		GR/SI/CL			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
28	Dry						
29	No perceptible flow	A		SI/GR/BO			
30	No perceptible flow	B		SI/CL			
31	No perceptible flow	A		SI/GR/CL			
32	No perceptible flow	A		SI/CL			
33	Dry						
34	Run	A	0	GR/SI/CL			
35	Dry						
36	No perceptible flow	A		CO/GR/SI			
37	Dry						
38	No perceptible flow	B		CO/GR/SI			
39	Dry						

Table B-11 Tributary of River Hamble 5 (AW35) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						

Table B-12 Tributary of River Hamble 1 (AW6) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	No access						
2	Dry						
3	No perceptible flow	A		SI/CL			
4	No perceptible flow	A		SI/CL			
5	Dry						
6	No perceptible flow	A		SI/CL			
7	Dry						
8	No perceptible flow	A		SI/CL			
9	Dry						
10	No perceptible flow	A		SI/CL			
11	No perceptible flow	B		SI/CL			
12	No perceptible flow	A		SI/CL			
13	Run	A	1	SI/CL			
14	No perceptible flow	A		SI/CL			
15	Run	A	1	SI/CL			
16	No perceptible flow	A		SI/CL			
17	Run	A		SI/CL			
18	No perceptible flow	A		SI/CL			
19	No perceptible flow	B		SI/CL			
20	No perceptible flow	B		SI/CL			
21	Run	A	1	SI/CL			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
22	No perceptible flow	B		SI/CL			
23	Run	A	1	SI/CL			
24	No perceptible flow	B		SI/CL			
25	Dry						
26	No perceptible flow	A		SI/CL			
27	Dry						
28	No perceptible flow	B		GR/CO/SI			
29	Dry						
30	No perceptible flow	C		SI/CL			
31	Dry						
32	No perceptible flow	A		SI/CL			
33	No perceptible flow	A		SI/CL/GR			
34	Dry						
35	Dry						
36	No perceptible flow	B		SI/CL/SA			
37	Dry						
38	No perceptible flow	A		SI/CL/SA			
39	Dry						
40	No perceptible flow	A		CL/SA/SI			
41	Dry						
42	Dry						
43	Dry						
44	Dry						
45	No perceptible flow	A		CL/SA/SI			
46	No perceptible flow	A		CL/SA/SI			
47	Lamprey					Sub optimal	
48	Run	B	2	GR/SA/CO			
49	Run	B	3	GR/SA/CO			
50	Glide	B	1	SI/SA/GR			
51	Run	B	3	GR/SA/SI			
52	Glide	B	2	GR/SA/SI			
53	Lamprey					Sub optimal	
54	Run	B	2	GR/SA/SI			
55	Glide	B	2	GR/SA/SI			
56	Lamprey					Sub optimal	
57	Run	B	2	GR/SA/CO			
58	Pool	D	0	GR/SA/SI			
59	Glide	C	2	GR/SA/SI			
60	Lamprey					Sub optimal	
61	Run	B	3	GR/SA/SI			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
62	Run	C	3	GR/SA/SI			
63	Glide	C	1	GR/SA/SI			
64	Run	A	3	GR/SA/SI			
65	Glide	D	2	GR/SA/SI			
66	Run	B	3	GR/SA/SI			
67	Glide	B	1	GR/SA/SI			
68	Glide	C	1	GR/SA/SI			
69	Run	B	3	GR/SA/SI			
70	Run	B	3	GR/SA/SI			
71	Lamprey					Optimal	
72	Lamprey					Optimal	
73	Glide	C	1	GR/SA/SI			
74	Riffle	A	3	CO/GR/SA			
75	Run	B	3	CO/GR/SA			
76	Lamprey					Suboptimal	
77	Lamprey					Optimal	
78	Pool	D	0	SI/SA/GR			
79	Glide	B	2	GR/SA/SI			
80	No access						
81	Glide	D	1	SI/SA/GR		Small bridge	
82	Pool	E	1	SI/SA			
83	Riffle	A	3	CO/GR/SA			
84	Run	B	3	GR/SA/SI			
85	Pool	D	1	SA/SI			
86	Riffle	A	2	GR/CO/SI			
87	Run	B	3	GR/SI/CO			
88	Pool	C	1	CO/GR/SI			
89	Lamprey					Sub optimal	
90	Glide	D	2	GR/SA/SI			
91	Glide	D	1	GR/SA/SI			
92	Lamprey					Optimal	
93	Run	B	3	CO/GR/SA			
94	Lamprey					Optimal	
95	Glide	B	3	GR/SA/CO			
96	Lamprey					Optimal	
97	Glide	C	2	GR/SA/SI			
98	Glide	B	3	GR/SA/CO			
99	Pool	D	0	SA/SI/GR			
100	Pool	D	0	SA/SI/GR			
101	Riffle	A	3	CO/GR/SI			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
102	Run	B	2	CO/GR/SA			
103	Run	A	3	CO/GR/SA			
104	No access						

Table B-13 Tributary of River Hamble 1 (AW40) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Run	A	1	GR/SI			
2	No perceptible flow	B	0	SA/GR			
3	No access						Dense hedgerow
4	No perceptible flow	Nv	0	NV	EFL-5 FL-20		
5	No perceptible flow	Nv	0	NV	FL-90		
6	Potential obstruction to fish passage						Culvert
7	No perceptible flow	B	0	SI			
8	Potential obstruction to fish passage						Culvert
9	No perceptible flow	A	0	SI			
10	Potential obstruction to fish passage						Culvert
11	Choked with vegetation						
12	No perceptible flow	A	0	SI			
13	No access						Dense vegetation/access refused by landowner
14	Dry						
15	Dry						

Table B-14 Horton Heath Stream Habitat (AW5) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	No access						Horse paddock/stud farm
2	Dry						
3	Potential obstruction to fish passage						
4	Choked with vegetation						
5	Dry						
6	Choked with vegetation						
7	No access						Horse with young foals
8	No access						Horse with young foals

Table B-15 Ditch (Bow Lake) (AW14) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	Potential obstruction to fish passage						Culvert
3	Dry						

Table B-16 Bow Lake Aquatic (AW4) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	No perceptible flow	A	0	SI			
3	Dry						
4	No perceptible flow	B	0	SI			
5	Dry						
6	No perceptible flow	C	0	SI	EFL-20		
7	Choked with vegetation						
8	Dry						
9	No perceptible flow	A	0	GR/SI	EFL-15		
10	No perceptible flow	B	0	GR/SI			
11	No perceptible flow	A	0	GR/SI			
12	Dry	B	0	GR/SI			
13	No perceptible flow	A	0	GR/SI			
14	Dry						
15	No perceptible flow	B	0	GR/SO			
16	Dry						
17	No perceptible flow	B	0	GR/SO			
18	No perceptible flow	B	0	SI			
19	Dry						
20	Choked with vegetation						
21	Dry						
22	Choked with vegetation						
23	Dry						
24	Choked with vegetation						
25	No perceptible flow	B	0	GR/SI	EFL-10		
26	No perceptible flow	A	0	CO/GR/SI			
27	Potential obstruction to fish passage						Shallow tunnel
28	No perceptible flow	B	0	BO/GR/SI			
29	Run	A	1	GR/CO/SA			
30	No perceptible flow	A	0	GR/SA/SI	EFL-20		
31	Choked with vegetation						
32	No perceptible flow	A	0	CO/GR/SI			
33	Run	A	1	GR/SA/SI	EFL-5		
34	No perceptible flow	A	0	GR/SA/SI	EFL-60		
35	No perceptible flow	A	0	GR/SA/SI	EFL-20		
36	Choked with vegetation						
37	Run	A	1	GR/SA/SI	EFL-40		
38	No perceptible flow	A	0	GR/SA	EFL-45		
39	No perceptible flow	A	0	GR/SI	EFL-30		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
40	Choked with vegetation						
41	No perceptible flow	A	0	GR/SI	EFL-30		
42	No perceptible flow	B	0	GR/SI	EFL-40		
43	Choked with vegetation						
44	No perceptible flow	B	0	GR/SI	EFL-60		
45	No perceptible flow	A	0	GR/SA			
46	Dry						
47	No perceptible flow	C	0	GR/SA/SI			
48	Choked with vegetation						
49	No perceptible flow	A	0	GR/SI	EFL-20		
50	Dry						
51	No access						
52	Potential obstruction to fish passage						Lake outfall
53	No perceptible flow	Nv	Nv				
54	Run	A	1	GR			
55	Dry						
56	No perceptible flow	B	0	GR/SI			
57	No perceptible flow	C	0	SI			Golden/blue orfe observed in channel
58	No perceptible flow	B	0	GR/SI			
59	Dry						
60	No perceptible flow	B	0	GR/SI			
61	Dry						
62	No perceptible flow	B	0	CO/GR/SI			
63	Dry						
64	No perceptible flow	B	0	GR/SI			
65	Dry						
66	No perceptible flow	B	0	GR/SI			
67	No perceptible flow	B	0	GR/SI			
68	Dry						
69	No perceptible flow	C	0	GR/SI			
70	No access						Dense vegetation
71	No perceptible flow	B	0	GR/SA/SI			
72	Dry						
73	Choked with vegetation						
74	Dry						

Table B-17 Ditch (Bow Lake) (AW41) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	Potential obstruction to fish passage						Culvert

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
3	No access						
4	Dry						
5	Choked with vegetation						
6	Dry						

Table B-18 Ditch (River Itchen) (AW36) aquatic habitats survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	No access						Private back garden
2	Potential obstruction to fish passage						Culvert
3	No perceptible flow	C	0	GR/SA/SI			
4	Run	A	1	GR/SA/SI			
5	Glide	B	1	GR/SA/SI			
6	Run	A	1	GR/SA/SI			
7	No perceptible flow	B	0	GR/SA/SI			
8	Potential obstruction to fish passage						Chunk of concrete in channel
9	No perceptible flow	C	0	BO/GR/SI			
10	Run	A	1	GR/SI			
11	Glide	A	1	GR/SI	EFL-5		
12	Run	A	1	GR/SI			
13	Potential obstruction to fish passage						Culvert
14	No perceptible flow	B	0	GR/SI			
15	Run	A	1	GR			
16	No perceptible flow	B	0	GR/SI			
17	No access						Private garden
18	Choked with vegetation						
19	Potential obstruction to fish passage						Culvert
20	No access						Riparian vegetation too overgrown to observe channel
21	Dry						
22	No access						Riparian vegetation too overgrown to observe channel
23	Choked with vegetation						
24	Dry						
25	Potential obstruction to fish passage						Culvert
26	No access						Riparian vegetation too overgrown to observe channel
27	Dry						
28	No perceptible flow	B	0	GR/SA/SI			
29	No access						Riparian vegetation too overgrown to observe channel

