

River Parrett Oath to Burrowbridge Dredging

Environmental Impact Assessment Screening and Scoping Report

Report Status: Final

Job Number: J00256

Client: Parrett Internal Drainage Board

Date: April 2019

DOCUMENT CONTROL

Report prepared for:

Client Name: Parrett Drainage Board Consortium

Main contributors:

Matt Johns BSc MSc CEnv FGS MCIEEM MIFM (Johns Associates, Director and Head of Environment & Planning)

Andy Wallace BEng MRes CEng MCIWEM (AW Water Engineering)

Reviewed & Issued by:

Liz Johns BSc MSc CEnv MCIEEM MRSB

Johns Associates Limited, The Old Brewery, Newtown, Bradford-on-Avon, BA15 1NF

T: 01225 723652 | E: info@johnsassociates.co.uk | W: www.johnsassociates.co.uk

DOCUMENT REVISIONS

Version	Details	Date
V1	Initial draft produced for client copy	July 2018
V2	Updated draft incorporating baseline data, stakeholder meeting feedback and design iteration, for client review and approval.	March 2019
V3	Final draft for approval	10 th April 2019
V4	Final version issued	15 th April 2019

Third party disclaimer

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Johns Associates at the instruction of, and for use by, our client named on the front of the report. It does not in any way constitute advice to any third party who is able to access it by any means. Johns Associates excludes to the fullest extent lawfully permitted all liability whatsoever for any loss or damage howsoever arising from reliance on the contents of this report. We do not however exclude our liability (if any) for personal injury or death resulting from our negligence, for fraud or any other matter in relation to which we cannot legally exclude liability.

TABLE OF CONTENTS

1	INTRODUCTION	7
1.1	Background.....	7
1.2	Purpose of this report	8
1.3	Study area context	10
1.4	Proposed works	13
1.5	Consenting regime	14
1.5.1	Planning Acts	14
1.5.2	Environmental Impact Assessment.....	15
1.5.3	Environmental Permits.....	15
1.5.4	SSSI Assent	16
1.5.5	Habitats Regulations.....	16
1.5.6	Water Framework Directive	16
2	METHODOLOGY	17
2.1	Approach to defining the baseline	17
2.2	Approach to determining likely significant effects.....	18
2.3	Cumulative impact assessment.....	18
2.4	Consultation.....	19
3	SUMMARY ENVIRONMENTAL BASELINE	21
3.1	Population and human health	21
3.1.1	Recreation.....	21
3.1.2	Tourism.....	22
3.2	Traffic and transport.....	22
3.3	Geology and soils	23
3.4	Sediment quality	23
3.5	Water Environment	24
3.5.3	Catchment.....	24
3.5.4	Hydrogeology.....	24
3.5.5	Water Framework Directive	25
3.5.6	Flood Management.....	25
3.6	Landscape and Visual.....	26
3.6.7	National Character Area	26
3.6.8	Local landscape character assessment.....	26
3.7	Ecology	27
3.7.9	International statutorily designated sites.....	27
3.7.10	National statutorily designated sites.....	29
3.7.11	Locally-designated sites	30
3.7.12	Habitats of principal importance (NERC Act, Section 41)	31
3.7.13	On-site habitats.....	31
3.7.14	Species.....	32
3.8	Historic Environment.....	34
4	SCREENING	35
4.1	Characteristics of improvement works	35
4.2	Location of improvement works.....	35
4.3	Types and characteristics of the potential impact	35

4.4	Screening determination.....	35
5	SCOPING	37
5.1	Environmental factors	37
5.2	Scoping process.....	37
5.3	Scoping of POTENTIAL environmental effects associated with dredging of the River Parrett.....	39
6	ES CONTENTS	55

1 INTRODUCTION

1.1 BACKGROUND

1 This report has been prepared to support a separate request for a Screening Opinion and a Scoping Opinion from the Parrett Internal Drainage Board (PIDB), in accordance with the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 1999.

2 During the winter of 2013/14 the Somerset Levels and Moors experienced a severe and prolonged flood. There have also been recent notable floods in spring/summer 2012 and winter 2012/13. As part of the response to these floods the Somerset Rivers Authority (SRA) was formed. The SRA's purpose is to deliver higher standards of flood protection than would be funded nationally, and to create better flood protection and resilience against further flooding by joint planning and delivery from SRA members. The SRA produced a Flood Action Plan (FAP) covering the next 20 years, of which Workstream 1 includes dredging and river management.

3 The SRA, or partner organisations, have delivered a number of schemes within the wider Parrett catchment that have successfully reduced the risk of flooding. These include improvements to pumping and localised flood defence improvements. These works have ensured that if a flood of a similar magnitude to 2013/14 were to occur again then the degree of flooding would be much reduced from that experienced during that event. However, significant flooding would still occur in some locations. In addition, all smaller events would reduce in frequency, duration and extent.

4 In 2014, the Environment Agency carried out dredging along 8km of the River Parrett and River Tone to increase the conveyance capacity of the river following the 2013/2014 winter flooding to reduce the likelihood and severity of future flooding to surrounding communities. The SRA carries out the ongoing maintenance dredging of the 2014 river profiles and also identifies further dredging locations for improved flow conveyance and flood management under Workstream 1. Hydraulic studies carried out by CH2M, HR Wallingford and AW Water Engineering investigated and proposed additional dredging locations and compared these locations in terms of flood risk conveyance benefits, constraints and costs. The River Parrett between Northmoor Pumping Station and the M5 and the River Parrett from Oath Lock downstream to its confluence with the River Tone were identified and assessed as the next most beneficial dredging locations. The M5 dredging location was assessed and various constraints were identified. The Oath to Burrowbridge location has been assessed and a viable dredging proposal developed.

5 Focused assessment of the Oath to Burrowbridge site and dredging proposal has demonstrated that the maximum flood risk benefits can be achieved with the minimum environmental impact by reducing the extent of river dredged and focusing operations on the downstream reach. Consequently, the proposed dredge includes the banks immediately downstream of Stathe Bridge (downstream of Beazleys spillway) to the confluence with the River Tone at Burrowbridge (approximately 2.2km and half the length of the original proposal). The EIA baseline assessment includes the entire site from Oath Lock to Burrowbridge.

6 As a member of the SRA, the Parrett Internal Drainage Board (PIDB) is proposing to undertake the dredging operations in the last part of 2019. The project aims to increase the conveyance of the channel within the dredged reach by 3-4 cumecs at low tide. The project will therefore contribute to:

- relieving existing flood extents, durations and frequencies on several upstream moors including those on the River Sowey and Kings Sedgemoor Drain;

- reducing the duration of flooding to the surrounding road network; and
- reducing the flooding impacts on the wider community and businesses.

7 In addition to these direct benefits, this scheme, (alongside the other improvement works undertaken within the FAP), will confer further benefits which are less readily quantified. By increasing the capacity of the channel this will increase the overall flexibility in the system, and allow greater opportunities for more flexible operation within the system. This can be especially important when flood events are localized more on one catchment than another, or if emergency works need to be undertaken. Also, by increasing the flow passing Burrowbridge there will be an increase in channel velocities during low tides. This will increase the natural erosion of sediment that happens in the downstream channel, reducing the need for maintenance dredging.

8 The proposed dredging will be within the extents shown in Figure 1 below.



Figure 1. Plan showing extent of dredging and proposed working area

1.2 PURPOSE OF THIS REPORT

9 The proposed works could result in likely significant environmental effects in the absence of suitable scheme design to avoid such effects or through appropriate mitigation. Consequently, the proposed works is considered to fall under the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations (SI 1999 No. 1783)

(the 'Land Drainage EIA Regulations'), which have been subject to significant revisions in 2005¹ and in 2017². The 1999 Regulations, and subsequent amendments, are referred to as the 'Land Drainage EIA Regulations' within this report.

10 Environmental Impact Assessment (EIA) is process that ensures that the environmental effects of a proposed development are fully considered and taken into account, before it proceeds. The EIA process is impartial and systematic and it draws on a detailed understanding of current environmental conditions (the baseline), information gathered during consultation, and from a detailed understanding of potential effects from the development. This knowledge allows effects to be 'designed' out (e.g. avoiding dredging adjacent to residential properties) and where this is not possible, allow suitable mitigation (e.g. providing alternative habitats for animals or improving water level management) to be identified and included in the development proposal. Once these have been agreed and the final design has been 'frozen' an assessment of likely effects is carried out. This focuses on those effects that are considered to be significant. The findings of an EIA are reported in a document called an Environmental Statement (ES), which has to meet certain legal standards, which broadly set the main headings, topics that need to be considered, organisations that need to be consulted, stages of the project, timescales and types of effects and mitigation that need to be taken into account.

11 Under the Land Drainage EIA Regulations, the Drainage Body (in this case, PIDB) is required, taking into consideration the selection criteria in Schedule 2, to determine whether the proposed works are likely to have significant effects on the environment (Reg. 4); and therefore, whether formal Environmental Impact Assessment is required for this project. The process of determining whether proposed works require Environmental Impact Assessment (EIA) or not is known as 'screening'.

12 This report has been prepared to inform the EIA screening decision i.e. it considers and assesses whether the proposed works are likely to have significant effects on the environment in the absence of appropriate detailed design work to avoid such effects and/or the integration of appropriate mitigation.

13 **This report therefore supports the advice to the PIDB that their Screening Opinion should be that an EIA is required.**

14 This report goes on to describe those environmental effects which are likely to be significant and that should be taken forward for further detailed assessment within the EIA including consideration of changes in the design and embedded/integrated environmental measures that will be adopted to minimise any residual effects. This process is known as 'scoping'.

15 The key aim of the scoping process as reported within this document, is to identify the likely significant effects of the proposed works, describing those that need to be considered in depth as part of the EIA. By following the full EIA process, PIDB will ensure that any potentially significant effects on the environment resulting from proposed pioneering dredging of the River Parrett are considered, and where appropriate, mitigated. By default, the scoping process also identifies those effects which are not likely to be significant and can therefore be eliminated (or 'scoped out') from the EIA.

16 This document is intended as an informal Scoping Report that meets the requirements of the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations (SI 1999 No. 1783). It therefore has been

1 The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2005 (SI 2005 No 1399)

2 The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2017 (SI 2017 No 585).

produced to support advice to the PIDB for its Scoping Opinion on the content of the EIA. The PIDB may wish to engage with other statutory consultees to inform its Scoping Opinion (e.g. Natural England and the Environment Agency).

17 It will also be used as best practice dictates, by the project team to assist with proper targeting of the EIA and ES, supported by the Screening Opinion from the PIDB. It is also intended that this information will help to engage stakeholders during consultation, which in turn will feed into the developed scope of assessment and the remainder of the EIA process.

18 However, it should be noted that the PIDB has indicated that it does not intend to make a formal request under Regulation 8 to the Appropriate Authority (the Secretary of State) for its formal opinion as to the information that should be included within an ES.

1.3 STUDY AREA CONTEXT

19 The Study Area for the EIA will include the maximum potential extent of dredged river, locations where dredged material will be placed, access routes, compounds and the areas which could have resultant changes in water levels. The general Study Area is shown in Figure 2 and covers:

- The River Parrett between Oath Lock and its confluence with the River Tone, immediately to the south of Burrowbridge;
- 1km radius around this stretch of the river;
- For receptors where there are additional potential environmental pathways comprising changes to water levels within different moors (e.g. a potential change in splash conditions required by wintering water birds or flood depth and/or duration), the Study Area has been expanded.

20 The Study Area is predominantly rural in nature with a mixture of mainly livestock grazing with some arable land, populated with small villages, hamlets and farms. The River Sowey flood relief channel runs parallel to the River Parrett in the southern extent of the proposed dredging works. The A361 crosses the Parrett to the north of the proposed dredging works at Burrowbridge. A main railway line runs adjacent to the River Parrett immediately to the south of the proposed dredging works. The River Parrett Trail and Macmillan Way long-distance footpaths run along the right-hand bank of the River Parrett throughout the extent of the proposed dredging works.

21 The Study Area encompasses land of international importance for wildlife, designated as part of the Somerset Levels and Moors Special Protection Area and Ramsar Site (including component Sites of Special Scientific Interest Southlake Moor and West Sedge Moor, which lie immediately adjacent to the proposed dredging works). In addition, the non-statutorily-designated local wildlife site Aller Moor Site of Nature Conservation Importance (ryne and wet meadow site with an important wintering bird population) lies adjacent to the right-hand bank in the southern stretch of river to be dredged.

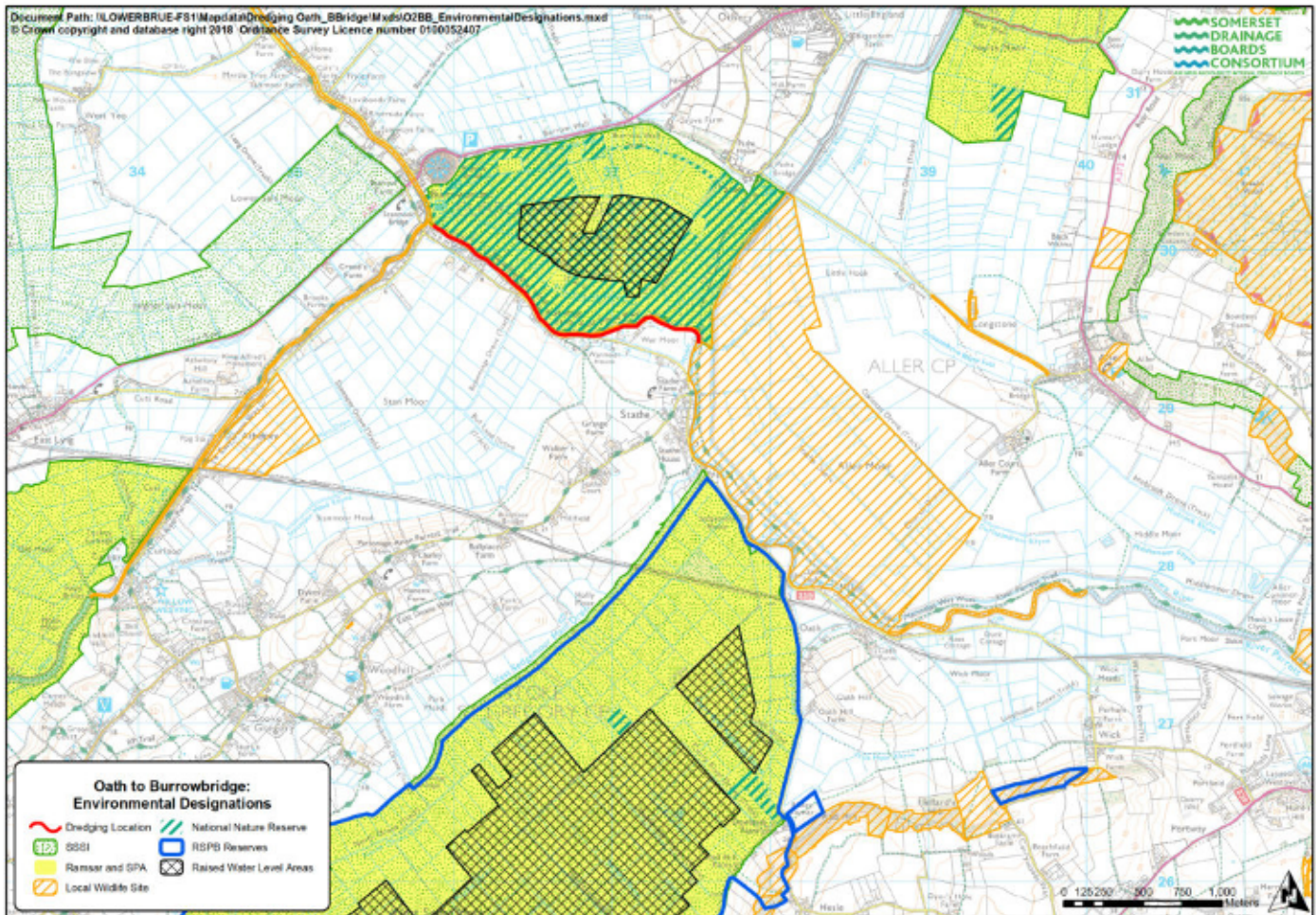


Figure 2. Plan showing extent of dredging, surrounding 1km study area, and key environmental designations

Other recent flood alleviation projects

22 A number of works aimed at alleviating flooding have recently been completed in the immediate area (since 2014) delivering considerable benefits to residents, landowners and tenants and to infrastructure through the overall flood risk reduction achieved. The past projects completed along the Parrett and Tone since the flooding of 2013/2014 include those listed below. The extent of dredging works on the Parrett and Tone since 2014 is shown in Figure 3 below.

- Completion of the dredging of the 8km reach between Hook Bridge on the River Tone and Northmoor Pumping Station on the River Parrett by the Environment Agency.
- Dredging of the 750m reach of the River Parrett downstream of Northmoor Pumping Station by the Environment Agency.
- SRA maintenance dredging of the EA profiles in 2015 using excavators and in 2016 and 2017 using hydro-dynamic dredging techniques (water injection dredging or WID);
- The Asset Recovery Programme (ARP) improvement works to the flood banks.
- Improvement works to several pump stations, including the works associated with bringing in temporary pumps.

- The revised operating rules for the pumping stations following the 'Trigger point' project.
- Works at Beer Wall (A372) to increase the capacity of the culverts under the road.
- Changes to the operation of the River Sowey and Kings Sedgemoor Drain during flood events.