Table B-19 River Itchen (AW1, AW2 and AW3) aquatic habitat survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Run	C	3	GR/SA/SI		Sub optimal spawning	
2	Glide	C	2	BO/GR/SA	EFL-5 SBL-5		
3	Lamprey		2.5			Sub optimal	
4	Pool	E	1	BO/GR/SA/SI	SBL-5 SFL-5 EFL-5		
5	Eddy	C	0	GR/SA			
6	Glide	D	1	GR/SA/SI	SFL-10 SBL-10		
7	Lamprey					Optimal	
8	Glide	D	1	CO/GR/SA/SI	SFL-50 SBL-10		
9	Glide	C	1	GR/SA/SI	EBL-5 SFL-60 SBL-10		
10	Glide	C	2	GR/SA/SI	SFL-20 SBL-25 EFL-5 EBL-2		
11	Glide	B	3	GR/SA	SFL-30 SBL-30		
12	Lamprey					Optimal	
13	Glide	C	2	GR/SA	SFL-30 SBL-20		
14	Glide	B	2	GR/SA	SBL-5 SFL-5 EFL-5		
15	Glide	D	1	SR/SA/SI	SFL-20 SBL-5		
16	Lamprey					Optimal	
17	Glide	C	2	GR/SA	SFL-5 SBL-5		
18	Potential obstruction to fish passage						Sluice
19	Eddy	E	0	NV			
20	Torrent	Nv	5	NV			
21	Eddy	E	0	NV			
22	Potential obstruction to fish passage						Weir
23	Pool	E	2	NV			
24	Glide	E	2	NV			
25	No access						River bank fenced so channel could not be observed
26	Potential obstruction to fish passage						Weir
27	Pool	Nv	2	NV			
28	Run	Nv	3	NV			
29	Run	B	3	CO/GR/SA		Fry	
30	Run	C	3	GR/SA			
31	Run	C	2	GR/SA	FA-20 SBL-10 FL-5		
32	Run	B	2	GR/SA/SI	SBL-5 FL-5		
33	Run	C	3	GR/SA/SI		Sub optimal spawning	
34	Run	C	2	GR/SA	SBL-5 SFL-5		
35	Run	D	3	BO/GR/SA	SBL-15 SFL-20		
36	Pool	D	2	BO/GR/SA	EBL-5 FL-5		
37	Lamprey					Sub optimal	
38	Run	C	2	GR/SA	SBL-60 SFL-20		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
39	Glide	B	3	GR/SA	SBL-20		
40	Run	C	3	GR/SA	SBL-20 SFL-30		
41	Glide	B	2	GR/SA			
42	Run	B	3	GR/SA	SBL-20 SFL-10		
43	Glide	B	2	GR/SA	SBL-60 SFL-10 FA-5		
44	Run	C	2	GR/SA	SBL-5 FA-10 SFL-60		
45	Run	A	3	GR/SA	SBL-60 EFL-10		
46	Run	B	2	GR/SA	SBL-10 SFL-5		
47	Run	C	3	GR/SA		Sub optimal spawning	
48	Run	C	3	GR/SA		Sub optimal spawning	
49	Run	B	2	GR/SA	SBL-50 SFL-30		
50	Potential obstruction to fish passage						Weir
51	Torrent	Nv	5	NV			
52	Run	B	3	CO/GR/SA	EBL-30		
53	Potential obstruction to fish passage						Weir
54	Run	C	4	BO/CO/GR		Parr	
55	Run	C	4	AR			
56	Lamprey					Sub optimal	
57	Run	C	4	BO/CO/GR			
58	Run	B	2	CO/GR/SA			
59	Riffle	A	3	GR	SFL-5		
60	Run	B	4	CO/GR		Parr/fry	
61	Riffle	A	3	CO/GR			
62	Glide	D	1	SA/SI	SFL-40 EBL-15 EFL-5		
63	Glide	D	2	GR/SA/SI	SBL-40 SFL-15 EBL-5 FL-2		
64	Glide	D	1	GR/SA/SI	SFL-10 SBL-10		
65	No perceptible flow	C	0	GR/SI	SFL-30 SBL-50		
66	Glide	D	1	SBL-5 EFL-5			
67	Glide	C	1	NV	EFL-5 SBL-40 FA-10 FL-5 SFL-40		
68	Glide	D	1	GR/SA/SI	SBL-5 SFL-5		
69	Glide	D	1	GR/SA/SI	EFL-5 EBL-5 SFL-40 SBL-40		
70	Lamprey					Optimal	
71	Glide	D	1	SA/SI	SFL-30 SBL-50 EBL-5 EFL-5		
72	Glide	E	1	GR/SA/SI	EBL-5 EFL-5		
73	No perceptible flow	B	0	GR/SA/SI			
74	Glide	C	1	GR/SA/SI	SBL-80 SFL-10		
75	Glide	C	1	GR/SA/SI	SFL-40 SBL-15		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
76	Glide	C	1	NV	FA-60 EBL-10 SBL-15		
77	Glide	D	2	GR/SA/SI	EBL-5 SBL-5 EFL-2		
78	Glide	C	1	SA/SI	FA-30 SBL-20 SFL-5 EFL-5 EBL-5		
79	Lamprey					Sub optimal	
80	No perceptible flow	C	0	GR/SA/SI	SFL-50 SBL-20 EFL-5		
81	Lamprey					Sub optimal	
82	Lamprey					Sub optimal	
83	Glide	D	2	GR/SA/SI	SFL-40 EBL-15 EFL-5 FL-5		
84	Lamprey					Optimal	
85	Glide	D	2	GR/SA/SI	FL-5 SFL-50 SBL-20		
86	Glide	C	2	GR/SA/SI	SBL-25 EFL-5 EBL-5		
87	Run	B	3	GR/SA	SBL-10		
88	Lamprey					Optimal	
90	Run	A	2	GR/SA			
91	Run	C	3	GR/SA		Spawning sub optimal	
92	Run	A	2	GR/SA			
94	Run	B	2	GR/SA	SBL-10 EFL-5		
95	Lamprey					Sub optimal	
96	Glide	B	2	GR/SA	EFL-5 SBL-5		
97	Run	B	2	GR/SA/SI	SBL-30 EFL-10		
98	Glide	B	2	GR/SA			
99	Run					Spawning sub optimal	
100	Glide	C	2	GR/SA/SI	SBL-15 SFL-10		
101	Run	B	2	GR/SA/SI	SBL-30 SFL-20 FA-10		
102	Lamprey					Sub optimal	
103	Glide	D	2	GR/SA	EFL-5 SFL-10 SBL-5		
104	Glide	C	2	GR/SA/SI	EFL-5 SBL-15 SFL-10		
105	Run	C	2	GR/SA	SBL-50 SFL-25 FA-10		
106	Run	B	2	GR/SA	SBL-50 FA-15 SFL-20		
107	Run	C	4	GR/SA	EBL-30 SFL-20 EBL-5 EFL-5	Parr/fry	
108	Glide	B	2	GR/SA	SBL-60 SFL-10 FA-5		
109	Run	B	2	CO/GR/SA	SFL-15		
110	Run	B	3	CO/GR/SA	SFL-30		
111	Run					Spawning sub optimal	
112	Eddy	C	0	CO/GR/SA			
113	Run	B	4	CO/GR/SA	SFL-20	Fry	
114	Riffle	A	3	GR/SA	SFL-30		
115	Eddy	B	0	GR/SA			

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
116	Pool	E	2	BO/GR/SA			
117	Eddy	C	0	GR/SA/SI			
118	Potential obstruction to fish passage						Sheet piling weir
119	Lamprey					Optimal	
120	Run	B	4	CO/GR/SA	SBL-15 SFL-15	Parr/fry	
121	Run	D	3	CO/GR	SBL-10		
122	Run	B	3	CO/GR/SA	SBL-10		
123	Run	C	3	CO/GR/SA		Spawning sub optimal	
124	Run	C	4	BO/CO/GR		Parr	
125	Pool	D	2	CO/GR/SA/SI	SBL-10		
126	Run	C	3	CO/GR/SA	SBL-30		
127	Glide	C	2	GR/SA	SBL-5 EFL-10		
128	Glide	D	2	GR/SA	EFL-5 SBL-20 SFL-5		
129	Run	C	2	GR/SA/SI	EFL-5 EBL-5 SFL-5 FL-2		
130	Run	D	2	GR/SA/SI	EFL-5 EBL-5 SFL-5		
131	Run	C	3	GR/SA		Spawning sub optimal	
132	Glide	C	3	GR/SA/SI	EFL-5 SFL-5 EBL-5		
133	Lamprey					Optimal	
134	Glide	B	2	GR/SA	SBL-10		
135	Lamprey					Optimal	
136	Run	C	3	GR/SA	EB.-20 SFL-20 EFL-5 EBL-5		
137	Run	C	3	GR/SA		Spawning sub optimal	
138	Run	C	2	GR/SA	EBL-30 EFL-10 SFL-20		
139	Lamprey					Sub optimal	
140	Run	C	3	GR/SA/SI	EBL-10 SFL-5 EFL-5		
141	Glide	C	2	GR/SA/SI	SBL-5 SFL-5		
142	Lamprey					Sub optimal	
143	Lamprey					Sub optimal	
144	Run	D	3	GR/SA	EBL-20 SFL-5 EFL-5		
145	Run	E	3	GR/SA/SI	SBL-5 SFL-5		
146	Pool	E	1	GR/CO/SA/SI	SFL-5		
147	Glide	C	2	GR/SA/SI	SBL-30 EFL-5		
148	Run	C	3	GR/SA		Spawning sub optimal	
149	Run	C	2	GR/SA/SI	SFL-5 SBL-5		
150	Run	B	2	GR/SA/SI	SBL-40 EFL-5		
151	Lamprey					Optimal	
152	Run	C	2	GR/SA	SBL-40 SFL-5 EFL-5 EBL-5		
153	Run	B	2	GR/SA	SBL-30 EBL-5 SFL-5		
154	Lamprey					Optimal	

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
155	Run	D	2	GR/SA	SFL-5 SBL-40 EBL-5 EFL-5		
156	Lamprey					Sub optimal	
157	Run	C	3	GR/SA		Spawning sub optimal	
158	Glide	D	1	GR/SA/SI	SFL-5 SBL-40 EBL-5 EFL-5		
159	Glide	C	1	GR/SA/SI	SBL-30 EFL-5		
160	Glide	C	1	GR/SA/SI	SBL-30 EFL-5		
161	No perceptible flow	C	0	GR/SA			
162	Glide	E	1	GR/SA/SI	SBL-10 SFL-15 EFL-5 EBL-5		
163	Glide	D	1	GR/SA/SI	SBL-20 SFL-15 EBL-5 EFL-15		
164	Glide	D	2	GR/SA/SI	SBL-40 SFL-10 EBL-5 EFL-20		
165	Glide	D	1	GR/SA/SO	SBL-30 SFL-5 EBL-5 EFL-5		
166	Glide	D	2	GR/SA/SI	SBL-20 EFL-10 SFL-15 EBL-5		
167	Run	B	3	GR/SA	SBL-50		
168	Run	C	3	GR/SA	SBL-60		
169	Lamprey					Sub optimal	
170	Run	C	3	GR/SA		Spawning sub optimal	
171	Run	B	2	GR/SA/SI	SBL-30		
172	Run	C	3	GR/SA/SO	SBL35		
173	Run	C	4	NV			
174	Run	C	2	GR/SA	SBL-30		
175	Run	C	3	GR/SA	SBL-40		
176	Lamprey					Sub optimal	
177	Glide	C	2	GR/SA/SI	SBL-30		
178	Lamprey					Optimal	
179	Pool	D	2	GR/SA/SI	SBL-5		
180	Run	C	2	GR/SA	SBL-5		
181	Run	B	2	GR/SA	SBL-40		
182	Run	C	3	GR/SA		Spawning sub optimal	
183	Pool	C	2	GR/SA	SBL-5		
184	Run	C	3	GR/SA	SFL-30 SBL-5		
185	Pool	D	2	GR/SA	SBL-5		
186	Glide	D	2	GR/SA/SI	EBL-5 SBL-20 SFL-10 EFL-10		
187	Run	C	3	GR/SA	SBL-60 SFL-20		
188	Glide	D	1	GR/SA/SO	SFL-15 SBL-10 EFL-5		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
189	Glide	D	2	GR/SA/SI	EBL-5 SBL-20 SFL-60 EFL-10		
190	Lamprey					Sub optimal	
191	Lamprey					Sub optimal	
192	Glide	D	1	GR/SA/SI	SBL-15 SFL-20		
193	Glide	C	1	GR/SA/SI	SFL-20 SBL-10		
194	No perceptible flow	B	0	GR/SI			
195	Choked with vegetation						
196	Glide	C	2	GR/SA/SI	EBL-5 EFL-5 SBL-5		
197	Lamprey					Optimal	
198	Glide	D	2	GR/SA/SI	SFL-20 SBL-20 EBL-5		
199	Glide	C	1	GR/SA/SI	SFL-10 SBL-15		
200	Glide	C	1	GR/SA/SI	SBL-10 SFL-10 EFL-5		
202	Lamprey					Sub optimal	
203	Run	C	2	GR/SA/SI	SBL-50 SFL-5 EFL-5 EBL-5		
204	Glide	D	1	GR/SA/SI	SBL-10 EBL-5 EFL-5 SFL-5		
205	Glide	E	2	GR/SA/SI	SFL-20 EFL-10		
206	Glide	D	1	GR/SA/SI	SFL-60 EFL-5 EBL-5 FL-2		
207	Glide	D	1	GR/SA/SI	EFL-5 SFL-5		
208	Run	C	2	GR/SA/SI	SBL-15 SFL-5		
209	Potential obstruction to fish passage						Sluice
210	Torrent	Nv	5	NV			
211	Run	Nv	4	NV			
212	Run	B	2	GR/SA/SI	EBL-10		
213	Run	C	3	GR/SA/SI	SBL-15		
214	Run	D	2	GR/SA/SI	EBL-10 SFL-10		
215	Run	B	2	GR/SA/SI	SBL-30 SFL-10 FA-10		
216	Glide	D	3	GR/SA	SBL-5 SFL-5		
217	Glide	B	2	GR/SA/SI	EBL-30 SFL-20 FA-10		
218	Pool	E	1	BO/GR/SA/SI	FA-10		
219	Glide	C	3	CO/GR/SA		Spawning sub optimal	
220	Glide	D	2	CO/GR/SA	SBL-10 SFL-10		
221	Glide	C	2	GR/SA	EFL-5 SBL-20 SFL-10		
222	Glide	E	2	GR/SA	EBL-15 SFL-5		
223	Glide	D	1	GR/SA/SI	SBL-20 SFL-5 EFL-5		
224	Glide	C	2	GR/SA	SFL-50 SBL-10 EFL-5		
225	Glide	B	2	GR/SA	SBL-10		

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
226	Glide	D	2	GR/SA/SI	SBL-10 EFL-5 EBL-5 SFL-10		
227	Glide	E	2	GR/SA/SI	EFL-10 SFL-10 SBL-5		
228	Glide	B	1	GR/SA/SI	SBL-5 SFL-15		
229	Lamprey					Optimal	
230	Lamprey					Optimal	
231	Glide	D	2	GR/SA/SI	EFL-10 EBL-5 SFL-30 SBL-5		
232	Glide	C	1	GR/SA/SO	SBL-10 SFL-10		
233	No access						Dense vegetation
234	Glide	C	2	GR/SA	EFL-5 SFL-20 SBL-30		
235	Potential obstruction to fish passage						Weir
236	Eddy	D	0	GR/SA			
237	Pool	E	2	BO/CO/GR	SBL-5 SFL-5		
238	Eddy	C	0	GR/SA			
239	Run	C	3	CO/GR/SA	EFL-2 SFL-10 SBL-15		
240	Run	D	3	BO/GR/SA			
241	Pool	E	2	BO/GR/SA/SI			
242	Glide	D	2	BO/GR/SAI/SI	SBL-30 SFL-30		
243	Run	C	3	GR/SA	EBL-30 SFL-30 EFL-5 EBL-10		
244	Run	C	2	GR/SA/SI	EBL-25 SFL-30 EFL-5 EBL-10		
245	Run	D	3	GR/SA/SI	EBL-30 SFL-25 EFL-5 EBL-5		

Table B-20 Otterbourne Stream (AW37) aquatic habitat survey attributes

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
1	Dry						
2	No perceptible flow	A	0	GR/SA/SI			
3	Dry						
4	No perceptible flow	A	0	GR/SA/SI			
5	Dry						
6	No perceptible flow	A	0	GR/SA/SI			
7	Dry						
8	No perceptible flow	A	0	GR/SA/SI			
9	No perceptible flow	A	0	GR/SA			
10	Dry						
11	No perceptible flow	A	0	GR/SA/SI			
12	No access						Dense vegetation
13	Choked with vegetation						
14	Potential obstruction to fish passage						Pipe weir

ID	Habitat type	Depth	Flow	Substrate	Vegetation cover	Habitat type/suitability	Comments
15	No perceptible flow	C	0	SI	EFL-20 EBL-5		
16	Choked with vegetation						
17	No perceptible flow	C	0	SI	EFL-20		
18	No perceptible flow	B	0	SI	EFL-20		
19	Choked with vegetation						
20	No perceptible flow	B	0	SI	EFL-5 EBL-10		
21	Run	A	1	GR/SA/SI	EFL-5 EBL-10		
22	No perceptible flow	B	Si	SI			
23	Dry						
24	No perceptible flow	B	0	GR/SA/SI	EBL-15		
25	Dry						
26	No perceptible flow	B	0	GR/SA/SI	EBL-15		
27	Dry						
28	No access						Dense vegetation
29	No perceptible flow	B	0	SI			Brown trout present
30	No perceptible flow	B	0	GR/SA/SI			
31	Run	A	1	GR/CO			
32	Glide	A	1	GR/CO			
33	Run	A	1	GR/CO			
34	Glide	A	1	GR/CO			
35	Run	A	1	GR/CO			
36	No access						Dense vegetation
37	No perceptible flow	A	0	GR/SA/SI			
38	Run	A	1	GR/SA/SI			
39	No perceptible flow	B	0	GR/SA/SI			
40	No access						Dense vegetation
41	No perceptible flow	B	0	GR/SA/SI	EBL-15		
42	No perceptible flow	C	0	GR/SA/SI			
43	No perceptible flow	A	0	GR/SA/SI	EBL-30		
44	No access						Dense vegetation
45	No perceptible flow	C	0	GR/SA/SI	EFL-5 EBL-5 FL-5		

B.3 Salmonid habitat definitions

Table B-21 Summary of requirements for spawning and incubation

Spawning requirements	
Flow	
Velocity	25-90 cm/s
Depth	17-76 cm
Gravel	

Spawning requirements	
Mean grain size	11.3 cm
Percentage fines by weight	≤ 8.2
Incubation	
Minimum permeability	1,000 cm/hr
Sand content	≤ 20%

Source: Hendry & Cragg-Hine (1997).

Annex C Fish survey data

C.1 Fish survey desk-based scoping

Table C-1 Fish survey sites scoped into the assessment

Watercourse Name	EA ID/RSK ID	Related WFD Water Body ID	Justification/Comments
Hermitage Stream	28323 Bentworth Close	GB107042016370 – Hermitage Stream	Reference site
Riders Lane	RSK 8	GB107042016370 – Hermitage Stream	Reference site
Bow Lake	38950 Leyland's Farm	GB107042016650 – Bow Lake	Reference site
Otterbourne	RSK 1	GB107042022580 - Itchen	Reference site
The Itchen Navigation	RSK 2	GB70710008 – Itchen Navigation	Reference site
River Itchen	RSK 3	GB107042022580 - Itchen	Reference site
The Itchen Navigation	6250 Ham Farm	GB70710008 – Itchen Navigation	Substitutes data unobtained for RSK 2
River Itchen	30230 Caravan Pool - Highbridge	GB107042022580 - Itchen	Substitutes data unobtained for RSK 3
River Meon	RSK 5	GB107042016640 – Meon	Reference site
Trib of River Hamble 1	30223 Tangier Farm	GB107042016280 – Upper Hamble	Reference site
Shawfords Lake (Trib of River Hamble)	RSK 4	South East Coastal Catchment	Reference site
Wallington River	26499 Spurlings Farm	GB107042016360 - Wallington	Reference site

Watercourse Name	EA ID/RSK ID	Related WFD Water Body ID	Justification/Comments
Trib of Wallington River 5	RSK 7	GB107042016360 - Wallington	Reference site
Bidbury Mead Stream	RSK 9	GB107042016370 – Hermitage Stream	Reference site

C.2 Fish survey control sites scoped into the assessment.

Table C-2 Fish survey control sites used in the fish survey analysis assessment

EA ID/RSK ID	Watercourse Name	Related WFD Water Body ID	Justification/Comments
34565 Shawford Park	River Itchen	GB107042022580 – Itchen	Upstream control for The Itchen Navigation
71443 Shawford US of Norris's Bridge	River Itchen	GB107042022580 - Itchen	Upstream control for the River Itchen. Substitutes 33939 Segar's Farm data from 2002.
4274 Northfields Farm	River Meon	GB107042016640 - Meon	Upstream control for the River Meon
26477 Upstream of Boarhunt Bridge	Wallington River	GB107042016360 - Wallington	Upstream control for the Wallington River

C.3 Fish survey physical parameter data

Table C-3 Summary of field survey information and physical site characteristics

Site ID	Watercourse	Survey Date	Survey length (m)	Survey area (m^2)	Mean channel width (m)	Mean channel depth (cm)	Substrate composition (%)	Habitat type (%)	Shade (%)	Aquatic vegetation (%)	Fish cover
RSK1	Otterbourne	28/10/22	80	192	2.4	7	Cobble – 10 Gravel – 75 Sand – 10 Silt/Clay – 5	Run – 20 Glide – 80	100	Emergent macrophytes-5 Bryophytes- 1	Woody debris, undercut banks, and tree roots
38950 Leyland's Farm	Bow Lake	04/08/22	30	77	2.57	4	Cobble – 60 Gravel – 30 Silt/Clay –10	Pool– 100	80	Open water/bare substrate- 99 Filamentous algae- 1	Woody debris and tree roots.
30223 Tangier Farm	Trib of River Hamble 1	04/08/22	100	131.7	1.32	10	Gravel – 50 Sand – 5 Silt/Clay – 45	Pool– 10 Glide– 90	55	Open water/bare substrate-10 Submerged macrophytes-10 Emergent macrophytes-30 Floating macrophytes-15 Filamentous algae-5	Woody debris, undercut banks and tree roots.

Site ID	Watercourse	Survey Date	Survey length (m)	Survey area (m²)	Mean channel width (m)	Mean channel depth (cm)	Substrate composition (%)	Habitat type (%)	Shade (%)	Aquatic vegetation (%)	Fish cover
RSK 4	Shawfords Lake (Trib of River Hamble)	05/08/22	70	103	1.47	12	Gravel – 40 Silt/Clay – 60	Pool–100	45	Open water/bare substrate- 75 Submerged macrophytes- 20 Floating macrophytes- 20 Filamentous algae- 5 Non-filamentous algae- 5 Bryophytes- 2	Woody debris and tree roots.
RSK 5	River Meon	02/08/22	100	800	8	-	Cobble – 5 Gravel – 80 Sand – 12 Silt/Clay –3	Pool–5 Riffle – 15 Glide – 80	70	Open water/bare substrate- 90 Emergent macrophytes- 10 Filamentous algae- 5 Non-filamentous algae- 2 Bryophytes- 2	Woody debris and tree roots.
26499 Spurlings Farm	Wallington River	06/09/23	90	495	5.5	18	Boulder – 5 Cobble – 35	Glide–100	40	Open water/bare substrate- 70	Woody debris, undercut

Site ID	Watercourse	Survey Date	Survey length (m)	Survey area (m^2)	Mean channel width (m)	Mean channel depth (cm)	Substrate composition (%)	Habitat type (%)	Shade (%)	Aquatic vegetation (%)	Fish cover
							Gravel – 37 Sand – 10 Silt/Clay –13			Emergent macrophytes- 35 Filamentous algae- 20 Non-filamentous algae- 5	banks and tree roots.
RSK 8	Riders Lane	28/20/22	100	363	3.63	13	Boulder – 5 Cobble – 20 Gravel – 40 Silt/Clay – 35	Pool– 10 Run – 10 Glide – 80	80	Open water/bare substrate- 98 Emergent macrophytes- 1 Bryophytes- 1	Woody debris and tree roots.
28323 Bentworth Close	Hermitage Stream	20/07/22	100	233	2.3	10	Bedrock –30 Cobble – 50 Gravel – 10 Silt/Clay –10	Pool– 20 Glide – 80	25	Open water/bare substrate- 99 Emergent macrophytes- 10 Filamentous algae- 2 Non-filamentous algae- 1 Bryophytes- 1	Woody debris, undercut banks and tree roots.

Site ID	Watercourse	Survey Date	Survey length (m)	Survey area (m^2)	Mean channel width (m)	Mean channel depth (cm)	Substrate composition (%)	Habitat type (%)	Shade (%)	Aquatic vegetation (%)	Fish cover
RSK 9	Bidbury Mead Stream	20/07/22	30	36	1.2	5	Cobble – 30 Gravel – 60 Sand – 7 Silt/Clay –3	Run – 70 Glide – 30	90	Open water/bare substrate- 94 Emergent macrophytes- 5 Bryophytes- 1	Woody debris, undercut banks and tree roots.
4274 Northfields Farm	River Meon	03/10/22	70	394	5.6	33	Boulder – 5 Cobble – 35 Gravel – 40 Sand – 15 Silt/Clay –5	Pool– 30 Run – 10 Riffle – 30 Glide – 30	70	Open water/bare substrate- 92 Submerged macrophytes- 1 Filamentous algae- 5 Non-filamentous algae- 1 Bryophytes-1	Woody debris, boulders, undercut banks and tree roots.

C.4 Fish survey species abundance and density data including major species fork lengths (excluding EA surveys)

Riders Lane Stream

Table C-4 Abundance and density of fish recorded in the catch-depletion survey on 28th October 2022 at RSK8 on Riders Lane Stream

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Bullhead	*Cottus gobio*	50	13.76
European eel	*Anguilla Anguilla*	2	0.55
Three-spined stickleback	*Gasterosteus aculeatus*	125	34.40
Total		**177**	**48.72**

Table C-5 Major species fork lengths for site RSK 8

Common name	Scientific name	Lengths (FL; mm)
European eel	*Anguilla anguilla*	380,500

Hermitage Stream

Table C-6 Abundance and density of fish recorded in the catch-depletion survey on 20th July 2022 on the Hermitage Stream at Bentworth Close

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Bullhead	*Cottus gobio*	28	12.00
European eel	*Anguilla anguilla*	12	5.14
Three-spined stickleback	*Gasterosteus aculeatus*	1	0.43
	Total	**41**	**17.57**

Table C-7 Major species fork lengths for site 28323 Bentworth Close

Common name	Scientific name	Lengths (FL; mm)
European eel	*Anguilla anguilla*	120, 180, 250, 280, 300, 300, 320, 330, 340, 360, 450

Table C-8 Abundance and density of fish recorded in the catch-depletion survey on 20th July 2022 on the Bidbury Mead Stream at site RSK 9

Common name	Scientific name	Abundance (n)	Density (n/100m²)
European eel	*Anguilla anguilla*	6	16.67
	Total	**6**	**16.67**

Table C-9 Major species fork lengths for site RSK 9

Common name	Scientific name	Lengths (FL; mm)
European eel	*Anguilla anguilla*	155, 200, 210, 240, 260, 280

Wallington River

Table C-10 Abundance and density of fish recorded in the catch-depletion survey on 6th September on the Wallington River at Spurlings Farm

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Brown/sea trout	*Salmo trutta*	60	12.12
Bullhead	*Cottus gobio*	64	12.93
European eel	*Anguilla anguilla*	21	4.24
Minnow	*Phoxinus phoxinus*	289	58.38

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Stone loach	*Barbatula barbatula*	25	5.05
	Total	**459**	**92.73**