23 The EA are currently delivering improvements to the River Sowey and Kings Sedgemoor Drain on behalf of the SRA. This project is being delivered in phases with the aim to increase the amount of flow that can be conveyed through this system from the River Parrett prior to the formal spillways (Aller Moor and Beazleys) being overtopped. Upstream of Langport this project will deliver similar impacts to the dredging being considered by this report.

24 Awareness of the SRA Flood Action Plan and ongoing programme for flood alleviation since 2014 is an important part of the cumulative impacts assessment within the EIA process and cover both past and present cumulative impacts.

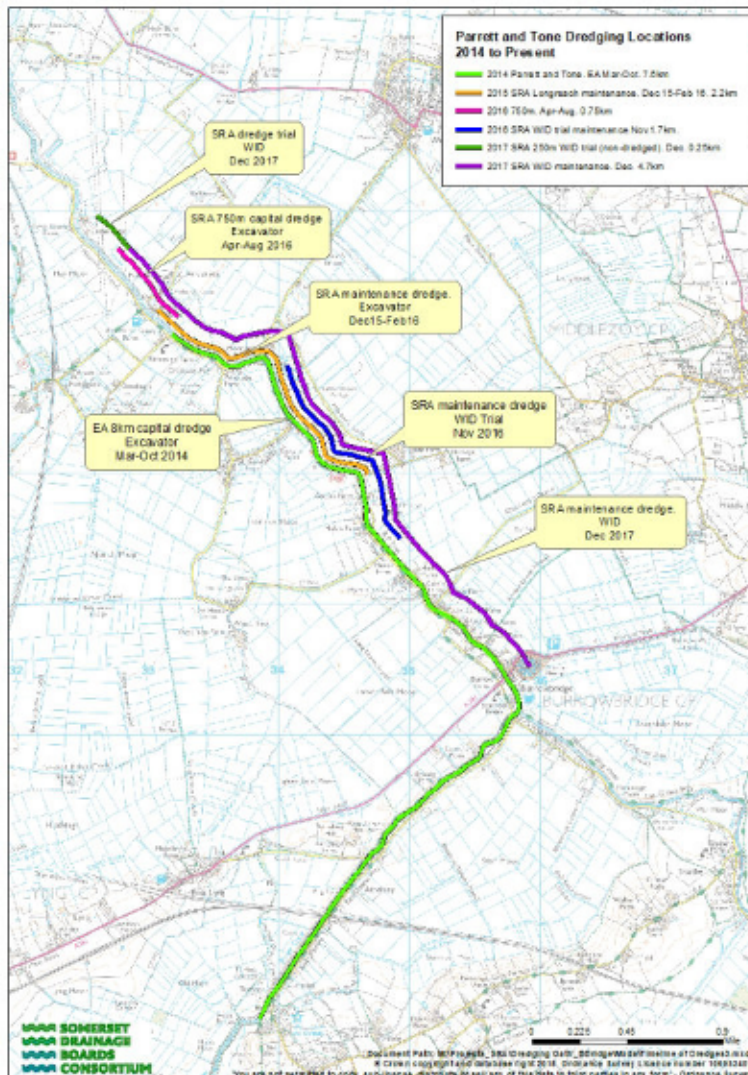


Figure 3. Extent of dredging works on the Rivers Parrett and Tone 2014 – present day

1.4 PROPOSED WORKS

25 The site under consideration comprises approximately 2.2km of the banks of the River Parrett between Beazley's spillway and its confluence with the River Tone (see Figure 1). This represents a shortened section of the overall Site from Oath Lock to Burrowbridge and is based on the outcome of environmental surveys, environmental, engineering and safety assessments, and the detailed hydraulic modelling indicating the areas with the maximum potential for improvement to flood conveyance. No dredging is proposed between Oath Lock and Beazleys spillway within this programme of works. Over part of the length of these works, the right bank acts as both a flood bank to contain flows within the river, and a reservoir bank to contain floodwater within Southlake Moor. The possible works to this length of bank are limited due to these functions.

26 The works will comprise excavation to increase the flow capacity in the Parrett by approximately 3-4 cumecs at low tide within the dredged reach by excavating accumulated silt back to the design gradient of the bank, to form a two-stage channel. 22,000m³ of silt will be removed in total from the banks within the 2.2km of dredging works. All arisings from the excavation are proposed to be deposited on the landward side of the right flood bank crest (facing downstream) under conditions of D1 and U1 waste exemptions. The level of the bank crest is not to be raised above existing levels. A sample cross-section showing the proposed excavation and placement of arisings is shown as Figure 3.

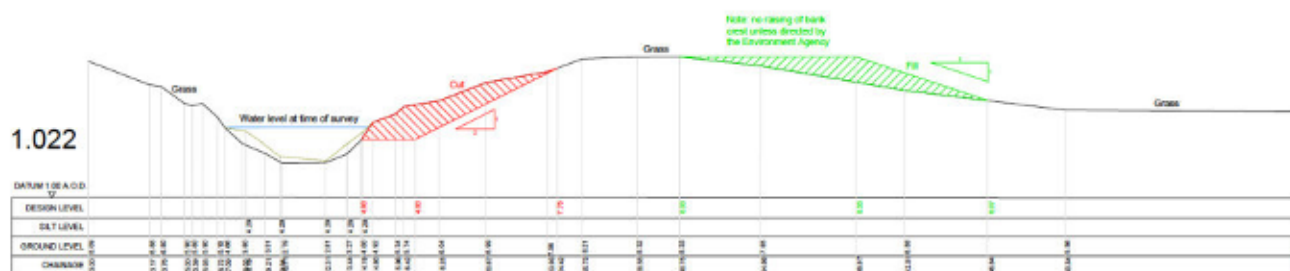


Figure 3. Sample cross section illustrating the works

27 Excavation will remove recent accumulations of silt on the upper banks only. No dredging below the lower flow channel (thalweg) is proposed. A 'reedy fringe' of 1-2m width of marginal vegetation (typically dominated by reed canary grass *Phalaris arundinacea*) will be left along all of the left-hand bank and up to 1000m of the right-hand bank to ensure critical habitat for aquatic fauna is retained at all times. Strip and recover/replanting of reed turf and rhizomes for a further 1-2m of bankface will be provided behind the reedy fringe wherever feasible. Re-establishment of vegetation beyond this will be achieved using a suitable seedmix.

28 Bank re-profiling will be managed sensitively, in order to reduce environmental impacts, mitigate impacts on the working bank and aid ecological recovery.

29 Long-reach excavators, meeting all current environmental and operating standards and Environment Agency specifications, working from, or near, the bank crest will be used for the cut and fill earthworks. Topsoil will be stripped from the landward bank where excavated material is to be deposited to form a raised bund along the proposed toe line for fill material. Topsoil will also be stripped from the 'cut' area and added to this bund. Machines will then excavate to the design profile, swinging round to place arisings in the 'fill' location to the rear of the flood bank.

30 The fill material will be allowed to dry out as necessary before it is graded and consolidated to the design profile. The stripped topsoil will then be dressed back over the fill material. Light harrowing will then be undertaken before seeding of the fill area.

31 It should be noted that the two-stage channel excavation will create marginal berms and areas of shallow water, which have potential to substantially increase habitat diversity, particularly for fish populations. In addition, morphological diversity will be retained on the river bank wherever possible. The bank surface will not be finished to a smooth compacted surface: final roughing up with a toothed bucket will help assist vegetation become established on the bank which will then assist with bank stability.

32 Vegetation recovery behind the retained reedy fringe will comprise reseeding using local native grass dominated species. A stockproof fence and hedge will be provided at the outer toe of the regraded bank to provide additional habitat features and to support appropriate and timely access of grazing livestock to the banks. Restoration of poor quality rhynes will be implemented. The proposed hedge and rhine works will provide a greater than 2:1 compensation of where these habitats necessarily will be modified through the proposals.

33 Dredging plant will access the right banks within the Working Area via the flood embankment of the River Sowey (accessed from Stathe Bridge). It is proposed that the long reach excavators will only work from the crest of the right bank to remove sediment from both the right and left of the channel (reaching across the channel) and deposit silt on the rear downslope of the right bank.

34 A site compound will be provided adjacent to the working area and will include a welfare unit for staff, staff parking for vehicles, a storage container and fuel bowser. It is anticipated that the mobile fuel bowser will be transported to the excavators along the banks as necessary. The mobile fuel bowser will be deployed in accordance with good practice EA guidance, with necessary spillage procedures and kits in place.

35 The works will commence in August 2019, with dredging commencing in September 2019. It is anticipated that all works will be completed within ten weeks, although there is potential for the works to over-run. Further activity to finalise bank profiles, vegetation restoration/management, deliver wider ecological enhancement and commence post works monitoring will occur in 2020.

1.5 CONSENTING REGIME

1.5.1 Planning Acts

36 The proposal to dredge the watercourse is considered to be improvement works that are a development activity. All proposed works (dredging and deposition of dredged arisings) will take place on the banks of the River Parrett, defined as a main river and under the statutory authority of the Environment Agency. The works will be carried out by the PIDB using powers delegated by the Environment Agency through a Public Sector Cooperation Agreement (PSCA). As such, the works fall within the Environment Agency's permitted development rights under Class D of Part 13 (water and sewerage) of Schedule 2 to the Town and Country Planning (General Permitted Development) (England) Order 2015:

Class D – development by the Environment Agency (58)

"Development in, on or under any watercourse or land drainage works and required in connection with the improvement, maintenance or repair of that watercourse or those works."

1.5.2 Environmental Impact Assessment

37 'Improvement works', as defined under Regulation 2(1) of the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations (SI 1999 No. 1783) (as amended in 2005³ and 2017⁴) (the 'Land Drainage EIA Regulations'), are works which are:

- (i) *the subject of a project to deepen, widen, straighten, or otherwise improve or alter, any existing watercourse or remove or alter mill dams, weirs, or other obstructions to watercourses, or raise, widen, or otherwise improve or alter, any existing drainage work; and*
- (ii) permitted development by virtue of Class C or Class D of Part 13 (water and sewerage) of Schedule 2 to the Town and Country Planning (General Permitted Development) (England) Order 2015.

38 The proposal to dredge the watercourse and return it to its baseline condition, are considered to be improvement works as per the bold highlighted definition above; and are further considered to be permitted development. Therefore, the Land Drainage EIA Regulations apply to these works.

39 It is the 'Drainage Body' who is responsible for implementing the Land Drainage EIA Regulations. The 'Drainage Body' as defined by the Land Drainage EIA Regulations comprises a public authority initiating improvement works, which can include an internal drainage board. As it is PIDB initiating the works, it is therefore PIDB who are responsible for implementing the Land Drainage EIA Regulations and assessing whether any likely significant environmental effects are likely to arise due to the works. In the event that formal EIA is required (screening), it is PIDB⁵ who will decide whether the improvement works should proceed, taking into account the necessary mitigation measures (or conditions) that the works should be subject to.

40 This document has been prepared to record the initial screening and scoping stages of the EIA process (see Sections 4 and 5).

1.5.3 Environmental Permits

41 Placement of dredging arisings on the rear of the flood bank will be undertaken in accordance with the Environmental Permitting Regulations 2010 as amended). The deposition of dredging waste will be covered by a D1 exemption to deposit dredged waste from inland waters and is therefore exempt from the requirement for an Environmental Permit. Sediment sampling has been carried out and confirms the waste code of the dredged arisings and the suitability for use under a D1 exemption.

42 The D1 exemption requires that all deposition is carried out under one mechanical action and allows for up to 50,000m³ of silt deposition over every metre of inland water dredged. The D1 exemption also allows for the temporary stockpiling of material for up to 1 year should this be required (only 6 months is allowed under the permitted development rights).

3 The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2005 (SI 2005 No 1399).

4 The Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2017 (SI 2017 No 585).

5 Under Regulation 12A of the Environmental Impact Assessment (Land Drainage Improvement Works) (Amendment) Regulations 2017 (SI 2017 No 585), SBDC may only progress the determination of whether the improvement works should proceed if there is no extant objection in relation to the likely significant environmental effects of the works.

43 It is not anticipated that there will be a requirement to manage the dredging waste in more than 1 mechanical action.

44 A U1 waste exemption would also be registered, allowing the dredged waste to be used in construction (i.e. river bank structural support) and for specific spillway works.

1.5.4 SSSI Assent

45 The improvement works are partly located within the boundary of Southlake Moor Site of Special Scientific Interest (SSSI). In addition, the works have the potential to damage the condition or special features of other SSSIs, including Curry and Hay Moors SSSI and West Sedgemoor SSSI.

46 As such, these works would require advice and approval (known as assent) from Natural England before carrying out the improvement works. However, where works are carried out under statutory permission (Environment Agency powers) they do not require a formal application for SSSI assent but instead require consultation with Natural England prior to works commencing. Consultation has been started with Natural England for this purpose.

1.5.5 Habitats Regulations

47 The SSSIs referred to above are also internationally designated as part of a network of 'Natura 2000' sites: the Somerset Levels and Moors Special Protection Area (SPA) and Ramsar Site.

48 As the improvement works, in the absence of mitigation, could result in impacts to the SPA and Ramsar site, a Habitats Regulations Assessment (HRA) will be required under the Conservation of Habitats and Species Regulations (2017). It will be necessary to demonstrate that the improvement works will not adversely affect the integrity of the SPA and Ramsar site, known as Appropriate Assessment.

49 PIDB are a 'Competent Authority' under the Habitats Regulations and will therefore undertake Habitats Regulations Assessment, consulting with Natural England as required by Regulation 63. Coordination with Natural England in accordance with Regulation 67 will also be required, as Natural England are also a Competent Authority with regards to these improvement works.

50 This document has been prepared to jointly inform the proposed scope of the Stage 1 HRA.

1.5.6 Water Framework Directive

51 Public bodies, including PIDB, must, in exercising their functions so far as affecting a river basin district, have regard to the river basin management plan prepared under The Water Environment (Water Framework Directive) (England and Wales) Regulations 2003.

52 As such, PIDB will be required to undertake a Water Framework Directive (WFD) Compliance Assessment to demonstrate that the improvement works support the objectives of the South West River Basin Management Plan (RBMP).

2 METHODOLOGY

2.1 APPROACH TO DEFINING THE BASELINE

53 The assessment of potentially significant effects requires a comparison to be made between the likely environmental conditions in the presence of the proposed improvement works and in its absence (i.e. the 'baseline').

54 The '**current baseline**' represents the conditions on the ground at the time of preparation of the Environmental Statement (ES) (detailed surveys conducted in late spring/ summer 2018, which have informed the detailed design iteration including engineering and hydrological investigations and this screening/scoping report and to be updated in late spring 2019).

55 In the context of the River Parrett and River Tone, a number of recent flood alleviation measures have been implemented since the flooding of 2013/2014 and had an impact on the fluvial environment. The current environmental baseline is therefore inclusive of these recently completed projects and the considerable betterment provided, in particular, those listed below:

- 2014 Environment Agency Phase 1 and 2 8km capital dredge of the River Parrett and Tone.
- 2015 Environment Agency 750m capital dredge.
- The Asset Recovery Programme (ARP) improvement works to the flood banks.
- Improvement works to several pump stations, including the works associated with bringing in temporary pumps.
- The revised operating rules for the pumping stations following the 'Trigger point' project.
- Works at Beer Wall (A372) to increase the capacity of the culverts under the road
- Changes to the operation of the River Sowey and Kings Sedgemoor Drain during flood events.
- Ongoing SRA maintenance dredging to retain the 2014/15 dredge river cross sectional profiles.
- Other flood alleviation works completed between 2015 and 2019.

56 This allows for the potential impacts of the proposed Oath to Burrowbridge dredge to be considered in the context of the cumulative changes to the system since the floods of 2013/2014 and the ongoing flood alleviation works.

57 The **current Environmental baseline** therefore comprises the status of the River Parrett at the time of preparing this EIA investigation (2019).

58 The Land Drainage EIA Regulations (Schedule 1) also require analysis of the likely evolution of the baseline scenario without implementation of the improvement works as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

59 As such, when assessing the potential environmental effects of the proposed improvement works, account has also been taken of the 'do-nothing scenario' and the '**future baseline**'. This ensures that ongoing trends and changes to the baseline environment, as a result of both natural and manmade processes, can be factored into the assessment.

60 The **future baseline** scenario for the River Parrett and Tone environment could be reasonably considered to include the ongoing maintenance dredging operations to retain the conveyance capacity achieved on the rivers since

2014 for the remainder of the SRA 20 Year Flood Action Plan duration (15 years). The exact location and quantity of future dredging maintenance will be informed by silt monitoring, refinements in methodology and lessons learnt. The future baseline should therefore expect maintenance dredging to be continued as per present operations over the short-medium term. Some consideration should be given to a 'no maintenance' future scenario that could result from a change to policy, funding or over a longer timescale.

61 As described above, the Environmental Impact Assessment will therefore include consideration of two baseline scenarios:

- Current baseline
- Future baseline

2.2 APPROACH TO DETERMINING LIKELY SIGNIFICANT EFFECTS

62 Decisions about the likely significant effects of the proposed improvement works have been based upon professional judgement, with reference to the project description, and using information about:

- the receptors (people and environmental resources) that could be affected by the proposed improvement works;
- the activities involved in undertaking the proposed improvement works;
- changes that could result from these activities (e.g. changes in water quality or land cover as a result of the proposed improvement works);
- the expected magnitude and other characteristics of the environmental changes that could result from these activities and that could affect important receptors;
- the susceptibility of important receptors to exposure to these changes e.g. how biodiversity receptors might be affected by changes in land cover); and
- the extent to which the design of the proposed improvement works avoids or reduces any potential effects.