Table C-11 Major species fork lengths for site 26499 Spurlings Farm

Common name	Scientific name	Lengths (FL; mm)
Brown trout	*Salmo trutta*	71, 68, 67, 198, 72, 68, 71, 219, 70, 161, 69, 295, 61, 67, 89, 63, 83, 68, 74, 91, 93, 76, 67, 79, 73, 70, 65, 64, 275, 96, 76, 177, 80, 174, 82, 68, 160, 72, 82, 76, 66, 67, 76, 92, 67, 72, 64, 74, 176, 90, 180, 84, 66, 86, 55, 111, 76, 78, 77, 66
European eel	*Anguilla anguilla*	320, 160, 310, 220, 350, 240, 250, 250, 200, 130, 280, 300, 200, 120, 250, 110, 200, 230, 370, 340, 270

Table C-12 Abundance and minimum density of fish recorded by the Environment Agency on 25th August 2021 from a single run survey on the Wallington River upstream of Boarhunt Bridge

Common name	Scientific name	Abundance (n)	Min. density (n/100m²)
Brown/sea trout	*Salmo trutta*	16	3.30
Bullhead	*Cottus gobio*	-	-
Common bream	*Abramis brama*	2	0.39
Dace	*Leuciscus leuciscus*	1	0.19
European eel	*Anguilla anguilla*	3	0.58
Gudgeon	*Gobio gobio*	19	4.40
Minnow	*Phoxinus phoxinus*	-	-

Common name	Scientific name	Abundance (n)	Min. density (n/100m²)
Perch	*Perca fluviatilis*	8	2.50
Roach	*Rutilus rutilus*	40	8.10
Stone loach	*Barbatula barbatula*	-	-
	Total[3]	**89**	**19.46**

River Meon

Table C-13 Abundance and density of fish recorded in the catch-depletion survey on 3rd October 2022 on the River Meon at Northfields Farm

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Brown/sea trout	*Salmo trutta*	79	20.03
Bullhead	*Cottus gobio*	55	13.95
Chub	*Leuciscus cephalus*	25	6.34
European eel	*Anguilla anguilla*	6	1.52
Minnow	*Phoxinus phoxinus*	24	6.09
	Total	**189**	**47.93**

[3] Major species only

Table C-14 Major species fork lengths for site 4274 Northfields Farm

Common name	Scientific name	Lengths (FL; mm)
Brown trout	*Salmo trutta*	197, 146, 232, 135, 215, 103, 145,131, 182, 216, 142, 119, 149, 135, 175, 138, 68, 145, 125, 81, 135, 153, 157, 138, 175, 295, 158, 201, 158, 111, 145, 121, 196, 135, 155, 132, 146, 145, 141, 122, 135, 187, 125, 141, 139, 217, 152, 124, 122, 215, 74, 69, 70, 130, 137, 122, 233, 64, 137, 61, 165, 144, 109, 132, 149, 114, 142, 138, 144, 151, 134, 112, 63, 123, 113, 80, 106, 143, 123
Chub	*Leuciscus cephalus*	469, 371, 368, 372, 428, 395, 470, 345, 280, 387, 177, 272, 439, 435, 327, 360, 435, 235, 380, 205, 257, 59, 54, 55, 350
Eel	*Anguilla anguilla*	310, 360, 400, 420, 435, 460

SE Coastal catchment (below Moors Stream)

Table C-15 Abundance and density of fish recorded in the catch-depletion survey on 5th August 2022 at RSK 4 on the Shawfords Lake tributary of the River Hamble

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Three-spined stickleback	*Gasterosteus aculeatus*	394	383.77
	Total	**394**	**383.77**

Table C-16 Major species fork lengths for site RSK 4

Common name	Scientific name	Lengths (FL; mm)
No major species caught	N/a	N/a

Upper Hamble

Table C-17 Abundance and density of fish recorded in the catch-depletion survey on 4th August 2022 on an unnamed tributary of the River Hamble at Tangier Farm

Common name	Scientific name	Abundance (n)	Density (n/100m²)
Brown/sea trout	*Salmo trutta*	4	3.04
Bullhead	*Cottus gobio*	7	5.32
Lamprey sp.	*Lampetra* sp.	1	0.76
Three-spined stickleback	*Gasterosteus aculeatus*	87	66.08
	Total	**99**	**75.2**

Table C-18 Major species fork lengths for site 30223 Tangier Farm

Common name	Scientific name	Lengths (FL; mm)
Brown trout	*Salmo trutta*	55, 71, 72, 78
Lamprey sp.	*Lampetra* sp.	155

River Itchen and tributaries

Table C-19 Major species fork lengths for site 38950 Leyland's Farm

Common name	Scientific name	Lengths (FL; mm)
No major species caught	N/a	N/a

Annex D Macrophyte survey data

D.1 Macrophyte field survey data

Table D-1 Taxon cover value of LEAFPACS2 scoring and additional taxa for the River Hermitage field survey area. Non-LEAFPACS2 compliant surveys have taxa scored as present only, using 'x'

	Taxon	Site				
		Hermitage_03	Hermitage_13	Hermitage_15	Hermitage_14	Hermitage_08,09,10,11
LEAFPACS Scoring Taxa	*Heloscidium nodiflorum*	1				X
	Filamentous green algae	9	7	7		
	Iris pseudacorus		2		X	
	Lythrum salicaria	1				
	Mentha aquatica			1		
	Oenanthe crocata	1	1			X
	Pellia endiviifolia		2	1		
	Persicaria hydropiper		1			
	Phalaris arundinacea	2				
	Phragmites australis	6				
	Nasturtium officinale	2				
	Sparganium erectum	2	1			
	Veronica beccabunga	1	1	1		
Additional Taxa	*Cardomine pratensis*	1	1			
	Carex pendula	1	1			X
	Carex sp.	2	1			X
	Conocephalum conicum	1	1			X
	Epilobium hirsutum	2				
	Equisetum sp.		1			X
	Impatiens glandulifera	3				
	Lycopus europaeus		1	1		
	Scrophularia auriculata		1			X
	Solanum dulcamara	**1**				

Table D-2 Taxon cover value of LEAFPACS2 scoring and additional taxa for the Wallington River field survey area

	Taxon	Site			
		Wallington_29	Wallington_14	Wallington_17	Wallington_28
LEAFPACS Scoring Taxa	*Alisma plantago-aquatica*		1		
	Helosciadium nodiflorum	1	2	2	
	Filamentous green algae	5	5	8	
	Mentha aquatica	1	1	1	
	Myriophyllum spicatum			5	
	Nuphar lutea		2		
	Oenanthe crocata		1		
	Pellia endiviifolia			2	
	Persicaria hydropiper	1	1		
	Phalaris arundinacea		2	2	
	Rorippa amphibia		1		
	Nasturtium officinale	2			
	Sparganium erectum		7	1	
Additional Taxa	*Cardomine pratensis*		1	1	
	Carex pendula	3			
	Carex sp.	1		2	
	Conocephalum conicum	1	1	1	
	Epilobium hirsutum			1	
	Impatiens glandulifera	2	4	4	
	Juncus effusus	1			
	Lunularia cruciata		1	1	
	Lycopus europaeus		1		
	Scrophularia auriculata		1	1	
	Solanum dulcamara	1	2		
	Stachys palustris	1			
	Symphytum officinale			4	
	Veronica sp.	1			

Table D-3 Taxon cover value of LEAFPACS2 scoring and additional taxa for the River Meon field survey area

	Taxon	Site	
		Meon_09	Meon_05
LEAFPACS Scoring Taxa	*Filamentous green algae*	4	4
	Fontinalis antipyretica	2	4
	Iris pseudacorus	1	1
	Lemna minor	1	1
	Lemna minuta	1	1
	Mentha aquatica	2	
	Myosotis scorpioides	1	
	Pellia endiviifolia	4	4
	Phalaris arundinacea	2	1
	Sparganium erectum	1	2
Additional Taxa	*Cardomine pratensis*	1	
	Carex pendula	2	2
	Carex sp.	1	
	Epilobium hirsutum	2	2
	Eupatorium cannabinum	1	2
	Impatiens glandulifera	6	6
	Lycopus europaeus	1	1
	Pulicaria dysenterica	1	
	Solanum dulcamara	1	2
	Stachys palustris	1	
	Symphytum officinale		1

Table D-4 Taxon cover value of LEAFPACS2 scoring and additional taxa for the River Hamble field survey area

	Taxon	Site						
		Hamble_23	Hamble_22	Hamble_01	Hamble_6, 7, 8, 9, 10	Hamble_18	Hamble_28	Hamble_26
LEAFPACS Scoring TAXA	*Alisma plantago-aquatica*						2	
	Helosciadium nodiflorum		3	3	3	2	3	
	Callitriche spp.			2				
	Carex riparia				2			
	Elodea nuttallii					2	4	
	Filamentous green algae			5	5	5	6	
	Fontinalis antipyretica			3				
	Iris pseudacorus					3	1	
	Lemna minor					2	2	
	Mentha aquatica			2	6	2	2	
	Myosotis scorpioides			4				
	Myosotis sp(p).				2			
	Oenanthe crocata		2			1	1	
	Pellia endiviifolia		2	2			1	
	Persicaria hydropiper			2	5		1	
	Phalaris arundinacea			2				
	Ranunculus (sect Batrachian) sp or hybrid			5				
	Nasturtium officinale						2	
	Sparganium erectum			3	6	2	2	
	Veronica beccabunga			1	1			
Additional Taxa	*Angelica sylvestris*		2					
	Carex pendula	3	4	1		3		
	Carex sp.	1						
	Conocephalum conicum		2					
	Epilobium hirsutum		2		3	3	2	
	Equisetum palustre						2	
	Filipendula ulmaria		3	1				
	Geranium robertianum	1						
	Impatiens glandulifera					6	3	
	Juncus effusus			1	3			
	Juncus inflexus			1				
	Lycopus europaeus			2			2	
	Pulicaria dysenterica		3	1				
	Scrophularia auriculata			1		2		
	Solanum dulcamara	2	1	2	2		2	
	Stachys palustris				2		1	
	Symphytum officinale			1				

Table D-5 Taxon cover value of LEAFPACS2 scoring and additional taxa for the River Itchen field survey area

	Taxon	Site												
		Itchen 02	Itchen 05,08,11	Itchen 07	Itchen 09,12	Itchen 10,13	Itchen 15,16	Itchen 24	Itchen 28	Itchen-Object ID 01	Itchen-Object ID 03	Itchen-Object ID 04	Itchen-Object ID 05	Itchen 04
LEAFPACS Scoring Taxa	*Alisma plantago-aquatica*	1												
	Apium inundatum		1											
	Helosciadium nodiflorum	3	1	2	1	2	1		4	1	1	1	2	2
	Berula erecta		6	3	2	7	5				3	7	8	
	Callitriche brutia var hamulata		2							1				
	Callitriche spp.	1	2	2	6	2	2			2	2	3	3	
	Carex acuta							1		2	2	2		
	Carex paniculata					1								
	Carex riparia		3		2		2						2	
	Elodea canadensis		1	2	2	1				6		1		
	Elodea nuttallii					1								
	Filamentous green algae	8	6	7	6	7	5	2	8	6	7	6	6	6
	Fissidens sp. (aggregated)			1									1	
	Fontinalis antipyretica				1	2						1	2	
	Glyceria maxima	1	2	2					1	1	1	2		
	Hildenbrandia rivularis		2				3					1	2	
	Hippuris vulgaris										1			
	Hygrohypnum luridum					2						1	1	
	Iris pseudacorus	1	1		2	1	1		1	1	1	1	1	
	Lemna minor		2	2	1	2	2			3	2		2	
	Lemna trisulca		3	2	1	3	2			2	2	3	3	
	Leptodictyon riparium					1		1		1		1	4	2
	Lythrum salicaria		1		1					2	1	1		
	Mentha aquatica	2	3	1	2	3			3	2	2	3	3	3
	Mimulus sp./hybrid		1							2	1		1	
	Myosotis scorpioides		3	2	1	1	2		1	2	1	2	1	
	Oenanthe crocata				1	1	1	1	1			1	1	
	Oenanthe fluviatilis			2	2	3				7	5	5	1	
	Pellia endiviifolia	1				6	2	2				1	1	
	Persicaria hydropiper	1												
	Phalaris arundinacea	2	3	2	2	2	2		1	2	4	1	1	6
	Phragmites australis	2	1		2					1	1			
	Potamogeton crispus									3				
	Ranunculus (sect Batrachian) sp or hybrid		5	2		3			1	2	2	5	7	
	Rorippa amphibia	1												
	Nasturtium officinale		4	2	1	1	1		1	3	1	2	2	2
	Rumex hydrolapathum									1				
	Schoenoplectus lacustris									1	5	3		
	Sparganium emersum	1	2	3	7	1	1			5		1	1	
	Sparganium erectum	2	2	2	2	1				4	2	3	1	5

	Taxon	Site												
		Itchen 02	Itchen 05,08,11	Itchen 07	Itchen 09,12	Itchen 10,13	Itchen 15,16	Itchen 24	Itchen 28	Itchen-Object ID 01	Itchen-Object ID 03	Itchen-Object ID 04	Itchen-Object ID 05	Itchen 04
	Typha latifolia										1			
	Vaucheria sp.					1								
	Veronica beccabunga	1			1				1	1		1	1	2
	Veronica catenata x anagallis-aquatica		1	1	1									
Additional Taxa	*Angelica sylvestris*			1	1						1	1	1	
	Bidens sp.			1	2	1	1					1		
	Cardamine sp.	1	1						1					
	Carex pendula			1			2	2	2					
	Carex sp.			1	1		1		1	1	1	1		
	Conocephalum conicum					1			2			1	**1**	
	Epilobium hirsutum	1	1	2		2				2		2	**2**	**4**
	Equisetum arvense				1									
	Equisetum palustre								1					
	Filipendula ulmaria			1	1	1						1		
	Geranium robertianum												**1**	
	Gunnera manicata				1									
	Impatiens capensis					1						1		**1**
	Impatiens glandulifera	2							1					**5**
	Lunularia cruciata								1					
	Lycopus europaeus	2	1		1	1				2	1	1	**1**	
	Lysichiton americanus				1									
	Petasites hybridus		1	2			2					2	**2**	
	Pulicaria dysenterica	1	1	1	1	1			1					
	Scrophularia auriculata	1			1	1			1	1	1		**1**	**3**
	Solanum dulcamara	1	1	1	1	1	1		1	2	1	2	**2**	**4**
	Stachys palustris					1	1			1	1			
	Stellaria aquatica				1				1					
	Symphytum officinale		1		1				1			1		
	Veronica sp.	2	1	2			1			2			**2**	
	Zantedeschia aethiopica					1								

D.2 Field survey environmental variables

Table D-6 Environmental variables for sites in the River Hermitage field survey area

Site	Watercourse	Survey Date	Upstream NGR	Downstream NGR	Total Cover (Macrophytes and filamentous algae) (%)	Channel width (m)	Channel depth (cm)	Substrate composition (%)	Shade (%)	Flow (%)
Hermitage_03	Hermitage Stream	27/09/2022	SU 70540 07982	SU 70640 07891	100	2-5	90% <25 10% 26-50	Silt / Clay - 10 Sand - 20 Pebbles / Gravel - 65 Boulder / Cobbles - 5	10	Run / Glide - 100
Hermitage_13	Leigh Park Stream	29/09/2022	SU 71773 08784	SU 71762 08709	52.5	30% <1 70% 2-5	<25	Silt / Clay - 100	100	Run / Glide - 100
Hermitage_15	Leigh Park Stream	29/09/2022	SU 71420 09033	SU 71452 08961	50	2-5	90% <25 10% 26-50	Silt / Clay - 30 Pebbles / Gravel - 40 Boulder / Cobbles - 30	100	Ponded reach / Pool - 10 Run / Glide - 60 Slack - 30

Table D-7 Environmental variables for sites in the Wallington River field survey area

Site	Watercourse	Survey Date	Upstream NGR	Downstream NGR	Total Cover (Macrophytes and filamentous algae) (%)	Channel width (m)	Channel depth (cm)	Substrate composition (%)	Shade (%)	Flow (%)
Wallington_14	Wallington River	30/09/2022	SU 58811 08710	SU 58786 08670	42.5	2-5	15% <25 80% 26-50 5% 51-100	Silt / Clay - 35 Pebbles / Gravel - 60 Boulder / Cobbles - 5	95	Run / Glide - 100
Wallington_17	Wallington River	30/09/2022	SU 58660 07909	SU 58695 07831	65	90% 2-5 10% 6-10	60% <25 30% 26-50 10% 51-100	Silt / Clay - 10 Pebbles / Gravel - 70 Boulder / Cobbles - 20	80	Ponded reach / Pool - 10 Riffle - 10 Run / Glide - 80
Wallington_29	Tributary off Wallington River	30/09/2022	SU 60491 09746	SU 60420 09635	10	2-5	95% <25 5% 26-50	Silt / Clay - 5 Sand - 5 Pebbles / Gravel - 85 Boulder / Cobbles - 5	87.5	Ponded reach / Pool - 5 Riffle - 5 Run / Glide - 90

Table D-8 Environmental variables for sites in the River Meon field survey area

Site	Watercourse	Survey Date	Upstream NGR	Downstream NGR	Total Cover (Macrophytes and filamentous algae) (%)	Channel width (m)	Channel depth (cm)	Substrate composition (%)	Shade (%)	Flow (%)
Meon_05	River Meon	27/09/2022	SU 56112 10266	SU 55987 10170	12.5	15% 2-5 85% 6-10	10% <25 75% 26-50 15% 51-100	Silt / Clay - 20 Sand - 10 Pebbles / Gravel - 65 Boulder / Cobbles - 5	90	Ponded reach / Pool - 10 Riffle - 20 Run / Glide - 70
Meon_09	River Meon	27/09/2022	SU 56580 10666	SU 56497 10572	12.5	10% 2-5 90% 6-10	20% <25 70% 26-50 10% 51-100	Silt / Clay - 15 Sand - 5 Pebbles / Gravel - 70 Boulder / Cobbles - 10	95	Ponded reach / Pool - 10 Riffle - 20 Run / Glide - 70

Table D-9 Environmental variables for sites in the River Hamble field survey area

Site	Watercourse	Survey Date	Upstream NGR	Downstream NGR	Total Cover (Macrophytes and filamentous algae) (%)	Channel width (m)	Channel depth (cm)	Substrate composition (%)	Shade (%)	Flow (%)
Hamble_01	River Hamble	28/09/2022	SU 54022 15845	SU 53695 15787	20	95% <5 5% 5-10	70% <25 30% 25-50	Silt / Clay - 5 Sand - 15 Pebbles / Gravel - 60 Boulder / Cobbles - 20	22.5	Ponded reach / Pool - 20 Riffle - 20 Run / Glide - 60
Hamble_06, 07, 08, 09, 11	River Hamble	12/09/2023	SU 54106 17200	SU 54199 17060	70	<1	<25	Silt / Clay - 60 Sand - 30 Pebbles / Gravel - 10	65	Run / Glide - 100
Hamble_18	River Hamble	12/09/2023	SU 53487 18128	SU 53535 18080	20	<1	<25	Silt / Clay - 100	75	Riffle - 5 Run / Glide - 95
Hamble_22	Shawfords	28/09/2022	SU 55966 14587	SU 55911 14435	20	<1	<25	Silt / Clay - 25 Pebbles / Gravel - 75	95	Run / Glide - 100
Hamble_23	Tributary off River Hamble	28/09/2022	SU 57151 13642	SU 57193 13556	7.5	<1	<25	Silt / Clay - 35 Pebbles / Gravel - 65	100	Ponded reach / Pool - 30 Run / Glide - 70
Hamble_28	River Hamble	12/09/2023	SU 53593 17960	SU 53632 17876	21	<1	<25	Silt / Clay - 75 Sand - 20 Pebbles / Gravel - 5	15	Riffle - 5 Run / Glide - 95

Table D-10 Environmental variables for sites in the River Itchen field survey area

Site	Watercourse	Survey Date	Upstream NGR	Downstream NGR	Total Cover (Macrophytes and filamentous algae) (%)	Channel width (m)	Channel depth (cm)	Substrate composition (%)	Shade (%)	Flow (%)
Itchen - ObjectID 1	The Itchen Navigation	21/09/2022	SU 46499 21962	SU 46445 21886	100	80% 6-10 20% 11-20	10% <25 20% 26-50 70% 51-100	Silt / Clay - 30 Sand - 20 Pebbles / Gravel - 49 Boulder / Cobbles - 1	3	Run / Glide - 100
Itchen - ObjectID 3	River Itchen	21/09/2022	SU 46512 21899	SU 46473 21805	65	11-20	10% <25 20% 26-50 50% 51-100 20% >100	Silt / Clay - 15 Sand - 25 Pebbles / Gravel - 55 Boulder / Cobbles - 5	10	Ponded reach / Pool - 10 Run / Glide - 90
Itchen - ObjectID 4	River Itchen	21/09/2022	SU 46680 22219	SU 46633 22134	100	50% 6-10 50% 11-20	10% <25 20% 26-50 70% 51-100	Silt / Clay - 5 Sand - 20 Pebbles / Gravel - 70 Boulder / Cobbles - 5	10	Run / Glide - 100
Itchen - ObjectID 5	River Itchen	21/09/2022	SU 46691 22181	SU 46633 22095	100	80% 6-10 20% 11-20	10% <25 30% 26-50 60% 51-100	Silt / Clay - 5 Sand - 25 Pebbles / Gravel - 55 Boulder / Cobbles - 15	90	Riffle - 5 Run / Glide - 90
Itchen_02	Bow Lake	20/09/2022	SU 49674 20700	SU 49590 20647	80	2-5	90% <25 10% 26-50	Silt - 100	25	Run / Glide - 10 Slack - 90
Itchen_04	Bow Lake	12/09/2023	SU 48655 20729	SU 48546 20773	50	<1	<25	Silt / Clay - 5 Sand - 15 Pebbles / Gravel - 60 Boulder / Cobbles - 20	50	Riffle - 10 Run / Glide - 90
Itchen_05, 08, 11	River Itchen	20/09/2022	SU 47018 22479	SU 46956 22440	55	11-20	30% 26-50 70% 51-100	Silt / Clay - 10 Sand - 25 Pebbles / Gravel - 60 Boulder / Cobbles - 5	12.5	Run / Glide - 100
Itchen_07	The Itchen Navigation	23/09/2022	SU 46892 22725	SU 46843 22673	70	11-20	10% <25 20% 26-50 70% 51-100	Silt / Clay - 30 Sand - 15 Pebbles / Gravel - 50 Boulder / Cobbles - 5	5	Run / Glide - 100
Itchen_09, 12	Rosemary Leet	23/09/2022	SU 46930 22583	SU 46885 22581	55	6-10	10% <25 30% 26-50 60% 51-100	Silt / Clay - 35 Sand - 10 Pebbles / Gravel - 50 Boulder / Cobbles - 5	10	Run / Glide - 100
Itchen_10, 13	River Itchen	23/09/2022	SU 46807 22580	SU 46752 22522	80	10% 6-10 90% 11-20	10% <25 80% 26-50 10% 51-100	Silt / Clay - 10 Sand - 30 Pebbles / Gravel - 60	7.5	Run / Glide - 100
Itchen_15, 16	Kingfisher Stream	23/09/2022	SU 47013 22500	SU 46943 22471	20	10% 2-5 90% 6-10	10% <25 90% 26-50 10% 51-100	Silt / Clay - 10 Sand - 25 Pebbles / Gravel - 60 Boulder / Cobbles - 5	75	Run / Glide - 100
Itchen_24	River Itchen	20/09/2022	SU 47406 21660	SU 47338 21668	3.5	<1	95% <25 5% 26-50	Silt / Clay - 60 Pebbles / Gravel - 30 Boulder / Cobbles - 10	97.5	Ponded reach / Pool - 5 Run / Glide - 95
Itchen_28	River Itchen	20/09/2022	SU 46400 23157	SU 46372 23092	70	2-5	<25	Silt / Clay - 15 Sand - 35 Pebbles / Gravel - 50	100	Run / Glide - 100

Annex E Phytobenthos survey data

E.1 Phytobenthos species data 2022-2023

Table E-1 Phytobenthos species list

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Achnanthes biasolettiana																2						5	4				
Achnanthes impexiformis																				2							
Achnanthes sp.															1	1											
Achnanthidium affine																	3										
Achnanthidium biasolettianum		2			2											4						4					
Achnanthidium biasolettianum / Achnanthidium pyrenaicum	4	2				2		4		2		6	8	3		2	5			2						4	
Achnanthidium exiguum																					1						
Achnanthidium lineare															5							2					
Achnanthidium minutissimum	205	178	279	47	145	32	29	196	40	146	73	27	153	94	286	60	34	79	14	74	56	80	27	148	20	128	156
Achnanthidium subatomus									4			2															
Adlafia minuscula	2						6		2	2			2											10		2	2
Adlafia suchlandtii																2											
Amphipleura pellucida			1									1															
Amphora capulata	2	5		9	4		4						6			4				3			2				3
Amphora fogediana																						2					
Amphora inariensis					7								2	4							2		2				
Amphora libyca	4		2				2	2		2			3			4				2		3					4
Amphora minutissima						4																2	6				
Amphora ovalis	4										2		2	2		2		3									
Amphora pediculus	210	575	55	443	184	119	164		52	227	339	271	246	148	101	308	206	549	4	177	262	561	392	12	140	126	187
Amphora sp												4															
Amphora sp.													4														
Asterionella formosa																1											
Aulacoseira ambigua									3													5	4				
Aulacoseira granulata	10			64					12												9	2	3				