63 If the information available at the time at which this document has been prepared does not enable a robust conclusion to be reached that a potential effect is **not** likely to be significant, the precautionary principle is assumed i.e. it is assumed that the potential environmental effect is likely to be significant.

2.3 CUMULATIVE IMPACT ASSESSMENT

64 There is a requirement under the Land Drainage EIA Regulations to consider the cumulative effects of the proposed improvement works. This will identify whether any of the individual effects of the proposed improvement works would combine to create a cumulative effect greater than the sum of the individual effects.

65 The cumulative effects assessment process considers this in two ways:

- **Intra-project effects:** Typically, these effects occur when different activities associated with a project act upon the same environmental receptor. In determining such effects, consideration would be given to the sensitivity of the receptor and the magnitude of environmental change. Consideration is given to both the interaction of significant effects and the interaction of different impacts from project activities even if individually they are not significant.
- **Inter-project effects:** Consideration will be given to whether there is the potential for the effects of the proposed improvement works and effects of other 'major' developments to combine and result in a significant environmental effect. Only potential cumulative impacts arising from 'known' developments or

projects will be considered, i.e. only those projects that are within the public domain and for which sufficient information is available.

66 In the first instance, a list of developments or projects to be included within the cumulative impact assessment will be compiled and agreed. These projects will be screened in or out for further assessment. Following early consultation with relevant bodies, the following major developments have been proposed for inclusion within the cumulative impacts assessment:

- Ongoing agreed maintenance dredging.
- SRA Sowey Scheme (partial assessment only of hydraulic impacts).

67 The potential impacts of the proposed improvement works in-combination with following river projects on the River Parrett and Tone will be assessed via reference to the relevant baselines, as described in section 2.1 above:

2.4 CONSULTATION

68 A range of statutory and non-statutory consultees have been engaged to inform the scope of the EIA (and also the HRA and WFD assessment). A summary of the consultation undertaken to date has been provided in Table 1 below. Consultation with these and other organisations and with the public will continue iteratively throughout the EIA process.

Table 2.1. Summary of consultation

Organisation	Date	Summary of consultation undertaken
South West Historic Trust	27/3/18	Phone conversation and email from Dr Richard Brunning (Senior Historic Officer) confirming that there are no apparent impacts to the historic environment from the dredging of material from the river, the deposition of the dredged material onto the existing floodbanks or the use of heavy machinery on the floodbanks. Working compounds should be sited to avoid known archaeological sites, especially the deserted medieval hamlets on the north bank of the river.
Natural England	2/5/18	Meeting (Mark Jones, Donna Gowler, Stephen Parker) to discuss scope of HRA; HRA monitoring undertaken to-date relating to previous dredging works; best way to progress mitigation and monitoring required for European sites; projects that need to be assessed 'in-combination'. It was agreed that Stephen would undertake initial assessment of breeding bird surveys and BTO WeBS data to assess whether there is a demonstrable link between dredging and decline in habitat suitability for wintering water birds.
	May 2018	Consultation with Natural England to agree the approach to water vole survey; and potential approaches to mitigation. Included an email from Mark Jones (8/5/8) confirming possible approach to licensing; and an email from Claire Howe (17/5/15) on required extent and scope of water vole survey.
	29/6/18	Meeting (Mark Jones, Stephen Parker) for initial discussion on the outcome of the hydraulic modelling with regards to water levels on the moors during low magnitude flood events (and the potential impacts on SPA conditions/target water levels for over wintering birds). It was agreed to further process the data for further analysis during the next meeting.

Organisation	Date	Summary of consultation undertaken
	11/7/18	Meeting to further discuss potential impacts on the water levels in the moors and SPA conditions for over wintering birds. First review of water level management plans to identify options for water level mitigations.
Environment Agency	28/02/2018	Meeting (John Rowlands, John Phillips and Gemma Mahoney) to discuss initial proposals, constraints and agree necessary baseline ecological surveys and assessments.
	Jan – Mar 2018	Email and meetings between AW Engineering (PIDB hydraulic modelling consultants) and the Environment Agency modelling team discussions to agree the modelling approach, modelling scope.
	10/5/18	Discussion and email to John Philips to establish monitoring data available from previous dredging projects; and to agree survey methodology for benthic invertebrate surveys.
	May – June 2018	Ongoing emails and telephone conversations with Gemma Mahoney and John Phillips to discuss WFD assessment/mitigations and potential impacts on Hairy Click Beetle (protected species) as a result of proposed works.
	25/6/18	Meeting with John Rowlands to discuss modelling outputs and potential impacts on flood risk benefits/dis-benefits to receptors in the moors. Decision to develop a summary paper of flood risk consequences and consult further with SRA board.
	11/7/18	Meeting to discuss desired objectives of change for water level management and agree necessary mitigations.
Royal Society for the Protection of Birds (RSPB)	May 2018	Email correspondence outlining the nature of the project and intended project timelines. Request for further consultation discussions.
Somerset Wildlife Trust (SWT)	27/6/18	Meeting with Anne Halpin to detail the intended project, the surveys carried out, potential mitigations to remove impacts and ongoing EIA proposals. Agreed to send Scoping Report for comment when prepared.
British Waterways Trust	May 2018	Telephone conversations outlining the nature of the project and the EIA process for consultation.
PIDB and SRA	June 2018 – March 2019	Extensive ongoing internal discussions and meetings to further develop the project design to develop an optimum scheme with minimal significant environmental effects.
Environment Agency	June 2018 – March 2019	Extensive ongoing internal discussions and meetings to further develop the project design to develop an optimum scheme with minimal significant environmental effects.
Natural England	June 2018 – March 2019	Extensive, ongoing internal discussions and meetings to further develop the project design to develop an optimum scheme with minimal significant environmental effects.

3 SUMMARY ENVIRONMENTAL BASELINE

69 A brief description of the environmental baseline, as understood at this screening/ scoping stage has been provided below.

3.1 POPULATION AND HUMAN HEALTH

70 The immediate Study Area in the vicinity of the works (Figure 2) encompasses a number of small villages and hamlets as well as numerous farms. The hamlet of Stathe is located on the left-hand bank approximately half way along the dredged stretch. There are a number of properties (40-50) that are located adjacent to the river on the dredged stretch. The village of Burrowbridge is located at the downstream (northern) end of the works.

71 The wider area affected by changes to fluvial flooding and water levels as a result of the proposed works includes properties, businesses, infrastructure (e.g. road network) and agricultural land within or adjacent to the Parrett catchment moors upstream of the proposed works, and on the Sowey and Kings Sedgemoor Drain moors.

72 The Study Area is spatially dominated by aspects of the rural economy, such as fields of grazing livestock and arable land. Much of the land is floodplain which is grazed typically by cattle and sheep. Much of the land within the Study Area is covered by the Environmental Stewardship and Countryside Stewardship agri-environment schemes that provide funding to farmers to deliver effective environmental management. Much of the land within the Study Area is covered by Entry Level and Higher Level schemes as part of the overall Environmental Stewardship Scheme. The Environmental Stewardship scheme is now closed to new applicants, although the existing schemes below will run until the end of the agreement (10 years for most Higher Level schemes and 4 years for Entry Level). The new Countryside Stewardship (CS) scheme was introduced during late 2016; and several farms within the Study Area are now covered by Mid and Higher Tier CS schemes.

73 However, it should be noted that the most recent Census data for the area shows a spread of economic activity in which the local population are engaged. The most dominant industry in terms of numbers employed in the area, and in Somerset as a whole, is the wholesale and retail trade. Human health and social work and education are also notably high employment areas. Agriculture, forestry and fishing account for a relatively small proportion of employment (Somerset County Council Partnership Intelligence Unit, 2011)

74 The main fisheries use of the Parrett and Tone is the glass eel fishery. This operates from the 14th February to the 25th May annually. Licences are issued by the Environment Agency on an unlimited basis (i.e. there is no limit to the number issued). In 2013, 169 licences were issued, which resulted in the capture of 4,000kg of glass eels. This comprises 90% of the Environment Agency south-west region, and 40% of the total UK glass eel catch. The economic value of the fishery fluctuates annually, depending on the prevailing market price of glass eels, which is in turn a reflection of supply (i.e. natural abundance and catches). Thus, in 2013 the value was £100/kg, which, given the capture of 4,000kg would have given the fishery a value of £400,000. In May 2018, the Environment Agency reported the current legal market value of glass eels as £150/kg. However, in other years the market value has risen as high as £250-£300/kg.

3.1.1 Recreation

75 Long Distance Paths are recreational trails which can, to varying degrees, be used for a range of non-motorised travelling options (including walking, cycling and horse riding). Typically, they will be at least 31 miles

(50km) long and will take the user more than a day to walk, but many are much longer than this. The Long-Distance Paths in the Study Area (see Figure 2) are comprised of a mix of Public Rights of Way (PRoWs) and permitted paths.

76 There are three Long Distance Paths within the Study Area – these are the River Parrett Trail, East Deane Way and Macmillan Way West (as shown on Figure 2). These paths are all in close proximity to the proposed dredging locations along the River Parrett; and run along the right-hand bank of the channel for the entire dredging stretch. The Parrett Trail section immediately adjacent to the dredging works is majority permitted path (2105m). This section of path is permitted by Natural England as the landowner. A small section of path adjacent to planned dredging works (immediate downstream of Beasleys spillway and Stathe Bridge) is a PRoW footpath (approx. 50m).

3.1.2 Tourism

77 Burnham-on-Sea is a designated beach for bathing and is tested by the Environment Agency regularly under the EU Bathing Water Directive (2006/7/EC). Burnham-on-Sea is located approximately 3km downstream of the confluence of the River Parrett with the Severn Estuary. The confluence is approximately 30km from the downstream extent of the dredging area.

78 Many tourism-related businesses in Burnham-on Sea are reliant on the quality of the beach and bathing water and could suffer if the bathing water quality does not satisfy the requirements of the new Directive in 2015.

79 A water quality warning is currently in place for Burnham Jetty North and bathing is therefore not advised at this area due to poor water quality (based on monitoring results from 2014 to 2017). This bathing water is subject to short term pollution. Short term pollution is caused when heavy rainfall washes faecal material into the sea from livestock, sewage and urban drainage via rivers and streams. At this site, the risk of encountering reduced water quality increases after rainfall and typically returns to normal after 1-3 days. The Environment Agency makes daily pollution risk forecasts based on rainfall patterns and will issue a pollution risk warning if heavy rainfall occurs to enable bathers to avoid periods of increased risk. 63 warnings advising against swimming due to an increase risk of short term pollution were issued in 2017 for Burnham Jetty North bathing water (Environment Agency, n.d.).

80 The Somerset Levels are a popular destination for walkers, cyclists, ornithologists, photographers, for arts and crafts and broader tourism.

3.2 TRAFFIC AND TRANSPORT

81 The local road network incorporates one main road (the A361) which runs through Burrowbridge immediately to the north of the proposed dredging works. Through its connections with the A372 and A38, this road provides connectivity for local communities within the Study Area to nearby towns such as Taunton, Bridgwater and Glastonbury; as well as providing an important access route for emergency services. The A361 crosses the River Parrett at Burrowbridge immediately to the north of the proposed dredging works.

82 There are also a large number of interconnected secondary local roads within the Study Area. Many of the secondary roads are below 4m in width and serve to connect small communities and farms with the rest of the road network and surrounding villages. In places, the secondary roads also form part of Long Distance Paths.

83 Of these secondary local roads, Stathe Road runs alongside the left-hand bank of the River Parrett for the entire dredging stretch, before it crosses the River Tone close to its confluence with the Parrett at Burrowbridge (Stanmoor Bridge). There are no other road bridges associated with this stretch of the River Parrett.

84 Much of the local road network (including the A361) was flooded during the recent flooding events, in particular the winter flooding of 2013/14. Flood risk to this road has been significantly improved as a result of the flood risk benefits achieved by the 2014/15 capital dredges and the further SRA improvement works. However, the road remains at risk of future flooding in extreme events.

85 A major railway line runs through the Study Area east-west, connecting London to Devon and Cornwall (through Taunton). A second line runs through North Moor connecting Bristol to towns in Devon and Cornwall. This line was closed during the 2013/14 flood event, but significant improvement works have been undertaken to the line since this time to increase its resilience to flooding.

3.3 GEOLOGY AND SOILS

86 The superficial deposits underlying the area of proposed works comprises alluvium. This normally comprises soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.

87 The bedrock geology comprises the Mercia Mudstone Group, comprising dominantly red, less commonly green-grey, mudstones and subordinate siltstones with thick halite-bearing units in some basinal areas. Thin beds of gypsum/anhydrite widespread; sandstones are also present. The Mercia Mudstone Group outcrops near to the left-hand bank of the Parrett at Stathe (British Geological Society, n.d.).

88 Soil type in the Study Area comprises loamy and clayey floodplain soils with naturally high groundwater. The surrounding areas on marginally higher ground such as Stoke St Gregory are characterized by slightly acid loamy and clayey soils with impeded drainage. Outside of the Study Area, isolated areas of fen peat soils are located on some of the nearby moors such as West Sedgemoor and Kings Sedgemoor.

89 According to the provisional Agricultural Land Classification (ALC) of England & Wales, agricultural land may be graded with regards to its quality. This takes into account the limitations of the land, typical cropping range and the expected level and consistency of yield. The most productive and versatile land falls into grades 1, 2 and sub-grade 3a, and collectively comprises about one third of agricultural land in England and Wales. Land which falls into sub-grade 3b is considered moderate quality. Grade 4 and 5 land is considered poor, or very poor, producing very low yields. The provisional ALC within the Study Area (Natural England, 2010) shows that Grade 3 agricultural land is the dominant land use in the Study Area with small areas of Grade 2 (good) and Grade 4 (poor) agricultural land also being present.

3.4 SEDIMENT QUALITY

90 Extensive sampling, chemical analyses and screening of the sediment within the site of the proposed dredging has been completed in 2018 to ensure that there is no risk to human health or the environment from the deposited sediment. Options for spreading the sediment to agricultural land and waste disposal have also been explored. Geotechnical analysis in the form of Particle Size Distribution testing has been carried out to determine the grading of the sediment.

91 Overall the sediment appears to be of good chemical quality, with no exceedances of any of the screening criteria recorded in any of the samples. The sediment can be classified as 'Dredging spoil not containing hazardous substances' with the European Waste Code (EWC) 170506. Based on the analyses carried out, the sediment is suitable for bankside retention, and does not pose a risk to human health. The sediment passed the SSV and PTE screening criteria, indicating that there are no contaminants present which would be detrimental to agricultural land.

From the testing carried out to date, it appears that the sediment contains no anthropogenic contaminants of concern which would complicate disposal.

3.5 WATER ENVIRONMENT

3.5.3 Catchment

92 The Parrett and Tone rivers and associated tributaries flow from their source in the Quantock and Brendon Hills, Blackdown Hills and Dorset Heights to the southwest and east of the catchment and flow in a north and westerly direction into an extensive lowland floodplain, before flowing out into the Bristol Channel through the Parrett Estuary.

93 The watercourses in this catchment are typically steep, narrow and unconstrained in the uplands; while further downstream they are slower moving and heavily constrained by flood embankments, particularly through the low-lying, flat floodplain characteristic of the Somerset Levels and Moors, where the lowland rivers are known as 'high-level carriers'. These are watercourses that are embanked on both sides, fully or partially straightened and counter-drained on either side. Their normal water levels are set above the level of the surrounding floodplain. The whole lowland area of the catchment is heavily dependent on a controlled system of drainage and water level management, which has been in place for hundreds of years.

94 The lower reaches of the River Parrett and Tone are tidally influenced for about 30-40km inland depending on the height of the tide. The flood tide brings in sediment up the watercourse from the Severn Estuary. These tidal sections are depositional in nature and their sediment dynamics and modified physical form control the nature of flows and the habitats for flora and fauna. During periods of high fluvial flow following rainfall, the river will erode some of this sediment and convey it towards the Severn Estuary. Generally, this only occurs within the lower parts of the channel, but will also often lead to slumping of the deposited sediment above this level.

95 The capacity of the main river, tributaries and drainage channels to discharge fluvial flows can be significantly reduced by high tidal water levels backing up flow in the tidal River Parrett and Tone. Due to the very low gradient of the lowland river system and current system of management in this area, the lowland rivers readily (annually) overtop their embankments so that floodwater is temporarily stored in the moors before it slowly drains away or is pumped back into the river system.

96 The underlying rock types influence the catchment's response to rainfall, with relatively fast run-off from the impermeable uplands in the east and water-logged conditions dominating the lowlands. The area does not have any major aquifers so groundwater flooding is not a major risk; however, flooding in lowland areas, can take a long time to drain away.

3.5.4 Hydrogeology

97 The area is underlain by the Tone and Somerset Streams groundwater body. The bedrock is Mercia Mudstone which is not an aquifer. At the Curry Moor pumping station, a borehole indicates that the depth to bedrock is about 15m. Soft alluvial clays and silts overlie a well-defined peat layer. Below this there is firm alluvial clay above the Mudstone. None of these materials are considered to be aquifers.