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Aulacoseira granulata var. angustissima																					12						
Bacillaria paxillifer						1																					
Caloneis amphisbaena							2						2														1
Caloneis bacillum				2										3		2						2					
Caloneis lancettula	2	6			7	3	13								2	6	8	20		2			7		2		
Caloneis sp																		2									
Caloneis tenuis																				2							
Chamaepinnularia mediocris		4					2																				
Cocconeis disculus		10														4											
Cocconeis neothumensis		2	2																								
Cocconeis pediculus	28	1	2	2	4	5			9		12		7	3	1	25		23				2	6		1		3
Cocconeis placentula													2								5						
Cocconeis placentula var placentula	2				2				3				2	3		2	2	4							2		
Cocconeis placentula var. euglypta	135	46	84	107	267	186	78	8	140	68	338	89	483	162	60	313	11	90		40	47	53	63	49	115		150
Cocconeis placentula var. lineata	16		7	4	4	2	4				5		59	4	52	11		2		3	10	11	2				5
Cocconeis placentula var. pseudolineata	12	4		7	2	133	2			4	18		22	13	20	15					1	11	2	3	2		14
Cocconeis pseudothumensis		2					2								3	6											11
Craticula accomoda					43																			11		6	
Craticula buderi			2																					4			
Craticula cuspidata																								8			
Craticula halophila					1																						
Craticula molestiformis																				2							
Craticula subminuscula			3			3	2				3			2		2		2						4			3
Cyclostephanos dubius	11			167					16											1	4		2				
Cyclostephanos sp.	3								5													2	2				
Cyclostephanos tholiformis				49																			7				
Cyclotella meneghiniana	63			80	13	1			87				23		5						8	6	4				2

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Cyclotella pseudostelligera				2					9												2		35				
Cyclotella sp.	191			30												2			4		2						
Cyclotella stelligera									8																		
Cymatopleura solea						2														2		1	4				
Cymbella affinis					2																						
Cymbella helvetica													1														
Cymbella neocistula																							2				
Cymbella proxima									6													2					
Cymbella sp.									4																		
Cymbella tumida													2														
Denticula subtilis						23																					
Denticula tenuis																					3						2
Diadesmis contenta													2							54							
Diadesmis / Humidophila contenta			60		4	123			4	114		6				2				152			2	26			
Diatoma mesodon						3																					
Diatoma problematica					2																						
Diatoma vulgare	6	14		1												15		1									2
Diploneis elliptica																											2
Diploneis fontanella							2																				
Diploneis modica																		5									
Diploneis oblongella																1											2
Diploneis oculata		3			2		2							3		25				2							
Diploneis praetermissa		2			4		2						2			2		22									
Diploneis sp.		2							1			1				3		3			1	1	1		1		
Diplonie petersenii															2												
Ellerbeckia arenaria	12					1								4		6		2									
Encyonema "ventricosum" ag.		1																									
Encyonema caespitosum																		2									
Encyonema minutum		4				4						2															4

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Encyonema prostratum / Encyonema leibieinii		3				2																					
Encyonema silesiacum	6	2			8	2	4		3	2		12	6		122	22		12		4			8			2	2
Encyonopsis minuta													2								6						
Eolimna minima / Sellaphora nigri	10	15	38	55	18	8	4	44	16	18	50	38	29	6	78	34	41	4	8	26	78	165	131	75	14	43	25
Eolimna tantula			7					9	4	2					2												
Eolimna/ Craticula subminuscula	2	6	3		4		25				6						2			2		2		2			2
Epithemia adnata									1				2								4						
Eunotia bilunaris								53												2						2	
Eunotia bilunaris var. mucophila					2			20	2																	2	
Eunotia botuliformis																								2			
Eunotia formicina																										1	
Eunotia naegelii								4																			
Eunotia pectinalis		2						17															4				
Eunotia pectinalis var. minor								2				2															
Eunotia praerupta								8																			
Eunotia rhomboidea															2												
Eunotia soleirolii								2															2				
Eunotia sp				3				4				2															
Eunotia sp.			5					14																			
Fallacia lenzii		7	2	2	12		7					3				10		11		9		9	2		6		3
Fallacia pygmaea				2																2							
Fallacia pygmaea var subpygmaea																											3
Fallacia subhamulata	4						13			4	2					7		2		25		4	4				37
Fallacia sublucidula							4																				26
Fistulifera saprophila					3						38																5
Fragilaria berolinensis																					3						
Fragilaria brevistriata		20		8												35		9			4						
Fragilaria capucina		1		2				7		2												4	6				

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Fragilaria capucina var. gracilis			2	2	7		1		1				8			6						2	6				
Fragilaria capucina var. rumpens								2																			
Fragilaria dilatata													1														
Fragilaria famelica								2																			
Fragilaria martyi / Fragilaria leptostauron var martyi													4														
Fragilaria nanana					2				4																		
Fragilaria radians																							2				
Fragilaria recapitellata							2																				
Fragilaria sp.													1	2								1					
Fragilaria tenera					2														4								
Fragilaria vaucheriae				7	1								16	4		4					1	5	12		2		
Fragilariforma virescens					4								12										8				
Frustulia rhomboides var. saxonica													2														
Frustulia vulgaris				10			8		2				8											1	5	1	2
Gomphonema acuminatum		2	3		1			158					1											2			
Gomphonema angustatum								20		4		2	2		4				53	17				29	27		
Gomphonema angustum		2																									
Gomphonema augar								4																			
Gomphonema augur																							2				
Gomphonema auritum																										3	
Gomphonema clavatum								14																2			
Gomphonema coronatum								2																			
Gomphonema cymbelliclinum												2															
Gomphonema extentum								3												2							
Gomphonema graciledictum								4		2																	
Gomphonema italicum									2																		
Gomphonema micropus	4			2		5		8		12	3	2		1	2		2		14	46				1	1		

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Gomphonema minusculum							3		2	4							2							2	6		
Gomphonema minutum																	2			6	4				4		
Gomphonema olivaceum	8	34	2			3	8	10	14	8	12		4		2	16		10		4	8	9	2	10			4
Gomphonema parvulum	2		20	6	19	12	8	83	64	12	15	9	6	2	4	7	3		64	36		15	4	95	29	20	
Gomphonema parvulum var. parvulius													2														
Gomphonema pseudoaugur								4																			
Gomphonema pumilum		16	64	4		4			80	43		12	3	3	6		20		2	60	22		4	3	23	10	
Gomphonema sarcophagus						5													2								
Gomphonema sp.		12	7	8	1	6	2	6	14	16	4	2	16	10	6	7			12	16	11	8		6	39	10	
Gomphonema subclavatum		4						15									2		4					6		2	
Gomphonema tergestinum													2				2										
Gomphonema truncatum									2																		
Gomphosphenia holmquistii												4															
Gyrosigma acuminatum	16		1	1	2	3	6		10	2			9			1						2					20
Gyrosigma attenuatum	22																			2		2					
Gyrosigma kuetzingii									2																		
Gyrosigma obtusatum					3		2									4							2				
Gyrosigma sciotoense	11						4		2							3		7		3		9			2		12
Gyrosigma sp.	2		1				3		5	2						2						1					
Halamphora montana		4					6		6						2							4	8				8
Halamphora normanii			2	8																							
Halamphora veneta							8																				
Hantzschia abundans	2							1														2					
Hantzschia amphioxys				1					7	5		2								2					8		1
Hippodonta capitata	2			2		2			3				3										2				
Humidophila brekkaensis													2														
Humidophila contenta			29	43		4	6			12		25				4				3					3		
Karayevia clevei		2		3												2		1									2

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Karayevia laterostrata												5														2	
Karayevia oblongella			2	14	55							23			3				4						2	55	
Karayevia ploenensis		4				4					6					2											
Kolbesia kolbei																		1									
Kolbesia / Karayevia ploenensis	12			3						4										2	4	6	5			22	
Lemnicola hungarica					4			4																2			
Luticola goeppertiana														2						4							
Luticola mutica			2	4		14		3	7	2		3					8			2		2				4	
Luticola saprophila																						3					
Luticola ventriconfusa				2																							2
Mayamaea atomus	2			2		2			2			2				2	2					2					4
Mayamaea atomus var. permitis	8	8	1		44		4	5			10	4	2		14	5		4		8		34	10	4	2		2
Melosira varians	42		6	6	24		16	18	4		3	4	5	4					13	1	8	14	47				
Meridion circulare			2		4	2		54		5			3				4		6				2				7
Meridion circulare var. constrictum	2				7			31													2						4
Navicula antonii	4			11	9	4	2		8							2	2	13				7	7				3
Navicula capitatoradiata	12								6																		
Navicula cincta	7		2	67		7	9	4	13	2	2	6	6				1			14		3		6	2		5
Navicula cryptocephala	5			7	2	2	3	22	5			12	2						4	1	6	2	2			12	10
Navicula cryptotenella	48	23	2	26	12	6	42	8	4	4	22	2	12	15	6	21		73		5	16	4	10		11		52
Navicula cryptotenelloides		6		2			2		4								2	6		10		4					
Navicula erifuga									2			2								6						1	
Navicula exilis	7														2												
Navicula gregaria	111	4	7	73	17	19	31	50	17	67	137	279	111	2	76	6	21		23	30	8	14	17	36	82	289	32
Navicula hofmanniae																				2						2	
Navicula lanceolata	160		19	83	46		40	2	29	134	119	136	95	36	21		11		69	51	38	67	14	9	54	32	24
Navicula menisculus										8	2																
Navicula menisculus var grunowii									2							2							6				
Navicula notha										2																	

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Navicula radiosa					2								5								1				8		
Navicula reichardtiana	2			2			16								4	4		20		2						3	6
Navicula simulata										2			3							17						18	
Navicula slesvicensis				2					2	6		8	9								4	1	3	3			
Navicula sp.	2	4	2						5	1		2			2	3		4			2	3	1	13			3
Navicula subalpina															2												
Navicula tenelloides						2																					
Navicula tripunctata	20	16	2	6	17	20	43		38	13	13	31	24	38	14	56	35	107	2	24	20	38	53		20	4	222
Navicula trivialis					2			3	5	6						2					2	11	12		3		
Navicula veneta			1	11	9	2	7	11		5	4	12		2	3					8	8	27	15	8	2		11
Navicula vilaplanii				10			10		5			4			2					13			4		6	2	
Navicula wildii																					2						
Nitzschia acicularis	3			3																	4		2			1	
Nitzschia adamata												1												2			2
Nitzschia amphibia		6	1		4	7		3	8	12	22	8	5		4			4	2	2	48	21	73	2	5		18
Nitzschia archibaldii								16																			
Nitzschia capitellata						2																			4		
Nitzschia communis																						2					4
Nitzschia commutata																				1							
Nitzschia debilis																				8							
Nitzschia denticula													2														
Nitzschia dissipata	32	100	2	14	23	4	25	6	8	5	3		6	34	6	44	2	74		10	11	16	38	2	5	5	2
Nitzschia dissipata subsp. media	16			4	8		7	20		4			7		4	8		4			1	8	2	2	4	4	
Nitzschia dubia										2	2			2			7			9							
Nitzschia filamformis var conferta						8			2																		
Nitzschia fonticola																4		6		1							6
Nitzschia fossilis																		2									
Nitzschia frustulum		6		1	2	4			8				2			13		2				1		4	2		3
Nitzschia gracilis	9				72		4					5								2	6		4				
Nitzschia hantzschiana																	7										

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Nitzschia heufleriana																						2					
Nitzschia inconspicua																							2				
Nitzschia intermedia			2	2	2	2													2		14			7		2	
Nitzschia linearis	17		7	3	2	1	26	6	6	6	7		7	4	14	4		6		14		7	11	4	9	6	29
Nitzschia linearis var tenuis					2															2			2				
Nitzschia palea	18	2	9	8	73	31	28	58	2	16	1	25	16	4	87	6	2	3	7	18	13	24	22	115	8	12	17
Nitzschia palea var debilis								7																			
Nitzschia palea var. tenuirostris					20			12											2		1			18			
Nitzschia paleacea												1															
Nitzschia perminuta			2									2			2												2
Nitzschia pura					1																						
Nitzschia pusilla				2	8								4		5					2		7	3	2			
Nitzschia recta	29			8	9		6	11		2	7	1	24		5	7		5	1	20	6	8	3				
Nitzschia sigma			2	18							2	2	4				1			2						1	
Nitzschia sigmoidea																				1							
Nitzschia sociabilis	78	26	2	10	10		24	1	2			3	7	18	2	63		44		10	7	8	15		1	10	
Nitzschia solgensis																					4	2	3				
Nitzschia soratensis										6	2				2											3	
Nitzschia sp.	3		2			2	6			4	1	3				8	5			20	4	2		4	3	2	
Nitzschia subacicularis	5												2														
Nitzschia sublinearis																										2	
Nitzschia subtilis															3					1						1	
Nitzschia subtilis																				2							
Nitzschia supralitorea					2							4												2		8	
Nitzschia tenuis									1												1						
Nitzschia wuellerstorffii																						4					
Pinnularia interrupta																							2				
Pinnularia microstauron								3	2																		
Pinnularia obscura												2															
Pinnularia sp.					5												1										4