3.5.5 Water Framework Directive

98 The Study Area falls within the South West River Basin District and within the River Parrett WFD catchment. The proposed dredging works will be undertaken within the Parrett Transitional water body (ID GB540805210900), which is classified in the 2015 South West River Basin Management Plan (RBMP) (Department for Environment, Food & Rural Affairs and the Environment Agency, 2015) as a heavily modified water body (HMWB) for the purpose of flood protection. The water body is currently assessed as being moderate overall status (moderate ecological and good chemical), with a target of good potential by 2027. The classification of the water body as heavily modified under the WFD recognises the importance of the water body for flood protection, but dictates that any works must not prevent delivery of measures that have been identified to improve the water body's ecological potential.

99 The RBMP identifies that the major causes of water quality issues within the catchment are diffuse run-off from agricultural land as well as discharges from sewage treatment works. Fine solids running off land or from sewage discharges can carry an excess of nutrients that cause an imbalance in the river leading to algal blooms and water quality problems. Too much fine sediment can also settle in the river bed, preventing a good flow of oxygen for benthic fauna and flora. The specific methods and timings proposed by this pioneer dredging project have been partially selected to minimise such effects on water quality.

100 The River Parrett discharges at Bridgwater Bay where there are six designated Bathing Waters in neighbouring catchments, including the 'Burnham Jetty North' (Burnham-on-Sea) Bathing Water Quality Area (see Section 3.1.2 above). Burnham is a sand and mud beach, approximately 2.2 kilometres wide with a shallow slope backed by a sea defence wall. The beach has a very large tidal range so it can be up to half a kilometre to the sea at low tide.

3.5.6 Flood Management

101 During fluvial flooding, there is wide scale inundation of the moor areas in the Parrett catchment. Depending on the moor, this flooding can either drain back to the river by gravity when river levels recede, or has to be pumped back into the river. Flooding happens to a large area of moors upstream of Langport, which acts to restrict the flow passing this point in a flood. Pumping out of these moors is restricted partially based on when the spillways are overtopping on the rivers downstream of Langport.

102 The flood water that does continue downstream of Langport either passes into the River Sowey via Monks Leaze Clyde sluice or the spillways, or continues down the River Parrett. Flood water in the River Sowey is discharged into the Kings Sedgemoor Drain, which then discharges into the River Parrett at low tides at Dunball Sluice. The River Parrett is joined by the River Tone at Burrowbridge. During flood conditions, flow passes over spillways and banks from the River Tone into Curry and Hay Moors. The amount of overtopping will be partially influenced by the flows within the River Parrett.

103 During very extreme flood events (as happened in 2013/14), flood water can then pass from Curry Moor into Salt and North Moors via Athelney spillway and Lyng Cutting. This can lead to flooding to the communities of Moorland and Fordgate.

104 The works that have been undertaken by the SRA and partner organisations following the 2013/14 flood have significantly reduced the risk of flooding. The greatest reductions in flood risk have been to Curry, Hay, North and Salt Moors. The impact is most pronounced on North Moor, where, if the 2013/14 flooding was to be repeated, the scale of flooding would be dramatically reduced.

3.6 LANDSCAPE AND VISUAL

3.6.7 National Character Area

105 The Study Area is within National Character Area (NCA) number 142: Somerset Levels and Moors. This NCA extends from the Bristol Channel coastline between Stolford and (but not including) Clevedon and inland in stretches loosely encompassing the Rivers Parrett, Brue, Axe and Kenn. This area includes Bridgwater, Weston-Super-Mare, Burnham-on-Sea and the majority of Street.

106 Key characteristics of this NCA as defined by Natural England include the following:

- Flat, open landscape of wet pasture, arable and wetland divided up by wet ditches or 'rhynes'.
- Absence of dispersed farmsteads or any buildings on levels and moors. Nucleated settlements on ridges/islands.
- Surrounded, and divided up, by low hills, ridges and islands which form distinctive skylines.
- Peat working and nature reserves contrasting with the rectilinear planned landscape of the Moors.
- Dramatic and prominent hills such as Barrow Mump, rising above the Levels and Moors.
- Sparse tree cover on Levels and Moors contrasting with woodland, hedges and orchards of surrounding hills.
- Sparsely populated Moors but settlements common on hills, ridges and islands.
- Historic landscape strongly evident in features ranging from prehistoric track-ways and lake villages to post-medieval enclosures and peat working.
- International nature-conservation significance for wetland, waders and waterfowl.
- Raised rivers and levées, with main roads and causeways flanked by houses.
- Flooding in winter over large areas.

3.6.8 Local landscape character assessment

107 The stretch of the River Parrett within the Study Area falls within the scope of the Taunton and Deane Landscape Character Assessment; and comprises Landscape Character Area 6A: Curry and West Sedge Moors (Taunton Deane Borough Council, 2011). Wrapping around the North Curry Sandstone Ridge, this is a strikingly flat landscape forming part of the much more expansive Levels and Moors landscape type, which stretches from South to North Somerset and forms the largest area of lowland wetland in Britain. The landscape has been systematically reclaimed from natural marsh (or fenland) that would have once been frequently flooded by the sea.

108 Key characteristics of Landscape Character Area 6A as defined by Taunton and Deane Borough Council include the following:

- Low-lying landscape of drained inland marshland (Moors) predominantly defined by an agricultural land use of dairying and stock rearing.
- Strong sense of human intervention in the landscape due to hierarchy of water channels – draining the land and controlling flooding.
- Strikingly flat landform with a regular, geometric pattern of enclosure (boundaries often defined by drainage channels or 'rhynes').
- Large areas of standing water in the winter, providing important habitat for wild fowl and wading birds.

- Internationally important landscape – a designated Ramsar site, Special Protection Area and Environmentally Sensitive Area. There are a number of SSSI sites and an area designated as a National Nature Reserve.
- Fields of withies, associated with a long tradition of willow weaving.
- Lines of pollarded willows - aligning rhynes, droves and roads – create strong landscape pattern and sense of place.
- Burrow Mump – a natural (although modified) landform feature with its ruined chapel is a prominent landmark, offering extensive views across the Moors.
- Limited, linear settlement at Burrowbridge, Stathe and Curload - Athelney – following the course of main water channels.

109 The strength of landscape character is judged to be strong. The dramatically flat landform, the engineered drainage system of ditches, rhynes and embanked rivers, the fields of withies, the pollarded willows and areas of standing water combine to make a very recognisable, distinct landscape. Landscape condition is judged to be moderate overall (poor in places).

110 Between Stathe and Oath Lock, the River Parrett lies partly within South Somerset District. The South Somerset Landscape Character Assessment (South Somerset District Council, 1993) concurs that the local landscape is typified by 'great grassy vistas' lying almost at sea level. Although most of the landscape is classified as 'open moor', parts of West Moor have been characterised as 'semi-open moor' due to the presence of withy beds of osier willow supplying the basket industry.

3.7 ECOLOGY

3.7.9 International statutorily designated sites

111 The location of statutorily-designated sites within the Study Area is shown on Figure 2 above.

112 The Somerset Levels and Moors Special Protection Areas (SPA) and Ramsar sites comprise a number of discrete areas of moorland. The SPA and Ramsar sites have the same boundaries. The moors are wet during the winter, with water entering the moors from rivers either via overtopping flood banks or via water control structures. The interest features for each site are summarised in Table 3.1 below:

Table 3.1. Somerset Levels and Moors SPA and Ramsar Site

Interest Feature	SPA	Ramsar
Bewick's swan <i>Cygnus columbianus bewickii</i> (over winter)	X	X
European golden plover <i>Pluvialis apricaria</i> (over winter)	X	
Eurasian teal <i>Anas crecca</i> (over winter)	X	X
Northern lapwing <i>Vanellus vanellus</i> (over winter)	X	X
Eurasian wigeon <i>Anas penelope</i> (over winter) *	X	
Northern shoveler <i>Anas clypeata</i> (over winter) *	X	
Internationally important assemblage of waterfowl (over winter)	X	X
17 species of British Red Data Book invertebrates		X

113 The River Parrett flows into the Severn Estuary Special Area of Conservation (SAC) at Bridgwater Bay, towards the western extent of the estuary. The SAC is designated for the following habitat and species interest features:

- Estuaries
- Mudflats and sandflats not covered by seawater at low tide
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*)
- Sandbanks which are slightly covered by sea water all the time
- Reefs
- Sea lamprey *Petromyzon marinus*
- River lamprey *Lampetra fluviatilis*
- Twaite shad *Alosa fallax*.

114 The Severn Estuary SPA and Ramsar sites cover approximately the same extent as the Severn Estuary SAC. The interest features for each site are summarised in Table 3.2 below:

Table 3.2. Severn Estuary SPA and Ramsar Site

Interest Feature	SPA	Ramsar
Bewick's swan <i>Cygnus columbianus bewickii</i> (over winter)	X	X
Eurasian teal <i>Anas crecca</i> (over winter)		X
Gadwall <i>Anas strepera</i> (over winter)	X	X
White-fronted goose <i>Anser albifrons</i> (over winter)	X	X
Dunlin <i>Calidris alpina</i> (over winter)	X	X
Shelduck <i>Tadorna tadorna</i> (over winter)	X	X
Redshank <i>Tringa totanus</i> (over winter)	X	X
Internationally important assemblage of waterfowl (over winter)	X	X
Immense tidal range		X
Unusual estuarine communities		X
Run of migratory fish between sea and river via estuary		X
Migratory birds in spring and autumn		X
Fish of the whole estuarine and river system		X

115 The Somerset Levels and Moors SPA and Ramsar sites are ecologically linked to the Severn Estuary SPA and Ramsar sites. This is because the Severn Estuary populations of wintering waterfowl use the Somerset Levels and Moors as an alternative wintering site.

116 Species of migratory fish designated under the Severn Estuary Ramsar site include salmon *Salmo salar*, sea trout *S. trutta*, sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, allis shad *Alosa alosa*, twaite shad *A. fallax*, and eel *Anguilla anguilla*.

117 Some migratory fish from the Severn Estuary will make use of the Parrett catchment for their freshwater life stages. However, other than for glass eels, there is no formal long-term survey data on the species which utilise the Parrett. The PIDB has commissioned some fisheries surveys to inform this EIA and this will form part of the final baseline assessment. However, whilst the proportion of the populations of the Severn Estuary that rely on the other major rivers entering the Severn is significant (the Wye and Usk are known to host freshwater life stages of the species concerned in significant numbers), the support that the river habitat of the Parrett provides is likely to be significantly less, because:

- the lowland reach of the Parrett is heavily modified, and arguably less inherently suitable to lamprey and shad; and
- the Parrett is much smaller (thus offering less habitat of any type).

3.7.10 National statutorily designated sites

Southlake Moor SSSI

118 Southlake Moor SSSI (also designated as part of the Somerset Levels and Moors SPA and Ramsar Site – see above) is located at Burrowbridge, where the River Tone joins the River Parrett. Part of the SSSI is also designated within the Somerset Levels National Nature Reserve (NNR). The land is below sea level in the basin of the River Parrett. The water table is high throughout the greater part of the year with the system of ditches and rhynes being penned at high levels during summer. When conditions in the River Sowey are suitable, it may be flooded deliberately in winter by means of a sluice in the river bank

119 The majority of the site is permanent grassland with a wide range of grassland types resulting from varying topographic and management conditions. There is a considerable variation in species composition. A range of ditch clearing methods are used resulting in diverse aquatic communities, a good submerged flora and a notable invertebrate assemblage.

120 When the moor is flooded, large numbers of waterfowl may be present; with up to 22,000 wigeon, 250 Bewick's swan and good numbers of pochard *Aythya farina*, teal and tufted duck *Aythya fuligula*. When floods recede, large flocks of lapwing *Vanellus vanellus* and snipe *Gallinago gallinago* return to feed; with dunlin and black-tailed godwit *Limosa limosa* often present. Much of the moor remains moist into the spring and early summer, providing suitable conditions for breeding snipe, redshank and lapwing

121 Regular signs of otter are seen on the banks of the River Parrett. The ditches on the east side of the site contain a population of the palmate newt.

North Moor SSSI

122 North Moor SSSI lies to the west of the proposed dredging works at Burrowbridge. The site is designated for its nationally important grazing marsh and ditch system. A range of neutral grassland types supporting common and scarce plants has developed mainly due to variations in soil and management practices. Although some fields are managed as short-term grass leys and a few are under arable cropping, most of the site is in permanent pasture

123 Aquatic plant communities present are exceptionally diverse with good populations of nationally sparse species. The main community type is characterised by a combination of emergent species, floating species and submerged species. The ditches have a rare aquatic invertebrate community which includes two nationally rare species. The meadows and ditches contain at least twenty-five nationally-notable invertebrate species.

124 The site has special interest in its breeding and wintering bird populations. There are good populations of breeding lapwing and whinchat *Saxicola rubetra* on the central part of the moor. In winter, the wet grasslands support large flocks of lapwing, snipe, dunlin and golden plover *Pluvialis apricaria* with small numbers of additional species when flooding occurs.

125 The ditches and rhynes are known to be used by otter.

West Sedgemoor SSSI

126 West Sedgemoor SSSI (also designated as a component part of the Somerset Levels and Moors SPA and Ramsar Site – see above) lies immediately to the west of the River Parrett between Stathe and Oath Lock. The site comprises numerous small, low lying fields and meadows separated by narrow water-filled rhynes and ditches. Many of the meadows have a diverse flora including indicator species such as meadow rue *Thalictrum flavum*, meadow thistle *Cirsium dissectum*, marsh arrowgrass *Triglochin palustris* and marsh ragwort *Senecio aquaticus*. The rhynes exhibit a rich flora including locally rare species such as flowering rush *Butomus umbellatus*, frogbit *Hydrocharis morsus-ranae* and fine-leaved water-dropwort *Oenanthe aquatica*.

127 A rich invertebrate fauna is present including scarce water beetles, dragonflies and bugs. The site also supports good populations of waterfowl, especially waders. Breeding birds include snipe, lapwing, redshank, curlew, water rail, yellow wagtail and whinchat. Large numbers of wintering birds visit and feed on the moor during the winter months including particularly lapwing, snipe and Bewick's swan; and significant numbers of passage waterfowl, notably whimbrel, are recorded in Spring.

Curry and Hay Moors SSSI

128 Curry and Hay Moors SSSI is located adjacent to the River Tone. The river overtops annually, flooding the fields in winter. Vegetation in the grazing meadows consists almost entirely of agriculturally improved swards. A small number of hay meadows are herb-rich. The flora and fauna of the ditches is of national importance. Over 70 bankside vascular plants have been recorded. Over 100 species of aquatic invertebrates inhabit the ditches including one nationally rare soldier fly and 13 nationally scarce species.

129 In winter, the flooded fields provide food for large numbers of waterfowl with several thousand lapwing, hundreds of snipe and smaller numbers of golden plover and dunlin regularly present. Over 200 Bewick's swans have been recorded in the past, at the time making this site an internationally important wintering ground for this species. It is understood that this is no longer the case (Stephen Parker, Natural England, Pers. comm. 2018). Large numbers of wigeon, teal and pochard regularly winter on the flooded field

130 Raptor species including short-eared owl *Asio flammeus*, merlin *Falco columbarius* and peregrine *Falco peregrinus* regularly hunt over the site in winter. Vertebrate species present include grass snake *Natrix natrix* and common frog *Rana temporaria*. Otter are regularly recorded on the site.

Bridgwater Bay SSSI

131 See above under Severn Estuary SPA, Ramsar and SAC.

3.7.11 Locally-designated sites

132 Three non-statutory sites designated at the local level are located within or immediately adjacent to the dredging stretch as follows (see Figure 2 above):

- The River Parrett, Middle Moor to Screech Owl Site of Nature Conservation Importance (SNCI) (the designation covers the entire works area). Comprises river with legally protected species (otter) and rare invertebrate species.
- The River Tone and Tributaries SNCI located immediately to the west of Burrowbridge. This site has been designated as it is considered to: be the best example in the county of a whole river from source to saline

limit of each river type; comprise a section of river with a minimum of modification to bed and water level and a high proportion of semi-natural habitats on both banks; have high biological quality; and show regular recent use by otter, including all bankside wetland, scrub and woodland.

- Aller Moor SNCI, located immediately to the east of the River Parrett between Stathe and Oath Lock. Supports rhine and wet meadow habitats; and an important wintering bird population.

3.7.12 Habitats of principal importance (NERC Act, Section 41)

133 There are several habitats of principal importance within the Study Area, including 'Rivers'. 'Coastal and floodplain grazing marsh' comprises the dominant habitat type surrounding the River Parrett. In addition, a collection of lowland meadows is present over 300m from the River Parrett, to the south-east of Burrowbridge. Habitats recorded are described here. Running water

3.7.13 On-site habitats

134 A detailed vegetation and habitat mapping survey has been completed in May/June 2018 in accordance with the standardised system for classifying and mapping British Habitats Handbook for Phase 1 Habitat survey – a technique for environmental audit (Joint Nature Conservancy Council, 2010). Appendix A contains habitat maps illustrating the type and distribution of habitats within the study area.

135 Aquatic macrophytes growing submerged within running water are limited in species diversity, with fennel pondweed *Potamogeton pectinatus* occurring abundantly at the edges of the channel in slower flowing water, in localised stands. Additional macrophytes present, at occasional abundance, include unbranched bur-reed *Sparganium emersum* and sea club-rush *Bolboschoenus maritimus*, suggesting a brackish influence in the Site.