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Pinnularia subcapitata												2															
Pinnularia viridis																										2	2
Planothidium conspicuum	3		1	5		2			4	2		10						2		4	90	6	4	4	32	6	
Planothidium delicatulum																									2		
Planothidium dubium															104												10
Planothidium frequentissimum	20	9	115	78	12	15	9	69	57	36	17	42	29	8	66	13	70	8	35	61	26	72	71	103	54	126	30
Planothidium granum															2												
Planothidium hauckianum															2												
Planothidium lanceolatum	12	30	311	87	18	103	9	136	109	73	24	21	16	10	87	4	217	13	9	22	104	52	93	92	142	9	38
Planothidium rostratum		1	8		3			4					1		50	3		5			13		5				
Platessa lutheri			1																								
Pleurosigma / Gyrosigma nodiferum																3											
Psammothidium lauenburgianum		6	3	6		29			2	5	2			2		23		4			53	30	5			6	8
Pseudostaurosira elliptica / Staurosira elliptica																					20						2
Reimeria sinuata	4	15	35	6	10	108	4		4	8	4	10	23	6	2	4	17	2	4	15	8	6	2		3	2	5
Reimeria uniseriata						10	4				2																
Rhoicosphenia abbreviata	30	43	130	19	87	34			81	76	40	37	8	8	24	2	24	8	4	60	14	11	14		116	29	1
Sellaphora bacillum													2														
Sellaphora laevissima								7																			
Sellaphora pupula	2			6				4												4	10		5				11
Sellaphora raederae		13														4		4					3	6			2
Sellaphora raederae / Eolimnia raederae		5			9		5									9		2								5	
Sellaphora saugerresii			6		2	2	4	4		4			8		7	3	2		4		14	14	2	10	2		2
Sellaphora utermoehii					4										1	2				2			2				
Sellaphora vitabunda								2																			
Simonsenia delognei	4											10	2					4		10		2	2				
Stauroneis anceps				1																							
Stauroneis kriegeri								8																			

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Stauroneis parathermicola		2																									
Stauroneis silvahassiaca																										2	
Stauroneis smithii				2			2		2																		
Stauroneis sp.									1																		
Stauroneis subgracilis												2															
Staurosira binodis																					2						
Staurosira construens f. venter			1	2						4			4			4					77		2				
Staurosira construens var. binodis					2																						
Staurosira construens var. construens																					6						
Staurosira pinnata var. pinnata												2	2		10						163						4
Staurosira pinnata var. pinnata / Staurosirella pinnata							33			2					43	6					33	2					
Staurosira/ Pseudostaurosira brevistriata									3				6	2		15					9	10	4				
Staurosirella leptostauron																1											
Staurosirella leptostauron var. dubia															4												2
Staurosirella oldenburgiana													2								2						
Stephanodiscus hantzschii				2	3				65																		
Stephanodiscus parvus	33			30	3				23				10						6		27	9	8				1
Stephanodiscus sp.	6								24			4	5						2			1					
Surirella amphioxys																						4	2				
Surirella angusta	5			3				10		4		2			2					7	2		4	8		3	2
Surirella brebissonii										2	4								9								
Surirella brebissonii var. kuetzingii	10		1	14	15	2	3			27	32	4	6		6		5		23	9		10	13	1	2	2	
Surirella brebissonii var. punctata																	2										
Surirella linearis																							2				

Taxon	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Surirella minuta					6		4												4	3			2				
Surirella sp.			4	2																			4				1
Surirella terricola				2																1							
Synedra acus		6		1	8		9						1									4	2				
Synedra acus var. angustissima									5																		
Synedra parasitica																2											
Synedra rumpens								2											2				6				
Synedra ulna	3	18		1	31		25	10	9		1		24	3		82	1	4		2	2	44	82		4		18
Synedra ulna var acus							2	3		2												2					
Synedra/ Ulnaria capitata													2														
Tabularia tabulata													2														2
Thalassiosira sp.																			64								
Thalassiosira weissfloggii																					2						
Tryblionella angustatula																	3			2							
Tryblionella apiculata																	2			9						3	
Tryblionella debilis						3				4									2	15			2			9	
Tryblionella hungarica	5	1								7	3			1						16		14		6	1	9	2
Trybloneilla debilis				27			6																				
Ulnaria grunowii					14																						
Total taxa	72	59	59	82	82	61	71	68	81	64	45	65	87	41	61	82	42	53	37	88	74	87	95	52	52	56	77

Annex F White-clawed crayfish survey data

F.1 Desk based scoping

Table F-1 White-clawed crayfish survey sites scoped into the assessment

Survey ID	Watercourse Name	NGR	Justification
WCC_01	Ditch (Bow Lake)	SU 48816 20979	Reference
WCC_02	Bow Lake	SU 48667 20722	Reference
WCC_03	Moors Stream	SU 55797 16720	Reference
WCC_04	Moors Stream	SU 55880 16458	Reference
WCC_05	Trib of River Hamble	SU 54165 17130	Reference
WCC_06	River Hamble (Upper)	SU 54061 15904	Reference
WCC_07	Trib of River Hamble	SU 55894 14414	Reference
WCC_08	River Meon	SU 56022 10173	Reference
WCC_09	River Meon	SU 58902 14103	Reference
WCC_10	Trib of River Meon	SU 60142 13809	Reference
WCC_11	Trib of Wallington River	SU 62175 12095	Reference
WCC_12	Potwell Tributary	SU 66639 09720	Reference
WCC_13	Riders Lane	SU 71392 09063	Reference
WCC_14	River Itchen and Navigation	SU 47193 24510	Reference
WCC_15	Ditch (River Itchen)	SU 47417 21659	Reference
WCC_16	River Itchen and Navigation	SU 47241 24530	Reference
WCC_17	River Itchen and Navigation	SU 47592 24426	Reference
WCC_18	River Itchen and Navigation	SU 47657 24361	Reference

F.2 Field survey site descriptions

Table F-2 Field survey site descriptions

Site	Description
WCC_01	Small stream bordered by industrial buildings on the right bank and closed down pub on the left bank with the stream running through a thin strip of woodland/scrub. Recent reports indicated the stream was dry, however, overnight rain had caused some ponding. The site was not suitable for many search techniques available. The eDNA sample was collected from the downstream extent. Potential sources of pollution were present within the watercourse.
WCC_02	Small stream bordered by grazed grassland with a thin riparian strip. No discernible flow was observed. The water present was likely filled by overnight rain. The upstream extent was suitable for a manual search, although the rest of the stretch was not. A three spined stickleback (*Gasterosteus aculeatus*) individual was caught in the net whilst surveying.
WCC_03	Unsuitable habitat for survey
WCC_04	Small channel with almost no flow, likely to have been dry before recent rain. Firm substrate with 30mm silt cover. The channel was choked by emergent vegetation and Himalayan balsam (*Impatiens glandulifera*). No suitable refuges for manual search, a hand net search was conducted. An eDNA sample was also taken here, although only one sample was taken to form the bulk of the sample. No offline parts of the watercourse were detected.
WCC_05	Unsuitable habitat for survey
WCC_06	Meandering section of the River Hamble with natural pool/riffle sections. The bordering land uses on both banks were woodland and grassland, set aside for conservation. The substrate within the survey stretch consisted of mainly gravel, with areas of silt deposition.
WCC_07	Unable to survey / dry
WCC_08	Treelined section of the River Meon with natural pool/riffle sequence. The survey stretch was abundant with Himalayan balsam. There was good crayfish habitat throughout, particularly the roots of alder trees. The bulk of the eDNA sample was collected from three locations: the side of the managed water, the riffle section and the pool section.
WCC_09	Unable to survey / no access to watercourse
WCC_10	Trees lined the meandering stretch of river surveyed, with grazing in most places, encroaching onto the river. The river channel would benefit from moving fences back and increasing the buffer zone. The water was too turbid to see the substrate and the habitat was a sequence of pools and riffles.

Site	Description
	Overall, it was a redundant structure, possibly with a bridge at the U/S end of the survey reach. Due to the recent rain, it was too turbid to conduct a manual search. For the eDNA sample, only one sample was taken due to the homogeneity of the river.
WCC_11	This site was like the upstream site although, it was impounded by an EA gauging weir at the downstream extent. On the left bank horses were present grazing, on the right bank a mixture of arable farming and rough grazing was present. The water was turbid with a riffle habitat. Large amounts of woody debris were also located within the channel.
WCC_12	Small gravel-bed stream within a dense woodland habitat. A small amount of surface flow present caused localised ponds 1-2cm deep. The site was not suitable for manual search techniques. An eDNA sample was collected, although only from one area that was deep enough. If the flow were to increase however, searchable habitats would exist. Multiple channels with small culverts were present. Heavy rain occurred the week before surveying, suggesting the channel could have been dry prior to survey
WCC_13	Unable to survey / dry
WCC_14	Itchen Navigation channel running through residential grounds, with a number of small weirs throughout the reach. The substrate present was mainly gravel with some larger cobbles. Large sluice gate and very deep pool at the bottom of the reach. Much of the bank was also reinforced. Mostly deep-water glide habitat.
WCC_15	Unsuitable for manual search technique. Small tributary running through a residential area into a field. Horses present in field. Stream mostly vegetated with trees and shrubs along the extent. Shallow slow running water with large amounts of filamentous algae.
WCC_16	Main channel of the River Itchen running through residential grounds, with a number of small weirs throughout the reach, with mostly riffle and shallow glide habitat. The substrate present was mainly gravel with some larger cobbles. Much of the bank was also reinforced. For the eDNA sample, three samples were taken and mixed together from the downstream bridge, downstream weir and upstream weir.
WCC_17	A carrier stream running through residential property. A mown lawn consisted of the right bank, and woodland on the left bank. The banks were also partially reinforced using logs. Small weir at the downstream extent. Signal crayfish remains were found. Additional refuges were checked at the upstream extent.
WCC_18	Unsuitable habitat for survey

F.3 White-clawed crayfish field survey data

Table F-3 White-clawed crayfish field survey results

Site	Date	Reach Length (m)	Water Temp (^{0}C)	pH	Wetted Width (m)	Total search time (mins)	Total search area (m^2)	Refuge Types Present/Searched (Bold: Primary Refuge)	Crayfish (Present /Absent)	Total No. WCC Crayfish	Habitat (None/Present/Frequent/ Abundant)	Bullhead (Present/ Absent)
WCC_01	14/9/22	N/A	17	7.64	0.75	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WCC_02	14/9/22	20	15.4	7.6	1-2	45	35	Cobble (6.5-15cm) Cobble (15-25.6cm) Woody debris Tree roots (large) Vertical or undercut bank Shading above	Absent	0	Present	Absent
WCC_03	Unsuitable habitat for survey											
WCC_04	13/9/22	23	15	7.92	0.5	25	26.5	Tree roots (fine) Emergent macrophytes Vertical or undercut bank Shading above	Absent	0	None	Absent
WCC_05	Unsuitable habitat for survey											
WCC_06	14/9/22	76	16	7.96	4-7	62	420	Cobble (6.5-15cm) Rubble (brick) Woody debris Tree roots (fine) Tree roots (large) Vertical or undercut bank Shading above	Absent	0	Frequent	Present
WCC_07	Unable to survey / dry											
WCC_08	14/9/22	75	16.4	8.05	7	45	460	Cobble (6.5-15cm) Cobble (15-25.6cm) Other urban debris Tree roots (fine) Moss Tree roots (large) Vertical or undercut bank Shading above	Absent	0	Present	Absent
WCC_09	Unable to survey / no access to watercourse											
WCC_10	15/9/22	N/A	16.4	8.05	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WCC_11	15/9/22	N/A	16.4	7.98	5	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WCC_12	15/9/22	N/A	15	7.77	0.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WCC_13	Unable to survey / dry											
WCC_14	13/9/22	125	15.1	8.31	10	N/A	860	Cobble (6.5-15cm) Cobble (15-25.6cm)	Present	0	Present	Absent

Site	Date	Reach Length (m)	Water Temp (^{0}C)	pH	Wetted Width (m)	Total search time (mins)	Total search area (m^2)	Refuge Types Present/Searched (Bold: Primary Refuge)	Crayfish (Present /Absent)	Total No. WCC Crayfish	Habitat (None/Present/Frequent/ Abundant)	Bullhead (Present/ Absent)
								Other submerged vegetation Emergent macrophytes				
WCC_15	13/9/22	N/A	16	8.12	0.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
WCC_16	13/9/22	N/A	14.6	8.08	10	N/A	N/A	Cobble (6.5-15cm) Cobble (15-25.6cm) Rubble (15-30cm) Filamentous algae Other submerged vegetation Cobble/boulder Shading above	N/A	N/A	N/A	N/A
WCC_17	13/9/22	27	14.7	8.09	6	30	202	Cobble (6.5-15cm) Cobble (15-25.6cm) Rubble (10-25cm) Tree Roots (fine) Filamentous algae Other submerged vegetation Emergent macrophytes Tree roots (large) Shading above	Absent	0	Present	Present
WCC_18	Unsuitable habitat for survey											