136 Marginal vegetation occurs throughout the site along the base of the banks of the River Parrett, to a height of approximately 1-2m from the water level at the time of survey. The banksides are typically 5m in height, at an approximate angle of 45 degrees. Vegetation at the margins of the River Parrett is species poor and predominantly consists of reed canary-grass *Phalaris arundinacea*, which occurs abundantly and is dominant in some places. Stands of locally abundant common comfrey are also present, and species such as Himalayan balsam *Impatiens glandulifera*, common nettle *Urtica dioica* and bindweed *Calystegia* sp. are present at a constant frequent abundance across the habitat type. Himalayan balsam, a WCA 1981 Schedule 9 invasive species, is predominantly concentrated downstream of target note 1 (Stathe Bridge) upon the north (right hand) bank of the river but is also present upon the south bank (left hand bank) as smaller plants at the time of survey. This plant was also recorded as being generally present on the north (right hand bank) upstream of target note 1 (Stathe Bridge). Due to the small size of Himalayan balsam plants at the time of survey, unidentified stands may be present within the south bank (left hand bank) and its tall ruderal sward upstream of target note 1. Further survey later in the summer of 2018 would confirm a full extent of this species. No evidence was recorded of Japanese knotweed (*Fallopia japonica*) or giant hogweed (*Heracleum mantegazzianum*). A small number of additional marginal species are present in local areas, increasing the plant species diversity in places. Species including purple loosestrife *Lythrum salicaria*, water mint *Mentha aquatica*, gypsywort *Lycopus europaea* and brooklime *Veronica beccabunga* occur at occasional to rare abundance.

137 Above the height of variation in water level within the river, marginal vegetation on the banksides succeeds into tall ruderal vegetation, supporting common and competitive species which are typical of drier soils and nutrient enriched conditions. Common nettle *Urtica dioica* and broad-leaved dock *Rumex obtusifolius* are dominant in local swathes, particularly on northern most bank tops towards the south west of the Site near Oath. Additional ruderal species include Himalayan balsam, hogweed *Heracleum sphondylium*, cow parsley *Anthriscus sylvestris*, hemlock *Conium maculatum* and teasel *Dipsacus fullonum*, occurring at frequent to occasional abundance. Tall ruderal

vegetation on banks which are adjacent to gardens on the southern (left hand) bank are typically managed through cutting. Vegetation on the northern (right hand) banks are typically managed through grazing by cattle.

138 Neutral semi-improved grassland occurs towards the northwest of the Site, on the right-hand bank top. The grassland is grazed by cattle and composed of fields interspersed with a network of wet ditches. A number of species indicative of wet grassland are present, such as hard rush *Juncus inflexus*, marsh foxtail *Alopecurus pratensis* and sweet-grass *Glyceria* sp. The grassland varies in quality between fields, with some areas supporting a more species-poor sward typical of poor semi-improved grassland, and other areas supporting a greater species diversity with an equal cover of forb and grass species and a sward height of up to 20cm. Areas of poorer-quality semi-improved grassland are characterised by frequent perennial rye-grass *Lolium perenne*, cock's-foot *Dactylis glomerata*, creeping buttercup *Ranunculus repens* and white clover *Trifolium repens*, and occasional creeping thistle *Cirsium arvense*, common nettle and docks, all of which are species typical of nutrient enriched conditions. Areas of good quality semi-improved grassland support species indicative of wet soils with a neutral pH. Fine leaved grass species such as abundant red fescue *Festuca rubra* and frequent smooth meadow grass *Poa pratensis* and meadow foxtail *Alopecurus pratensis* are joined by a range of common forb species such as frequent meadow buttercup *Ranunculus acris*, red clover *Trifolium pratense*, common cat's-ear *Hypochaeris radicata* and ribwort plantain *Plantago lanceolata* and occasional meadow vetchling *Lathyrus pratensis* and common sorrel *Rumex acetosa*.

139 Improved, species poor, grassland occurs on well-trodden paths at the top of the right-hand bank along the public right of way. Constant species within the habitat, such as perennial rye-grass and cock's-foot, are joined by species tolerant of disturbed conditions, such as greater plantain *Plantago major* and annual meadow-grass *Poa annua*. Cattle grazed fields towards the south west of the site, on the right-hand bank, are also improved for agricultural purposes and support a species poor sward consisting of competitive species such as perennial rye-grass, white clover and dandelion *Taraxacum officinale* agg.

140 A small number of standing trees occur on the bank tops of the river. Trees which could be assessed from areas accessed during the survey are numbered on the Phase 1 Habitat map. Species included sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, yew *Taxus baccata*, hawthorn *Crataegus monogyna*, elder *Sambucus nigra* and willow *Salix fragilis* and *salix* sp. Only five small willow trees overhang the river channel, all other trees are situated on the bank top with the canopy not directly overhanging the river channel.

141 Hedgerows occurring across field ditches and at road boundaries are defunct in nature, and outgrown. Hedgerows are composed of mostly native species, with frequent hawthorn. It was not possible to assess entire lengths of hedgerows due to access restrictions, and as such these hedgerows may be native and species-rich.

142 Scattered willow scrub occurs frequently on small areas of bank top towards Burrowbridge.

143 Roads used for vehicular access located within approximately 10m of the left-hand bank top are composed of bare soil or tarmac, with no establishment of plant species

3.7.14 Species

144 Surveys during spring and summer 2018 by Johns Associates (unless otherwise stated) have shown the following notable species to be associated with the stretch of the River Parrett between Oath Lock and Burrowbridge.

145 No current evidence was found of water voles upstream of Stathe (although this section comprises suitable habitat and may be colonised by water voles in the future). The survey found a good population of water vole

downstream of Stathe, predominantly associated with the left-hand bank. There was very limited evidence of water vole on the right-hand bank, likely to be limited by cattle grazing.

146 An otter survey found no evidence of holts or resting places, but evidence of otter was recorded in several places indicating recent use of the river corridor (including fresh spraints, fish remains, footprints, scratch marks).

147 No potential bat roosts associated with the proposed working area were located between Stathe Bridge and the confluence with the River Tone.

148 No optimal great crested newt breeding or resting habitats (including overwintering habitat) are associated with the proposed working area. Potential breeding habitat is located within the wider area (e.g. rhynes) although more extensive areas of optimal habitat are separated by the Sowey Flood Relief Channel and the River Tone/Parrett channel.

149 The fish habitat survey found the habitat was generally limited by lack of channel diversity and lack of shade from overhanging trees. However, good habitat for fish was present within the channel in places (submerged vegetation) and with shelter provided by continuous belts of emergent vegetation. The river is considered to have potential to support river lamprey (ammocoetes) as well as a range of coarse fish. The river is known to support large numbers of migrating elver (glass eel) as well as other migratory species, including salmon and sea trout (population extent unknown).

150 An assessment of the potential for rare and conservation notable species of invertebrates associated with the Ramsar site was completed to inform part of the ecological baseline. This identified the potential for the presence of three species associated with records from ditches close to Burrow Bridge but outside of the working area namely: *Hydaticus transversalis*, *Dytiscus dimidiatus*, and *Hydrophilus piceus*, although proposed works to ditches are very limited. A further species *Lejops vittata* may be associated with stands of sea club rush, located within the lower part of the River Parrett channel (the Thalweg), which will not be affected by the proposals.

151 Fish surveys conducted by Loughborough University on behalf of the PIDB, within the study area recorded the presence of: thin-lipped grey mullet *Chelon ramada*, common bleak *Alburnus alburnus*, roach *Rutilus rutilus*, gudgeon *Gobio gobio*, bass *Dicentrarchus labrax*, pike *Esox Lucius*, common bream *Abramis brama*, chub *Squalius cephalus*, flounder *Paralichthys dentatus*, European eel *Anguilla Anguilla*, perch *Perca fluviatilis*, three-spined stickleback *Gasterosteus aculeatus* and rudd *Scardinius erythrophthalmus*.

152 Surveys for the endangered hairy click beetle *Synaptus filiformis* was completed by AEcol in 2018. The survey recorded 26 adults from 21 locations along the River Parrett between 500 m downstream of Oath Lock and 250 m downstream of Burrowbridge. The species was found to be associated with shallowly sloping tidal terraces, where dense stands of reed canary-grass are subject to flooding on the highest tides. Of an overall seven locations in which the species has historically occurred, it was recorded at three in 2018.

153 Aquatic macroinvertebrate surveys conducted in 2018 confirmed there were no notable or rare species found in any of the samples and all were characteristic of lowland waterbody habitat at or around the tidal limit with low diversity. However, relatively high numbers of the brackish shrimp *Gammarus zaddachi* were recorded from all four samples, with a maximum count of 429 individuals from sample S3. Biological Monitoring Working Party scores were generally low, although sample S1 contained some higher-scoring taxa (including blackfly larvae, water beetles, alderfly larvae and the cased caddisfly larva *Anabolia nervosa*), which explains the higher score of 81. All samples had a very similar ASPT, indicating a similar assemblage across the four sites.

154 Seven active badger setts have been recorded by Country Contracts in 2018, from the immediate vicinity of the river corridor, mostly associated with flood defence embankments.

155 A bird habitat survey found no evidence of nesting kingfisher. Two singing Cetti's warbler were recorded singing on the left-hand bank downstream of Stathe. Breeding was not confirmed and territories held by this species are large, however, nesting within riparian vegetation is possible.

3.8 HISTORIC ENVIRONMENT

156 A review of online resources, including Historic England's National Heritage List for designated heritage assets and information from the Somerset Historic Environment Record (HER), has established that a small number of statutorily designated heritage assets are located along this section of the River Parrett, including two Listed Buildings and the Burrow Mump Scheduled Monument. These are located at sufficient distance from the proposed dredging activities that they are deemed unlikely to be affected.

157 The Somerset Levels are known to have been used by humans since the Neolithic period. The landscape includes large areas of former marshland and reed bed, reclaimed by people since at least the Roman period.

158 There is evidence for human activity along the River Parrett from the prehistoric period onwards. In the vicinity of the proposed scheme, an undated enclosure (potentially associated with later prehistoric activity) and Roman period remains have been recorded. Prehistoric timber piles and post-Roman peat deposits have also been retrieved from river banks. The landscape was extensively utilised in the medieval period, with evidence of river straightening, drainage of the levels and associated industries (watermill) recorded along the scheme, together with areas of settlement (at Burrowbridge and to the south-east, where deserted hamlets along the river have been identified). Later activity is associated with local industries (withy boilers which facilitated basketry and brickworks).

4 SCREENING

159 Under the Land Drainage EIA Regulations, PIDB is required, taking into consideration the selection criteria in Schedule 2, to determine whether the proposed improvement works are likely to have significant effects on the environment (Reg. 4).

160 This report sets out its view on the screening results based on the criteria set out in Schedules 2 and 2A of the Land Drainage EIA Regulations, which are summarised below.

4.1 CHARACTERISTICS OF IMPROVEMENT WORKS

161 The scale of the works relates to 2.2km of river, with 22,000m³ of sediment to be removed, resulting in approximately 3-4 cumecs of additional conveyance in the Parrett at Burrowbridge at low tide. These are relatively small-scale works in the context of the whole catchment and the Somerset Levels, taking into account the quantum of maintenance dredging that occur annually in both the rivers and rhynes.

162 In addition, the Parrett Transitional (TRaC) is a heavily modified water body and regular management is required for the purposes of flood protection. Whilst this stretch of river has not been dredged in the recent past, it has been dredged within the last 50 years, as evidenced by the lack of in-channel diversity. **Providing mitigation is put in place to ensure no conflict with WFD objectives, the dredging will not result in major impacts to river ecology.**

4.2 LOCATION OF IMPROVEMENT WORKS

163 The proposed improvement works are located in a sensitive environmental area. In particular, a network of statutorily-designated sites of nature conservation importance are located in close proximity to the improvement works, including the Somerset Levels and Moors SPA and Ramsar Site, Southlake SSSI, Curry and Hay Moors SSSI and West Sedgemoor SSSI. These sites are highly sensitive and have low tolerance or absorption capacity to environmental change.

4.3 TYPES AND CHARACTERISTICS OF THE POTENTIAL IMPACT

164 Although impacts will mostly occur over a short time period, the magnitude and spatial extent has the potential to be large e.g. impacts on international sites. In addition, some impacts could be long duration (e.g. change to hydrological regime for Curry Moor).

165 The scoping exercise reported in Section 5 demonstrates that there are some likely significant impacts arising from the works that need further detailed assessment and/or the integration/ embedding of mitigation as part of the fundamental design of the project to avoid negative significant effects.

4.4 SCREENING DETERMINATION

166 In summary, the results of this EIA Screening have identified that the proposed improvement works are likely to have significant effects on the environment in the absence of changes to the design and/or mitigation.

167 Therefore, this report has been produced to support a separate request to the PIDB that it provides its formal Screening Opinion on the need to undertake an EIA under the Land Drainage EIA Regulations, and to publish this conclusion that an EIA is required (Reg.6). If PIDB concludes that EIA is required, it will then undertake the EIA and prepare an Environment Statement (Reg.7), carrying out the appropriate publicity (Reg.10) and consultation.

5 SCOPING

5.1 ENVIRONMENTAL FACTORS

168 Assuming PIDB concludes that EIA is required through its Screening Opinion, Regulation 12 (2) of the Land Drainage EIA Regulations requires PIDB to assess the significance of the likely effects on a series of environmental factors; and Schedule 1, paragraph 4 specifies those environmental factors which must be considered within an ES.

169 Table 5.1 lists the environmental factors outlined in Regulation 12 (2) and Schedule 1 of the Land Drainage EIA Regulations and highlights where these have been considered in this Scoping Report and the subsequent Environmental Statement (ES).

Table 5.1. Environmental topics and where they are addressed within Section 5.3

Environmental Factor (Land Drainage EIA Regulations)	Where this factor is addressed in Section 5.3 (table reference no)
Population	Population & Human Health The Water Environment Landscape and Visual Air Quality Traffic and transport
Human health	Population & Human Health The Water Environment Landscape and Visual Air Quality Traffic and transport
Biodiversity	Biodiversity
Land	Land Quality
Soil	Land Quality
Water	The Water Environment
Air	Air Quality
Climate	Climate change and sustainability
Material Assets	Traffic and transport Cultural heritage
Cultural heritage	Cultural heritage
Landscape	Landscape and Visual

5.2 SCOPING PROCESS

170 Scoping is a critical stage early in the EIA process. It provides an opportunity to identify and assess the key environmental impacts and issues of concern, facilitated by thorough consultation. Scoping should ensure that a progressively decreasing range of issues is considered as part of the EIA, but in increasing detail. It should ensure that a balance is struck between ensuring all potentially significant effects are considered whilst making sure that insignificant impacts are eliminated from further study.

171 The emphasis of EIA should be on the "main" or "significant" environmental effects to which a development is likely to give rise; and the Environmental Statement (ES) should be proportionate and not be any longer than is

necessary to assess properly those effects. Impacts which have little or no significance for the proposed works should need only very brief treatment to indicate that their possible relevance has been considered.

172 This overall approach has been applied to the potential effects arising from the proposed improvement works: the table in Section 5.1 records the results of the environmental scoping study.

173 The following potential causes of environmental effects were identified and 'numbered' for ease of reporting in the table:

1. Dredging;
2. Vegetation clearance / tree removal;
3. Machinery / vehicle movement;
4. Deposit and spreading of dredging arisings;
5. Siting of a compound; and
6. Operational effect of dredging (e.g. impact on flood risk).

174 Where a receptor or sub-receptor has been **scoped in** for further environmental assessment this has been recorded using a ✓, where a receptor or sub-receptor has been **scoped out** of requiring further environmental assessment this has been recorded using a X.

5.3 SCOPING OF POTENTIAL ENVIRONMENTAL EFFECTS ASSOCIATED WITH DREDGING OF THE RIVER PARRETT

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Population & human health					
Local residents/ businesses	3, 5	Machinery/vehicle movements associated with the works, as well as the location of the site compound/s could result in temporarily increased levels of noise and vibration.	<p>Construction traffic movements on the highways network will be minimal and will be limited to initial delivery of plant to the dredging area (as all dredging arisings will be managed <i>in-situ</i> by placing on the rear of the flood embankment).</p> <p>Excavators and dump trucks will be operating at any one time over a short period of time. These machines would be distributed over the entire 2.2km site; and therefore, there will be no risk of multiple machines working alongside each other at the same location.</p> <p>The works will be undertaken during normal considerate construction working hours using best construction practice.</p> <p>The works are typical of frequent routine operations in the same location for annual maintenance dredging of rhynes and weed control.</p>	X	Not applicable
Local community	6	Changes in hydraulic benefits to people, land and property.	The proposed dredge has the potential to reduce flooding to an area of around 65km ² . Within, or in close proximity to this area there are approximately 200 homes that will receive some additional hydraulic benefit as a result.	✓	Flood modelling and assessment
	6	Changed in hydraulic benefits to people, land and property.	The proposed dredge has the potential to reduce the hydraulic benefit already delivered to a small area associated with Curry Moor.	✓	Flood modelling and assessment

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Local community	1, 2, 3	Health and safety risks to public.	<p>Previous high river flows and flood conditions will already have presented a health & safety risk to the public.</p> <p>Risks to the public during the works can be managed by good site practice e.g. use of banksmen and warning notices on site to restrict public access to site for the duration of the works.</p> <p>Risk to bank stability through previous flooding and proposed dredging will be assessed and mitigated as part of detailed design.</p>	X	Not applicable
Local economy	6	Changed flood risk to businesses benefitting the local economy including the agricultural community.	<p>Reduced flood risk to agricultural land and associated agricultural infrastructure, will enable more continual grazing and reduce risk of death/loss of livestock.</p> <p>Reduced risk of road flooding will result in reduced road traffic delays with improved communications/logistics for business.</p> <p>Potential significant positive effect.</p>	✓	Flood modelling and assessment of area and associated economic activity, informing final scheme design to maximize positive benefits and minimise any negative effects.
Local economy	1	<p>Potential for dredging to result in temporary increased sediment load and release of contaminants (over and above those experienced in the baseline conditions).</p> <p>The indirect result of this could be changes to turbidity, dissolved oxygen levels and damage to eels/elver and other fish in the commercial fishery.</p>	There is a potential risk of the dredging works mobilising sediment and releasing contaminants at levels over and above those within the baseline water column. Mitigation for these impacts is being developed (e.g. timing the works to avoid the elver season).	✓	Development of suitable dredging methodology, mitigation and schedule to avoid significant negative effects.

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Local economy	1	Potential for dredging to result in release of contaminants (over and above those in the baseline water column) reducing quality of the bathing waters downstream at Burnham-on-Sea; and therefore, affecting the tourism industry	<p>The sediment load in the river during the works is anticipated to be raised at the commencement of the works. However, sediments are likely to settle and it can be anticipated that there will be reducing sediment load in the water column as the works progress.</p> <p>The findings of the sediment analysis did not identify the presence of substances/concentrations that would affect human health. No impacts to bathing waters and associated tourism are predicted.</p> <p>Mitigation measures to reduce and monitor the amount of sediment loading are being developed, based on tried and tested methods.</p>	X	Not applicable
Local economy	4	Deposit and spreading of dredged arisings on neighbouring agricultural land may affect its suitability as grazing land depending on the type/level of contamination and salinity.	<p>All dredging arisings will be placed on the rear of the flood embankment and will not be spread on adjacent agricultural land</p> <p>Sediments have been tested prior to dredging which has demonstrated that they are non-hazardous and suitable for agricultural use prior to depositing on river banks. Therefore, potential for contamination to affect agricultural land has been scoped out.</p>	X	Not applicable
Recreational users	1, 2, 3	Restricted access to the River Parrett Trail, East Deane Way and Macmillan Way West Long Distance Paths and other PROWs whilst dredging is undertaken.	<p>It is anticipated that the works will affect access to the path along the righthand banks (the River Parrett Trail, East Deane Way and Macmillan Way West Long Distance Paths) where dredging is being undertaken.</p> <p>Machinery/vehicle movements may also affect other PROWs where these intersect with site access routes.</p>	✓	Assessment of alternative routing and implications for users of the right-hand bank footpath within the proposed dredging area, during the period of works.

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Air Quality					
Local air quality	1, 3	Emissions to air from machinery and vehicles required for the dredging activity	Excavators and dump trucks will be operating over a short period of time (these machines would be distributed over the entire 2.2km site; and therefore, there will be no risk of multiple machines working alongside each other at the same location); and the resulting emissions (including NOx and PM10) are considered to be small-scale and temporary, resulting in negligible change to local air quality	X	Not applicable.
	4	Generation of dust during or immediately after placement of dry sediment, particularly in windy conditions.	Sediments have been tested prior to dredging and have been confirmed as non-hazardous. As such, any dust generated will not contain pollutants harmful to human health. The potential nuisance impacts from generation of dust will be managed through good construction practice and are therefore scoped out.	X	Not applicable.
Climate change and sustainability					
Climatic factors	6	Generation of gases (such as carbon dioxide) that have potential to increase the effects of global warming	No significant generation of climate gases is predicted due to the works. As such, the works themselves are not considered likely to have a significant effect on climate change and this element is scoped-out of further assessment.	X	Not applicable.
	6	Benefit of improved resilience to the anticipated impacts of climate change (increased rainfall and associated flooding).	The works in isolation are not anticipated to result in a significant impact in terms of improved resilience to climate change. However, when considered cumulatively with the package of measures to be implemented as part of the SRA	✓	Evaluation of climate change effects and incorporation of

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
			Strategic Flood Action Plan, all schemes are predicted to result in improved resilience to climate change.		adaptive features, within the ES, using guidance from UK Government.
Traffic & Transport					
A roads and local roads	6	Improved hydraulic benefit.	Likely positive effect from reduced flooding.	✓	Will be considered under 'Population'
	3	Possible temporary disruption to local traffic flow and tracking of debris onto roads.	Construction traffic movements on the highways network will be minimal and will be limited to initial delivery of plant to the dredging area (as all dredging arisings will be managed <i>in-situ</i> by placing on the rear of the flood embankment). No significant difference to existing use of road network predicted.	X	Not applicable
Railway line	1, 3	Potential effects on the railway line from dredging activity or movement of plant and vehicles.	It is not anticipated that the dredging works (including vehicle movements) will affect the railway line in any way.	X	Not applicable
The Water Environment					
Altered flood conveyance within the River Parrett Burrowbridge to Oath Lock	6	Changed flood risk to people, land and property	Addressed under Population and Human Health above	✓	See above
		Changes to frequency, depth and duration of flooding on moors, resulting in impacts to habitats and bird and invertebrate populations	Addressed under Biodiversity below.	✓	See below
Water Framework Directive Compliance (Parrett)	1, 2	Potential 'deterioration' in WFD status of the biological quality elements (BQEs) (NB fish, aquatic flora, benthic invertebrates, included in the 'Biodiversity'	Statement of WFD compliance for relevant WFD water bodies (directly affected and up or downstream where relevant) needs to be made – with reference to specific assessments reported on other EIA receptors (including flora and fauna	✓	Water Framework Directive (WFD) Compliance Assessment

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Transitional; Parrett River)		<p>receptors indicated below). As well as the direct effects of damage/removal on BQEs, potential changes in hydromorphological and physico-chemical (water quality) conditions during and after dredging may have indirect effects on the BQEs.</p> <p>Dredging may affect the implementation of WFD 'mitigation measures' for heavily modified water bodies as stated in the River Basin Management Plan.</p> <p>Dredging may affect bathing water quality (addressed under Population and Human Health: Tourism above)</p>	<p>and designated sites, hydrogeology and contamination/ tourism/bathing waters) where relevant.</p> <p>Assessment of contribution to or conflict with RBMP mitigation measures required. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>		
Hydrogeology	6	Changes to the hydro-geological regime; including changes to groundwater recharge and groundwater levels within surrounding sensitive moor land.	There are likely to be very localised, short duration and low magnitude changes on hydro-geology as a result of the changes to the flooding regime brought about by the dredging activity and the nature of the changes to the water level management put in place.	X	Not applicable
Biodiversity					
Statutorily-designated sites: Natura 2000 Sites (SAC, SPA & Ramsar sites); Southlake Moor, West Sedgemoor,	1	Dredging and material disposal will take place within Southlake and potentially West Sedgemoor (part of the Somerset Levels and Moors SPA and Ramsar site).	<p>Direct habitat loss will be limited to loss of species-poor improved grassland on the flood embankment and a small area to the rear of the bund. This will quickly regenerate, and no significant impact due to direct habitat loss is predicted.</p> <p>Potential for eutrophication of ditches due to high phosphate content in runoff from dredging</p>	✓	Water Framework Directive (WFD) Compliance Assessment

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
North Moor, Curry and Hay Moors SSSI			arising. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.		
	1, 2, 6	Potential for indirect impacts from disturbance (wintering water birds); temporary short-term changes in water quality affecting mobile species (particularly fish); temporary medium-term changes to river habitat used by mobile species (fish); and, changes to water levels on moors (resulting in decreased habitat quality for wintering water birds and Ramsar invertebrates, with a subsequent impact on populations).	Scoped into assessment. Outcomes of Appropriate Assessment will inform the EIA. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.	✓	Analyse modelling results, working with NE and hydrological expert to assess likely degree of change to 'splashy conditions' on the moors. Use monitoring results from previous dredging to inform impact assessment. Where impacts are still uncertain, progress monitoring and the necessary commitment to mitigation (e.g. commence process of change to water level management plans)
Non-statutorily designated sites	1, 2	Potential for direct impacts such as habitat loss or degradation; or, indirect impacts such as changes to habitats as a result of altered water or sediment regimes.	Aller Moor SNCI could be affected through direct habitat loss; or through potential for eutrophication of ditches due to high phosphate content in runoff from dredging arising. River Parrett, Middle Moor to Screech Owl SNCI	✓	Analyse modelling results, working with NE and hydrological expert to assess likely degree of change

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
			<p>could be affected through direct habitat loss; and the impacts of reduced water quality on fish and benthic invertebrates during dredging.</p> <p>There is some potential for indirect effects to the River Tone and tributaries (altered flow regime).</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>		<p>to 'splashy conditions' on the moors.</p> <p>Use monitoring results from previous dredging to inform impact assessment.</p> <p>Where impacts are still uncertain, progress monitoring and the necessary commitment to mitigation (e.g. commence process of change to water level management plans)</p>
Habitats, including NERC habitats of Principal Importance	1, 2	Potential for direct impacts such as habitat loss or degradation; or, indirect impacts such as changes to habitats as a result of altered water or sediment regimes.	See above under non-statutorily-designated sites. Additional potential for impacts to coastal and floodplain grazing marsh at Stan Moor. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.	✓	<p>Ecological Impact Assessment within ES</p> <p>Provision of compensatory hedgerows and other associated mitigation assessment in the ES.</p> <p>Develop Construction Environmental Management Plan.</p>

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
					Landscape and Ecological Management Plan.
Water vole	1, 2, 6	Potential for damage to water vole habitat and any re-established burrows within the dredging areas.	<p>The design of the dredging works will be modified to minimise the impact to these species as far as possible. The works will also be designed to ensure effective restoration of riverine habitat to ensure quick recovery of the study area by these species.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p> <p>Nevertheless, the detailed potential impact on these species populations needs to be assessed.</p>	✓	<p>Water Framework Directive (WFD) Compliance Assessment</p> <p>Development of method of working that meets the requirements and standards for a Natural England water vole licence, demonstrating no negative effects and legal compliance.</p> <p>Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.</p>
Otter	1, 2	Potential for damage to resting places or any re-established holts within the dredging areas.		✓	<p>Water Framework Directive (WFD) Compliance Assessment.</p> <p>Develop Construction Environmental Management Plan. Landscape and</p>

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
					Ecological Management Plan.
Reptiles	2, 3, 4, 5	Potential for killing or injury of reptiles (especially grass snakes) through destruction of hibernation and/or foraging and basking areas.		✓	Ecological Impact Assessment within ES Development of method of working to avoid injury / killing offences and avoiding areas of suitable resting/breeding habitats.
Badgers	2, 3, 4, 5	Potential for destruction of setts or disturbance to badgers as a result of plant and vehicle movements and location of spreading areas and site compounds.		✓	Ecological Impact Assessment within ES Implementation of suitable measures under a Natural England licence to avoid harm and legal offences. Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
Great crested newt	2, 3, 4, 5	Potential for killing or injury of GCN or impairment to their ability to breed; either through destruction of hibernation and/or foraging and commuting areas (including through rough grassland connecting breeding ponds).		✓	Ecological Impact Assessment within ES Development of method of working to avoid injury / killing offences and avoiding areas of suitable resting/breeding habitats. Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.
Wintering birds (see also international statutorily designated sites above)	1, 3, 4	Disturbance	The works are located in close proximity to important sites for populations of wintering birds. The works are programmed for October to avoid impacts where possible, however, there is scope for the works to continue into November. As such, this potential impact has been scoped-in. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.	✓	Appropriate Assessment. Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.
Fish (see also international statutorily designated sites above)	1	Potential for killing of fish as a direct result of the dredging activity (i.e. fish being caught up in the dredging activity). Also, potential for dredging to result in increased sediment load and	Potentially significant impacts from these effects. Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and	✓	Water Framework Directive (WFD) Compliance Assessment.

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
		<p>release of contaminants (over and above those experienced in the baseline conditions).</p> <p>The indirect result of this could be changes to turbidity, dissolved oxygen levels and damage to fish's gills, impacts on fish habitats, spawning grounds, feeding grounds and effects on migration.</p>	others.		<p>Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.</p>
Rare and scarce invertebrates (see also international statutorily designated sites above)	1, 2, 4	Direct loss of invertebrates (including the locally resident and nationally notable Hairy Click Beetle) as a result of removal with the dredged sediment and/ or removal of emergent and marginal vegetation.	<p>Although there are many species of notable/rare invertebrates within the nearby protected areas, a detailed habitat review by an entomological expert has concluded that the designated invertebrate assemblages are associated with the small rhynes and ditches in the moors, not the main river channels. Direct impact of habitat loss on the invertebrate assemblage associated with rhynes and ditches is very limited but will be been scoped in for further assessment.</p> <p>There is potential for eutrophication of ditches due to high phosphate content in runoff from dredging arisings. Changes in vegetation community within the rhynes may also result in changes to the invertebrate community, so this has been scoped into the assessment.</p> <p>Survey has shown that a colony of Hairy Click Beetle is associated with the working areas. Options for avoiding or translocating habitat will be considered. The potential for a direct impact is scoped-in to future assessment.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and</p>	✓	<p>Ecological Impact Assessment within ES</p> <p>Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.</p>

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
			others.		
Non-native invasive species	1, 2, 3, 4, 5	Spreading of invasive species and pathogens (e.g. Ash dieback) within the working area (and potentially beyond).	<p>A large population of Himalayan balsam is associated with the left bank downstream of Stathe, and the dredging works have the potential to cause the spread of this species.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>	✓	<p>Ecological Impact Assessment within ES</p> <p>Develop Construction Environmental Management Plan. Landscape and Ecological Management Plan.</p>
Dormouse	2	Potential for killing or injury of dormice and/ or damage to dormouse habitat as a result of vegetation clearance (in particular hedgerows or stands of dense scrub).	<p>Although dormouse could be present, as well connected or extensive sections of hedgerows and stands of dense connected scrub will not be removed for the works, and a precautionary work method statement can be adopted, this species has been scoped-out of future assessment.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>	X	Not applicable.
Breeding birds	2, 3, 4, 5	Loss of nesting habitat (such as habitats used by Cetti's warblers, sedge warblers, reed warblers and blackbirds) and/ or damage to nests caused by land clearance for site access, storage areas or other clearance of vegetation associated with the Works.	<p>Works are timed for the autumn period to avoid impacts to breeding birds. Marginal vegetation is expected to recover quickly.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>	X	Not applicable.
Rare or scarce aquatic plants	1, 2	Potential for direct loss or degradation of conditions for notable species of plants	Survey results have confirmed the absence of notable plants from the works area, therefore potential direct effects on notable plant	✓	Develop Construction Environmental

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
			<p>populations have been scoped-out. However, there is potential for eutrophication of ditches within Southlake and West Sedgemoor SSSIs due to high phosphate content in runoff from dredging arisings. This could result in loss of rare/ scarce aquatic plants from the affected ditches.</p> <p>Extensive consultation, liaison and development of positive mitigation measures is underway with the Environment Agency, Natural England and others.</p>		Management Plan. Landscape and Ecological Management Plan.
Land quality					
Soil resource	2, 3, 4, 5	<p>Vehicle movements over saturated soils can cause long-term degradation to the structure of the soil. Soil erosion is much more likely under waterlogged conditions especially where vegetative matter has been removed from the surface.</p> <p>Ground cover removal to facilitate the works (including storage and site compounds) and vehicle movements could result in compaction and erosion, leading to changes to the soil structure and fertility and functionality of the soil resource.</p>	<p>Works have been timed for the autumn period when conditions are much more likely to be dry.</p> <p>Soils will be protected through standard, good working practice and ground protection methods if necessary.</p>	X	Not applicable.
Waste and potential contamination	1, 2, 4	Generation of arisings from dredging, and waste from vegetation clearance removal; and potential ground contamination arising from placement on the rear	Sediments have been tested prior to dredging to demonstrate that they are non-hazardous prior to depositing on river banks.	X	Results of sediment testing will be provided within the Water Environment chapter

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
		of the flood embankment.			
Cultural heritage					
Designated sites	1, 2, 3, 4, 5	Potential for direct damage to a Scheduled Monument or Listed Building.	All such designated sites are located outside the works area. No potential for impacts to the curtilage of a Listed Building.	X	Not applicable.
Known archaeological sites	1, 2, 3, 4, 5	Potential for degradation of archaeological sites through inappropriate spreading of dredging arisings and tracking of machinery	Confirmation from Dr Richard Brunning (Senior Historic Environment Officer at the South West Heritage Trust) that there are no apparent impacts to the historic environment from the dredging of material from the river, the deposition of the dredged material onto the existing floodbanks or the use of heavy machinery on the floodbanks. Working compounds will be sited to avoid known archaeological sites, especially the deserted medieval hamlets on the north bank of the river.	X	Not applicable.
Previously undiscovered archaeology or heritage sites	1, 2, 3, 4, 5	Potential for damage to previously unknown archaeology or heritage sites by tracking of machinery and siting of compounds and material spreading areas.	The area has been previously dredged (in the 1960s). The project will not result in the widening or deepening of the channel beyond the widths and depths originally dredged in the 1960s. See above in terms of consultation with the South West Heritage Trust.	X	Not applicable.
Landscape and visual					
Change to, and deterioration in condition or quality of local landscape character	1, 2, 3, 4, 5	Changes in channel morphology. Loss of vegetation on banks / temporary scarring until revegetates. Possible secondary effects such as undercutting of banks.	Channel will become wider, but not more so than it has previously been following past widening and dredging works. No change to the fundamental nature of the landscape character is anticipated and any changes to be at a localised level. De-vegetation to be temporary.	X	Not applicable.
Visual	1, 2, 3,	Potential visual intrusion to	Visual intrusion will be temporary and slight.	X	Not applicable.