F.4 eDNA survey results

Table F-4 eDNA survey results

RSK ID	Watercourse	NGR	WCC Presence
WCC_01	Ditch (Bow Lake)	SU 48816 20979	Absent
WCC_02	Bow Lake	SU 48667 20722	Absent
WCC_03	Ditch (River Hamble)	SU 53630 17866	-
WCC_04	Otterbourne Stream	SU 46424 23040	Absent
WCC_05	Trib of River Hamble	SU 54165 17130	-
WCC_06	River Hamble (Upper)	SU 54061 15904	Absent
WCC_07	Trib of River Hamble	SU 55894 14414	-
WCC_08	River Meon	SU 56542 10634	Absent
WCC_09	River Meon	SU 55807 09956	Absent
WCC_10	Wallington River	SU 58853 08751	Absent
WCC_11	Wallington River	SU 58757 07474	Absent
WCC_12	Bidbury Mead Stream	SU 70253 06231	Absent

RSK ID	Watercourse	NGR	WCC Presence
WCC_13	Riders Lane	SU 71392 09063	-
WCC_14	River Itchen and Navigation	SU 46877 22713	Absent
WCC_15	Ditch (River Itchen)	SU 47417 21659	Absent
WCC_16	River Itchen and Navigation	SU 46998 22473	Absent
WCC_17	Kingfisher Stream	SU 46981 22484	Absent
WCC_18	Rosemary Leet	SU 46881 22580	-

Annex G Macroinvertebrate survey data

G.1 Macroinvertebrate species data 2022-2023

Table G-1 Macroinvertebrate species list

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Acroloxus lacustris											28																
Adicella reducta						1																					
Agapetus	3	6		5		1	8								251	48											29
Agapetus delicatulus			22												22	1		14		4							18
Agapetus fuscipes			9		27	4						2		5		3				60							
Amphinemura sulcicollis			11	1																							
Anabolia nervosa																1						1					
Anacaena lutescens				1																							
Ancylus fluviatilis	37			6		1	6				5		1														2
Anisus vortex	21	2	1	1					9				1					3									1
Antocha																5											
Antocha vitripennis																1											
Asellus aquaticus	9	1	12	5	7	82	37	15	48	28	65	2	9		1	1	6	4		46	17	12	7	34		25	3
Asellus meridianus																			1								
Athripsodes albifrons					1																						
Athripsodes aterrimus			3									1															
Athripsodes bilineatus					2																						
Athripsodes cinereus	4			1		1					4					1											
Baetis	5			1		3					1					30					5						3
Baetis fuscatus / scambus							3								4												
Baetis muticus																2		1									
Baetis rhodani	3											7						3			2						
Baetis rhodani / atlanticus	11	9		23		5	1			8	13	11	5	2	1	3		18									6
Baetis scambus / fuscatus																											3
Bathyomphalus contortus	31			1		21					40		2								1						

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Beraeodes minutus		1																									
Bithynia tentaculata	54	6		1	2									2													
Brachycentrus subnubilis	9	1														5											
Caenis luctuosa	4																										
Caenis rivulorum	4	5														6											
Calopteryx	1																										
Calopteryx splendens		2														3											1
Ceratopogonidae	4									1	1	2						1	1	2	3	2	9		1	5	2
Chaetopteryx villosa	1		1	1									5			2				2							3
Cheumatopsyche lepida																3		1									
Chironominae			1		1			3				1						3	1				1	18			2
Chironomus										15														11			
Cordulegaster boltonii													2	1					1						1		
Crangonyx pseudogracilis						5		23																9			
Cylindritoma distinctissinna					4																						
Dendrocoelum lacteum											1																
Dicranota			4													1		1									
Dixa															1										1		
Dolichopeza																									1		
Dolichopeza albipes																			1								
Drusus annulatus															70												
Dytiscidae	1			1												1							1			1	
Elmis aenea	42	16	5	40	2	20	24			1	2			5		28		21		84		1					5
Eloeophila										1					1												1
Ephemera danica	61	75		8	3									1		50		3									2
Epoicocladius flavens					13																						
Erpobdella octoculata	10		1	2	14	12	93	1		1	33	6	6				4		8	5	1	3	1	2	2	3	3
Gammarus					19							15	20						9								
Gammarus pulex	34	83	2449	51	18	74	53		2	130	78	164	23	1077	2340	115	791	57	223	581	441	104	76	17	390	5	262

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Glossiphonia complanata	20	4	2	1	2	4	16		7	1	29	9	1	2	2	4				4	1	1	1		13	2	2
Glossiphonia heteroclita					1				2							1					3						
Glyphotaelius pellucidus				5																1							
Grammotaulius nigropunctatus				1												1			1								1
Gyraulus albus	1	2		1												1											
Gyraulus crista							1																				
Habrophlebia fusca				6																							
Haemopis sanguisuga													1														
Halesus radiatus		4				1							1			3		1									1
Haliplus		1		2												2											
Haplotaxis gordioides			5																								
Helobdella stagnalis	4	2			1		17		16	1	3	10		3						12	2		7	1		3	
Hemerodromia	1	1					1													1							1
Heptagenia sulphurea		3														6											
Hydracarina		2	1													3				2							
Hydropsyche angustipennis													1					1									
Hydropsyche pellucidula	2	3		15			3							1		9		8									3
Hydropsyche siltalai	1	1		10	6	17	39						1			7		6		1							33
Hydroptila																19		4									
Isoperla grammatica		1		8												3		1									
Ithytrichia lamellaris		6														10		1									
Lepidostoma hirtum	5						1									1		1							1		1
Leuctra geniculata	1	7																									
Limnephilidae											1									1							
Limnephilus	1	11									2					1					5			1			
Limnephilus lunatus		9	13		3	13		1	11	8			10				2					17			11	8	25
Limnephilus rhombicus		7											1														
Limnius volckmari	3	7		67	9	34	23			1			2	7		31		40		5							33
Limnophora							1																				

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Lumbriculidae										1																	
Lymnaea palustris			1																								
Lymnaea stagnalis	1																										
Lype reducta					1	1								2													1
Melampophylax mucoreus		7																									
Mystacides azurea	4			1							16	1				1											
Nemoura avicularis																			1						1		
Nemoura erratica				1																							
Niphargus fontanus																			1								
Noterus	1				2																			1			
Odontocerum albicorne																6		5									
Oligochaeta		5	15	25	5	4		1	39	14	52	23	1	5	4	17	4	3	2	3	17	16	9	21	1	19	5
Orectochilus villosus	6			3			1							1		1											
Oreodytes sanmarkii							2																				
Orthocladiinae	12	11	11	6	2	1	12		21	1	1	3	3			3			14	2	13	8	7	4	2		6
Ostacoda		1																									
Ostracod																							3				
Oulimnius tuberculatus	5		1			7	1				3			1													
Oxycera leonina																									1		
Oxycera nigricornis																					1						
Paraleptophlebia submarginata	2																										
Pedicia rivosa															3												1
Physa fontinalis		1			1		1				3												7	11			
Pilaria			2							1					1	2			1					1	6		8
Piscicola geometra			2																								
Pisidium						2			1	5	16	1	3						3						1		
Pisidium casertanum																					6	2	6				
Pisidium milium																										1	
Planorbis											1																

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Planorbis carinatus																1											
Planorbis planorbis		1																									
Plectrocnemia conspersa																				4					1		
Plectrocnemia geniculata					1														4								1
Polycentropus flavomaculatus	2			1																							
Polycentropus irroratus						1																					
Potamophylax	1	16			1											1											
Potamophylax cingulatus		3					2						1														
Potamophylax latipennis		6														1											5
Potamopyrgus antipodarum	2	9	8	1		36	6		9	21	75	3	3		108	6				2					201		1
Prodamesia olivacea																	3										
Prodiamesa olivacea																					1				3		
Psychodidae										1							5		1		1	2					
Ptychoptera					3														13						32		26
Ptychoptera contaminata																								1			
Radix balthica	1	3									34	4		1												1	
Rhithrogena														7				7									
Rhyacophila dorsalis							9											1									
Scirtes						13				1			3						14	2	1				9		60
Sericostoma personatum	27	20	5	8	12	4	47							3		8		9									7
Serratella ignita	2	3		11			13									2		4			1						2
Sialis lutaria	2	4		1					7				5											4			
Sigara																					1					3	
Silo																		1									
Silo nigricornis	5			6			1							3		4											
Simulium				10	1						4							3									5
Simulium angustipes																			1								
Simulium latipes										1																	
Simulium ornatum group	13						3		3			1				17								5			

Taxa	42017	42048	42063	42824	43139	44280	44349	79516	79525	79720	81176	81177	82198	83160	89621	151020	R1	R10	R11	R2	R3	R4	R5	R6	R7	R8	R9
Sphaeriidae	5																										
Sphaerium				4			8		8							1											
Sphaerium corneum	13			5			2							11													
Sphaerium rivicola									32																		
Tabanidae																									1		
Tanypodinae	3	6	4	2			1	1		4	47	19	3					9	5	4	4	1	5	1	1	8	9
Tanytarsini	40	2	3	18	4	30		31	3	1	26	90	10	1	2	17	4	7		10	50	110	4	71	8	3	13
Theodoxus fluviatilis																		2									1
Tipula	1				2							1										5	1		2		
Valvata piscinalis		17							2				2														
Ylodes	1																										
Total taxa	53	46	26	43	31	28	32	8	17	23	28	22	28	21	15	53	8	33	21	23	22	15	18	16	24	14	42

G.2 Macroinvertebrate species data 2024 (temporary stream watercourse survey sites)

Table G-2 Macroinvertebrate species list

Taxa Name	CS	WCX1	WCX6	WCX10	WCX11	WCX13	WCX14	WCX16	WCX17	WCX18	WCX19	WCX6	WCX13
Agabus bipustulatus	1									1			
Agabus sturmii	1		1										
Agapetus fuscipes	1												1
Amphinemura sulcicollis	2						1				6		
Ampullaceana balthica	1											1	
Anacaena limbata	1									3			
Asellus aquaticus	1	79	3				5	103	136	64	6	23	2
Athous haemorrhoidalis	N/A	1											
Baetis sp.	N/A					3							
Chironomidae	N/A	32	3	4		1	73	1	1	1			
Chironomini	N/A											5	3
Cladocera	N/A											10	
Cloeon dipterum	1											3	
Coenagrion puella	2								1				
Cordulegaster boltonii	4				1								
Corixidae	N/A											30	

Taxa Name	CS	WCX1	WCX6	WCX10	WCX11	WCX13	WCX14	WCX16	WCX17	WCX18	WCX19	WCX6	WCX13
Crangonyx pseudogracilis / floridanus agg.	N/A											11	
Dicranota sp.	N/A												1
Drusus annulatus	1			4									
Dytiscidae	N/A											12	
Elmis aenea	1												12
Elodes sp.	N/A												24
Ephemera danica	1									1			
Empididae	N/A											3	1
Erpobdella testacea	4				3			4		1			
Galba truncatula	3											1	
Gammarus pulex	1	212	4	153	87	134	108		64	43	25	1	500
Gammarus pulex / fossarum agg.	1											1	
Glossiphonia complanata	1			2	1	1			1	6			4
Gyrinus substriatus	1								1				
Habrophlebia fusca	2	6			62	11	1	88	5		15		
Haliplus lineatocollis	1											2	

Taxa Name	CS	WCX1	WCX6	WCX10	WCX11	WCX13	WCX14	WCX16	WCX17	WCX18	WCX19	WCX6	WCX13
Haliplus sp.	N/A											2	
Helicoidea	N/A									7			
Helobdella stagnalis	1			11									
Hydracarina	N/A											2	
Hydroporus pubescens	2						2		1	2			
Hydroporus tessellatus	2					1				13			
Hydroptila sp.	N/A											13	
Ilybius chalconatus	7	1											
Isoperla grammatica	2	1											
Leuctra nigra	4			1									
Limnephilidae	N/A											3	
Limnephilus lunatus	1											1	
Lycosidae	N/A									7			
Nemurella pictetii	2			1									
Niphargus aquilex	6							1					
Notonecta glauca	1											1	
Notonecta sp.	N/A								2				
Oligochaeta	N/A											1	17

Taxa Name	CS	WCX1	WCX6	WCX10	WCX11	WCX13	WCX14	WCX16	WCX17	WCX18	WCX19	WCX6	WCX13
Oribatida	N/A												2
Orthocladiinae / Diamesinae	N/A											21	3
Ostracoda	N/A											18	
Oxyloma elegans	1								4	10			
Phacopteryx brevipennis	7				3			4	4	1			
Physella sp.	N/A										4		
Euglesa personata	3	1		3			4	7	2	1	5		
Plea minutissima	4											4	
Plectrocnemia conspersa	2			6	4	7							2
Polycelis nigra / tenuis	1											3	
Potamopyrgus antipodarum	N/A			1									
Scirtidae	N/A			9	4	1			1				
Sialis lutaria	1											1	
Sigara dorsalis	1											13	
Simuliidae	N/A					3							
Tanypodinae	N/A											12	

Taxa Name	CS	WCX1	WCX6	WCX10	WCX11	WCX13	WCX14	WCX16	WCX17	WCX18	WCX19	WCX6	WCX13
Tanytarsini	N/A											21	27
Theromyzon tessulatum	2											1	
Tipulidae	N/A	2	1					3				1	
Tricladida	N/A											1	
Tytthaspis sedecimpunctata	N/A							3		2			
Valvata cristata	2											64	
Valvata piscinalis	1											1	
Velia caprai	2			9	2	1					2		


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