Resource/ Environmental Receptor	Cause of potential effect	Description of potential effect	Scoping justification	Scoping outcome ✓: Scoped in X: Scoped out	Methods of assessment
intrusion	4, 5	residential receptors associated with the left bank; and users of the long distance path running along the right flood embankment. Visual intrusion arising due to dredging works, placement of dredged materials and siting of compounds	The works are typical of frequent routine operations in the same location for annual maintenance dredging of rhynes and weed control.		

6 ES CONTENTS

175 Following the results of the scoping exercise set out in Section 4, the following chapters will therefore be produced as part of the Environmental Statement:

- ES Non-Technical Summary (NTS) – a summary of the key issues and findings of the EIA
- ES Volume 1 – will comprise the full text of the EIA with chapter headings as follows.
 - Chapter 1 Introduction and the EIA Team.
 - Chapter 2. Description of Development Proposals
 - Chapter 3. The Consenting Regime
 - Chapter 4. Need and Alternatives
 - Chapter 5. Approach to Preparing the ES
 - Chapter 6. Policy and Legal Content
 - Chapter 7. Population
 - Chapter 7. The Water Environment
 - Chapter 8. Biodiversity
 - Chapter 10. Cumulative Effects
 - Chapter 11. Summary of Significant Effects and Proposed Mitigation
 - Glossary
- ES Volume 2 - Figures
- ES Volume 3 – Technical Appendices (providing supplementary information for the various technical studies)
 - This will also include:
 - Baseline Studies
 - Habitats Regulations Assessment
 - WFD Assessment

APPENDIX A – HABITAT MAPS



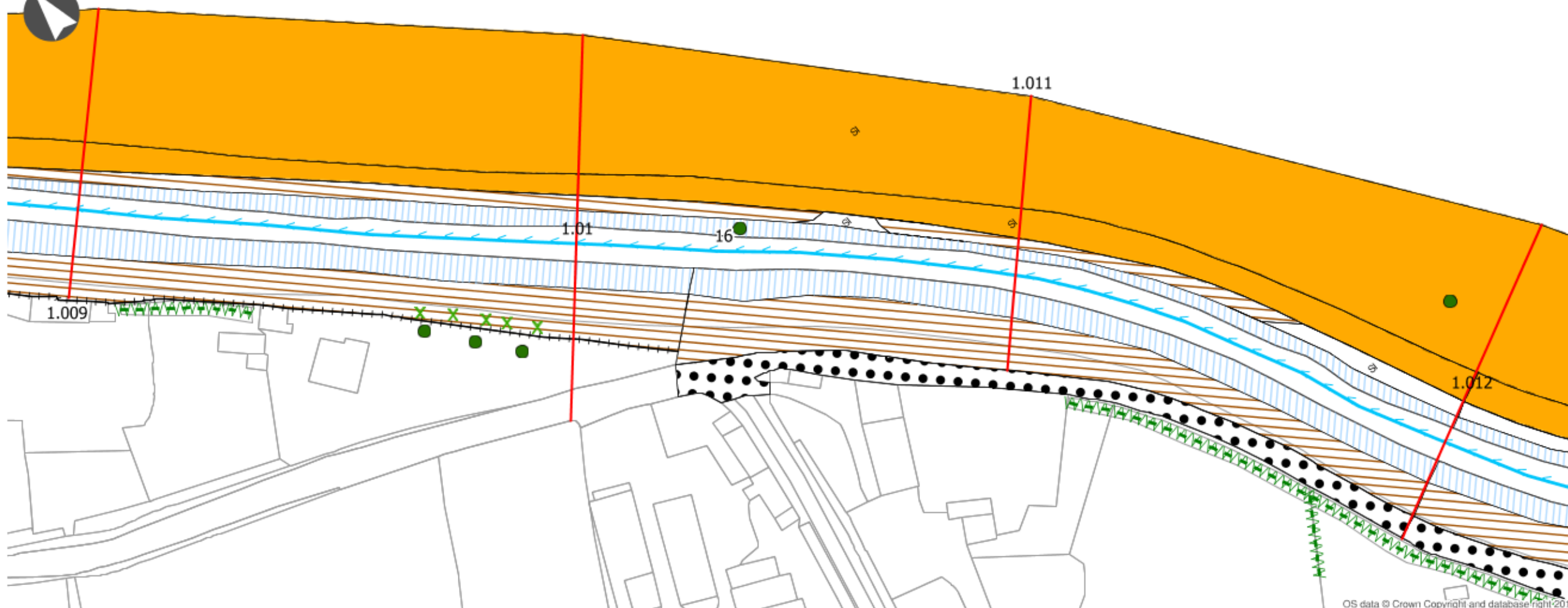
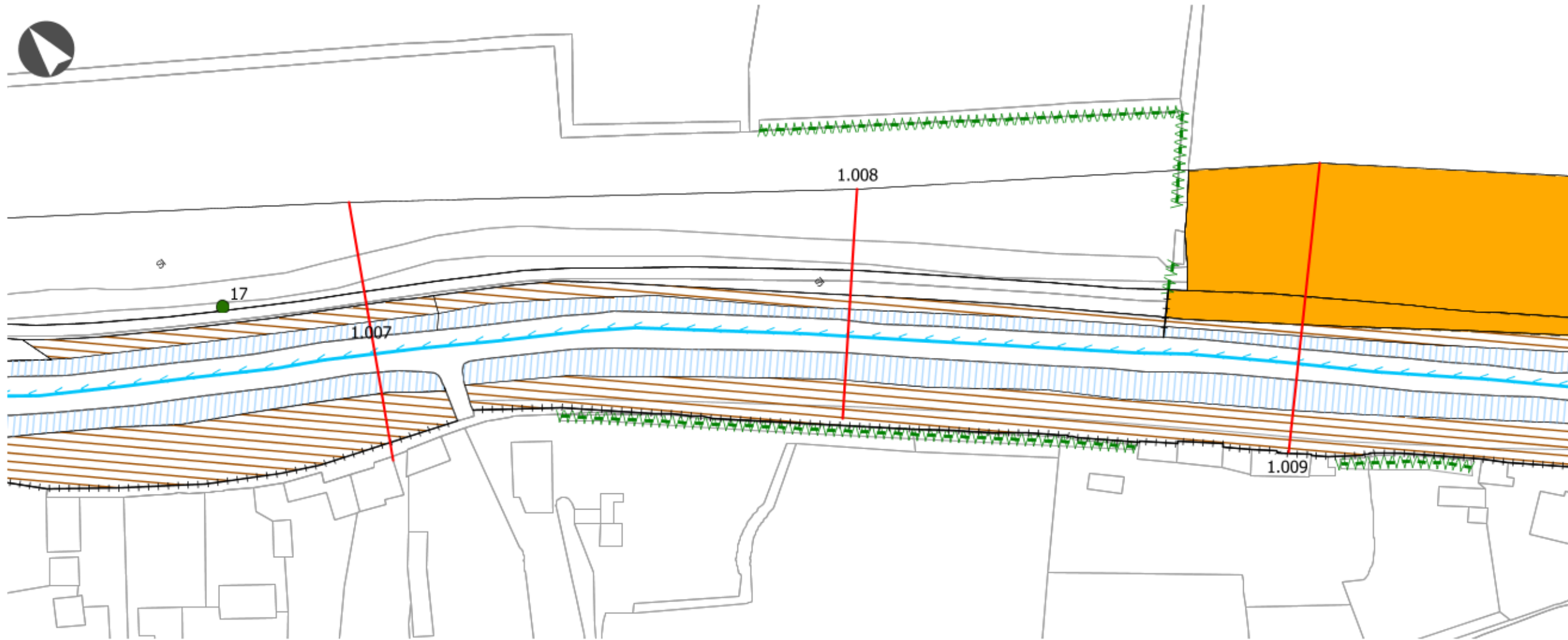
CLIENT
Somerset Levels Drainage Boards Consortium

PROJECT
Oath to Burrowbridge Dredging

TITLE
Survey sheets 1 and 2

SCALE @ A3	CREATED BY	CHECKED BY
1:1,000	MM	JW
REFERENCE	REVISION	DATE ISSUED
J00256.P1.s1/s2		15/6/2018

- Broadleaved tree
- X Scrub
- ⊙ Target note
- G2 - Running water
- X—X— J2.2.1 - Defunct hedge - native species-rich
- - - J2.4 - Fence
- SI B2.2 - Neutral grassland - semi-improved
- SI B6 - Poor semi-improved grassland
- / / / C3.1 - Other tall herb and fern - ruderal
- / / / F2.1 - Marginal and inundation - marginal vegetation



JOHNS
ASSOCIATES

CLIENT

Somerset Levels Drainage Boards Consortium

PROJECT

Oath to Burrowbridge Dredging

TITLE

Survey sheets 3 and 4

SCALE @ A3

1:1,000

REFERENCE

J00256.P1.s3/s4

CREATED BY

MM












REVISION

CHECKED BY

JW

DATE ISSUED

15/6/2018

-  Broadleaved tree
-  Scrub
-  Target note
-  G2 - Running water
-  J2.2.1 - Defunct hedge - native species-rich
-  J2.4 - Fence
-  B2.2 - Neutral grassland - semi-improved
-  B6 - Poor semi-improved grassland
-  C3.1 - Other tall herb and fern - ruderal
-  F2.1 - Marginal and inundation - marginal vegetation
-  J4 - Bare ground



JOHNS
ASSOCIATES

CLIENT

Somerset Levels Drainage Boards Consortium

PROJECT

Oath to Burrowbridge Dredging

TITLE

Survey sheets 5 and 6

SCALE @ A3

1:1,000

REFERENCE

J00256.s5/s6

CREATED BY

MM

REVISION

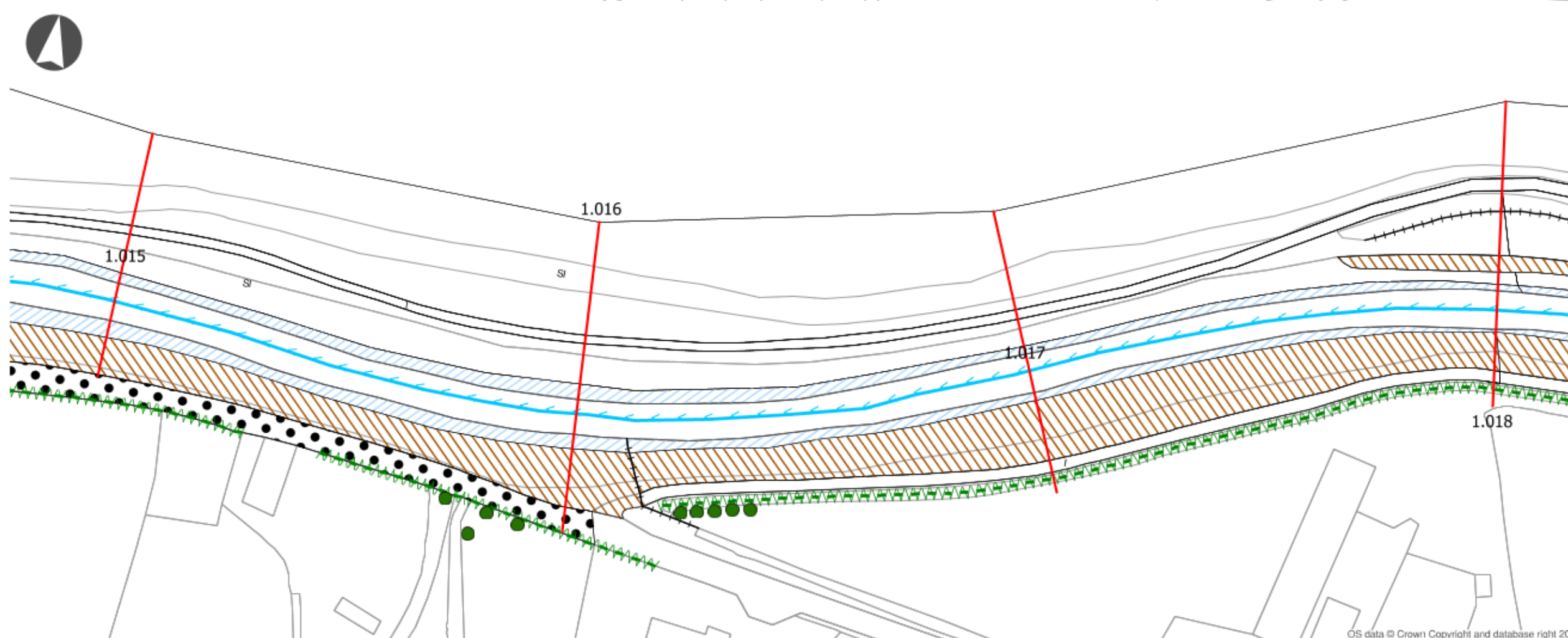
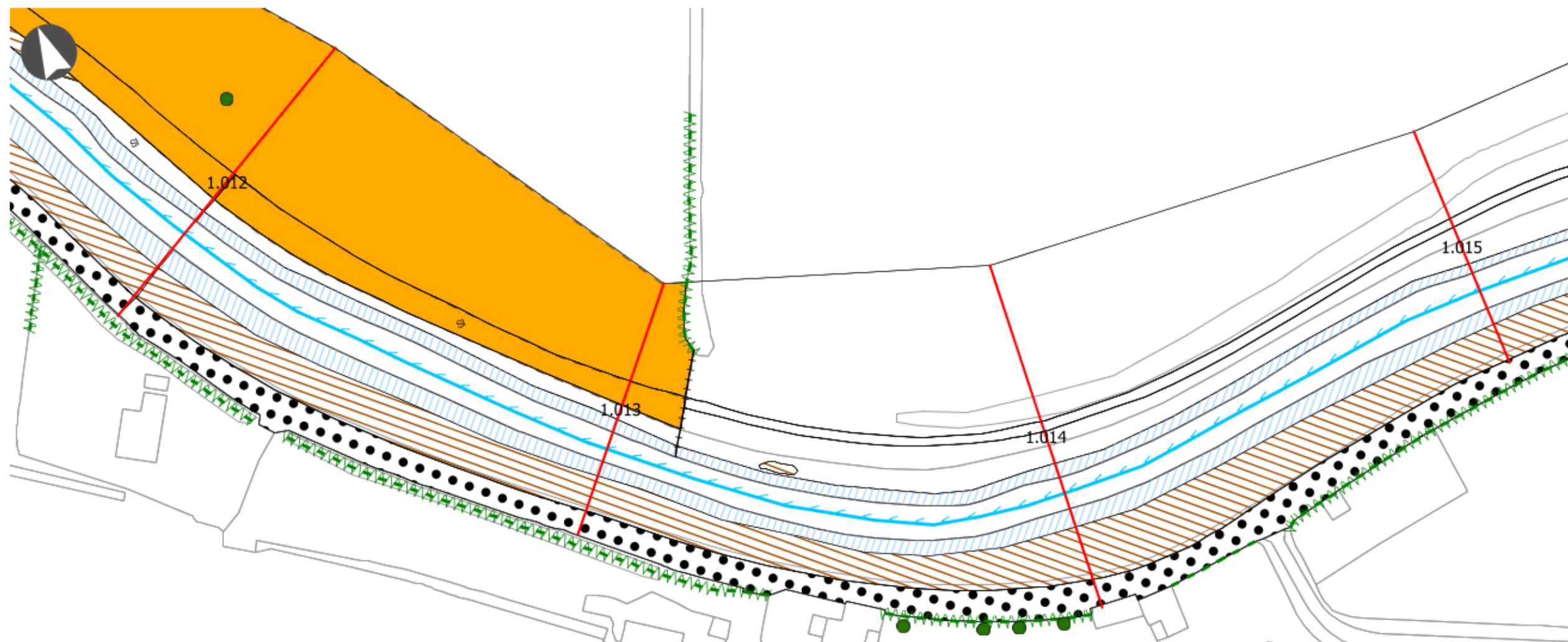
CHECKED BY

JW

DATE ISSUED

15/6/2018

- Broadleaved tree
- Scrub
- Target note
- G2 - Running water
- J2.2.1 - Defunct hedge - native species-rich
- J2.2.2 - Defunct hedge - species-poor
- J2.4 - Fence
- B2.2 - Neutral grassland - semi-improved
- B4 - Improved grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation
- J4 - Bare ground





JOHNS
ASSOCIATES

CLIENT

Somerset Levels Drainage Boards Consortium

PROJECT

Oath to Burrowbridge Dredging

TITLE

Survey sheets 7 and 8

SCALE @ A3

1:1,000

REFERENCE

J00256.s7/s8

CREATED BY

MM

REVISION

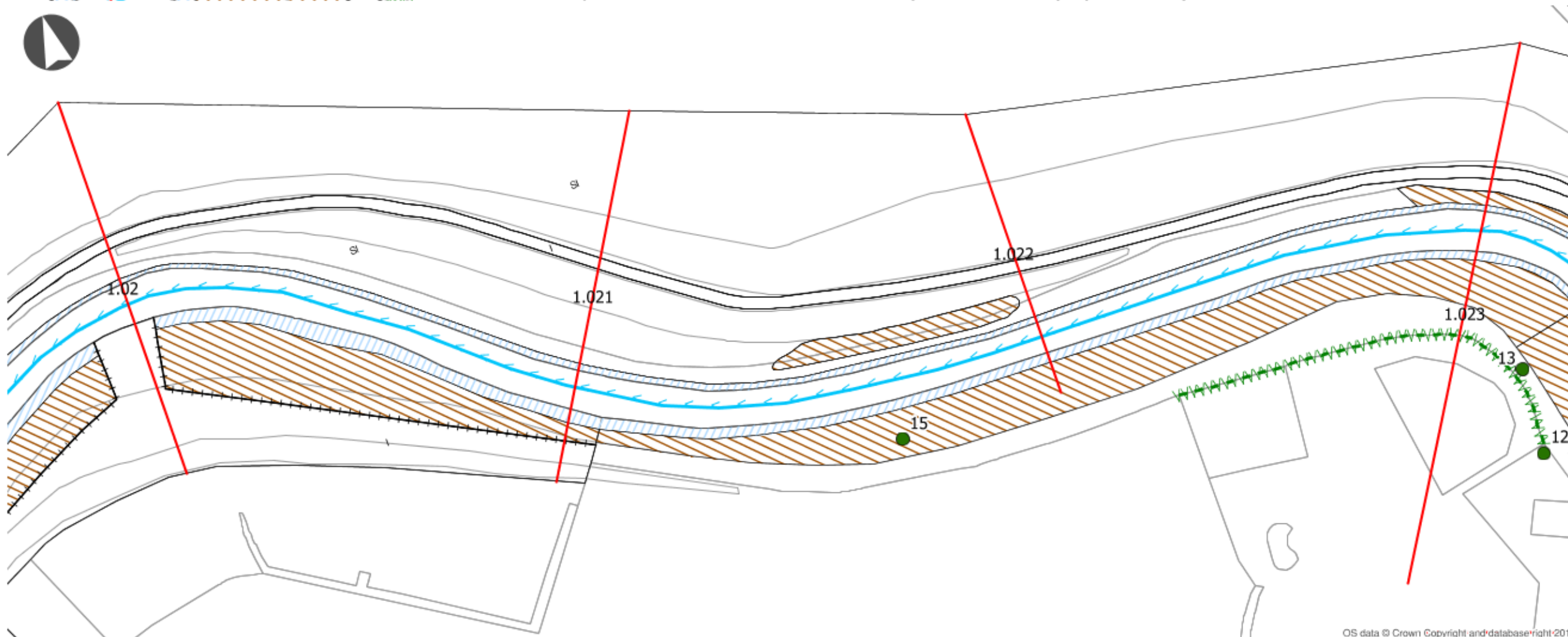
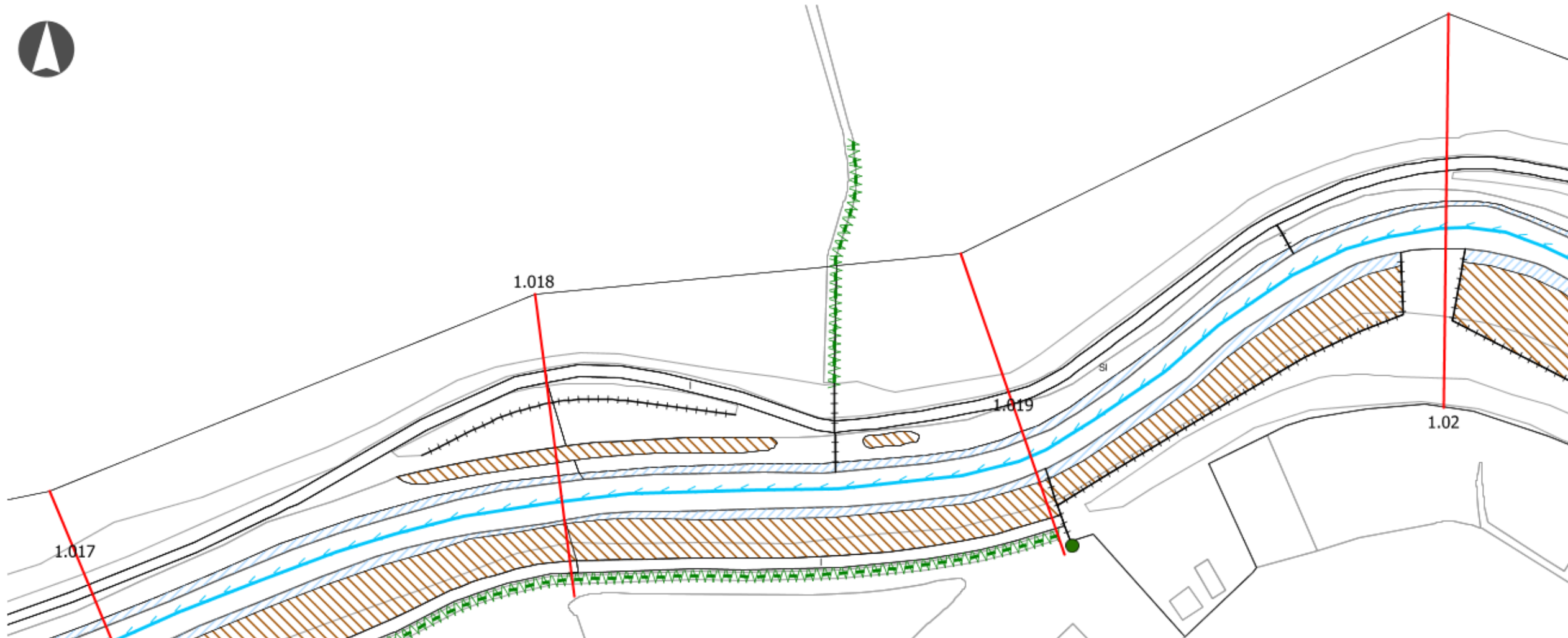
CHECKED BY

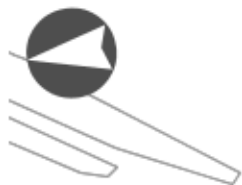
JW

DATE ISSUED

15/6/2018

- Broadleaved tree
- Scrub
- Target note
- G2 - Running water
- J2.2.1 - Defunct hedge - native species-rich
- J2.4 - Fence
- B4 - Improved grassland
- B6 - Poor semi-improved grassland
- C3.1 - Other tall herb and fern - ruderal
- F2.1 - Marginal and inundation - marginal vegetation





JOHNS
ASSOCIATES

CLIENT

Somerset Levels Drainage Boards Consortium

PROJECT

Oath to Burrowbridge Dredging

TITLE

Survey sheets 9 and 10

SCALE @ A3

1:1,000

REFERENCE

J00256.s9/s10

CREATED BY

MM




REVISION

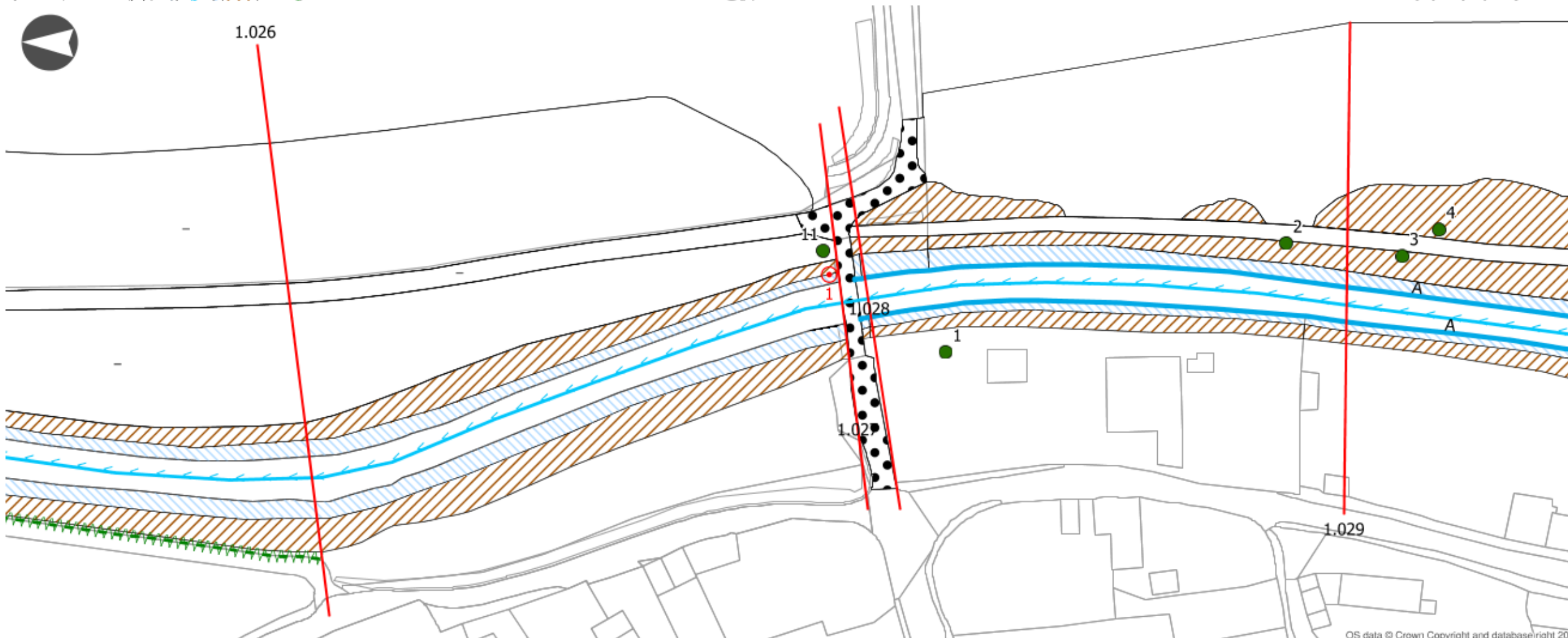
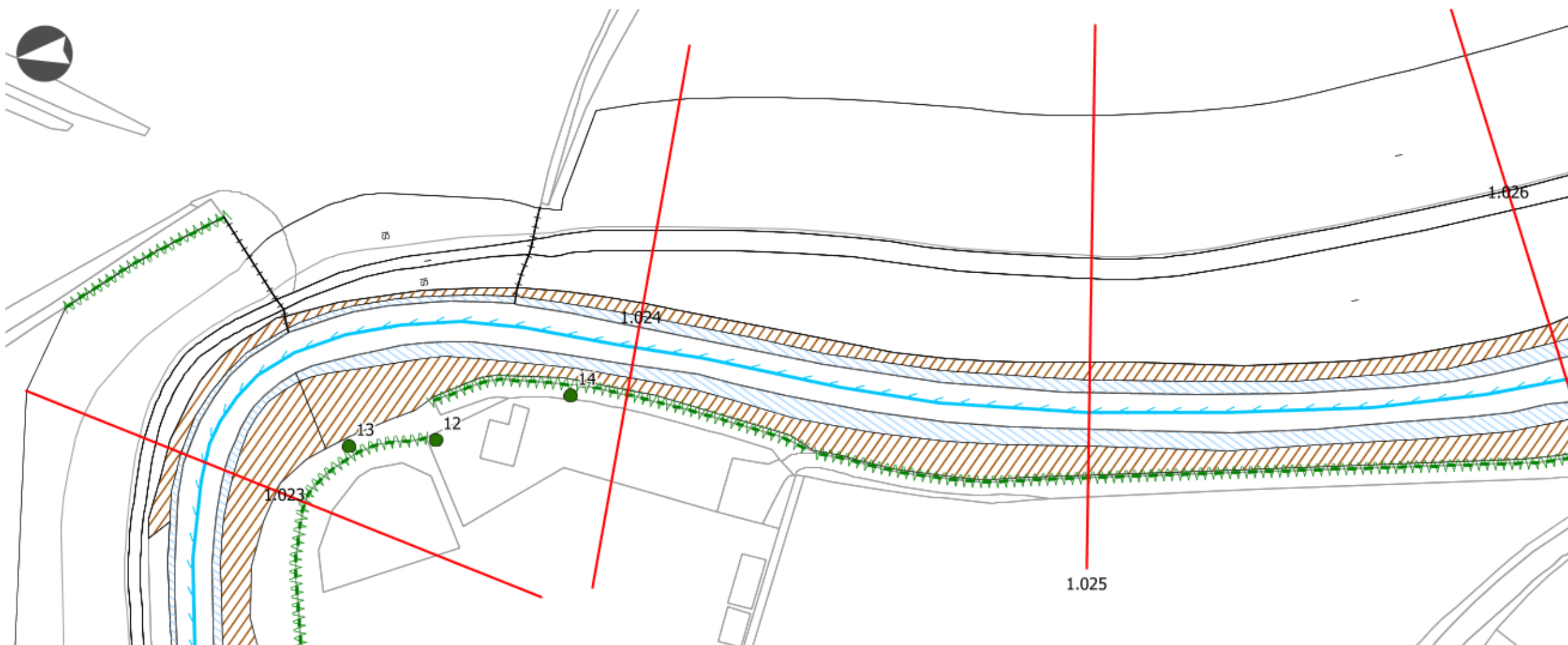
CHECKED BY

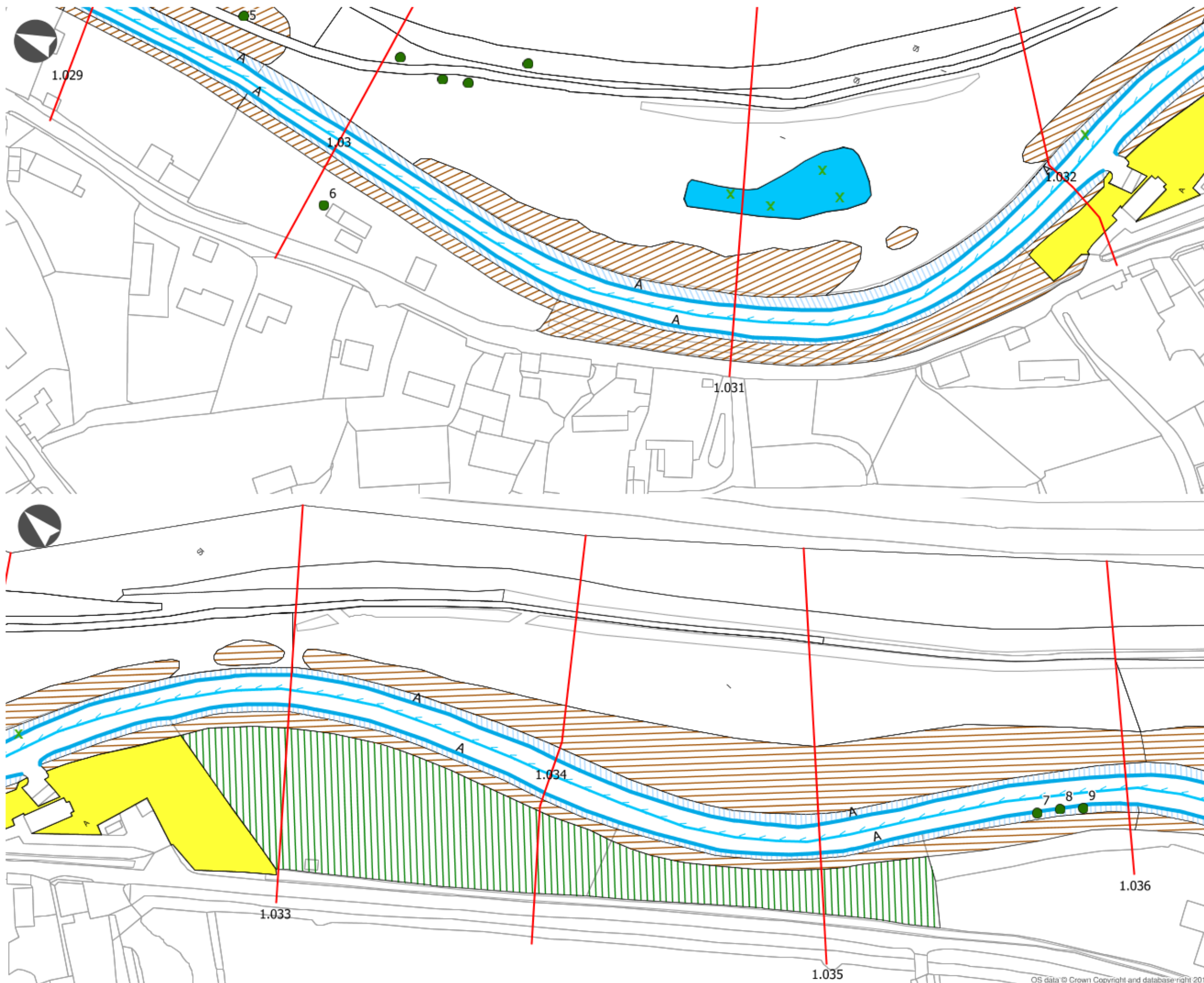
JW

DATE ISSUED

15/6/2018

-  Broadleaved tree
-  Scrub
-  Target note
-  G2 - Running water
-  J2.2.1 - Defunct hedge - native species-rich
-  Aquatic macrophytes
-  B4 - Improved grassland
-  B6 - Poor semi-improved grassland
-  C3.1 - Other tall herb and fern - ruderal
-  F2.1 - Marginal and inundation - marginal vegetation
-  J4 - Bare ground





JOHNS
ASSOCIATES

CLIENT

Somerset Levels Drainage Boards Consortium

PROJECT

Oath to Burrowbridge Dredging

TITLE

Survey sheets 11 and 12

SCALE @ A3

1:1,250

REFERENCE

J00256.s11/s12

CREATED BY

MM

REVISION

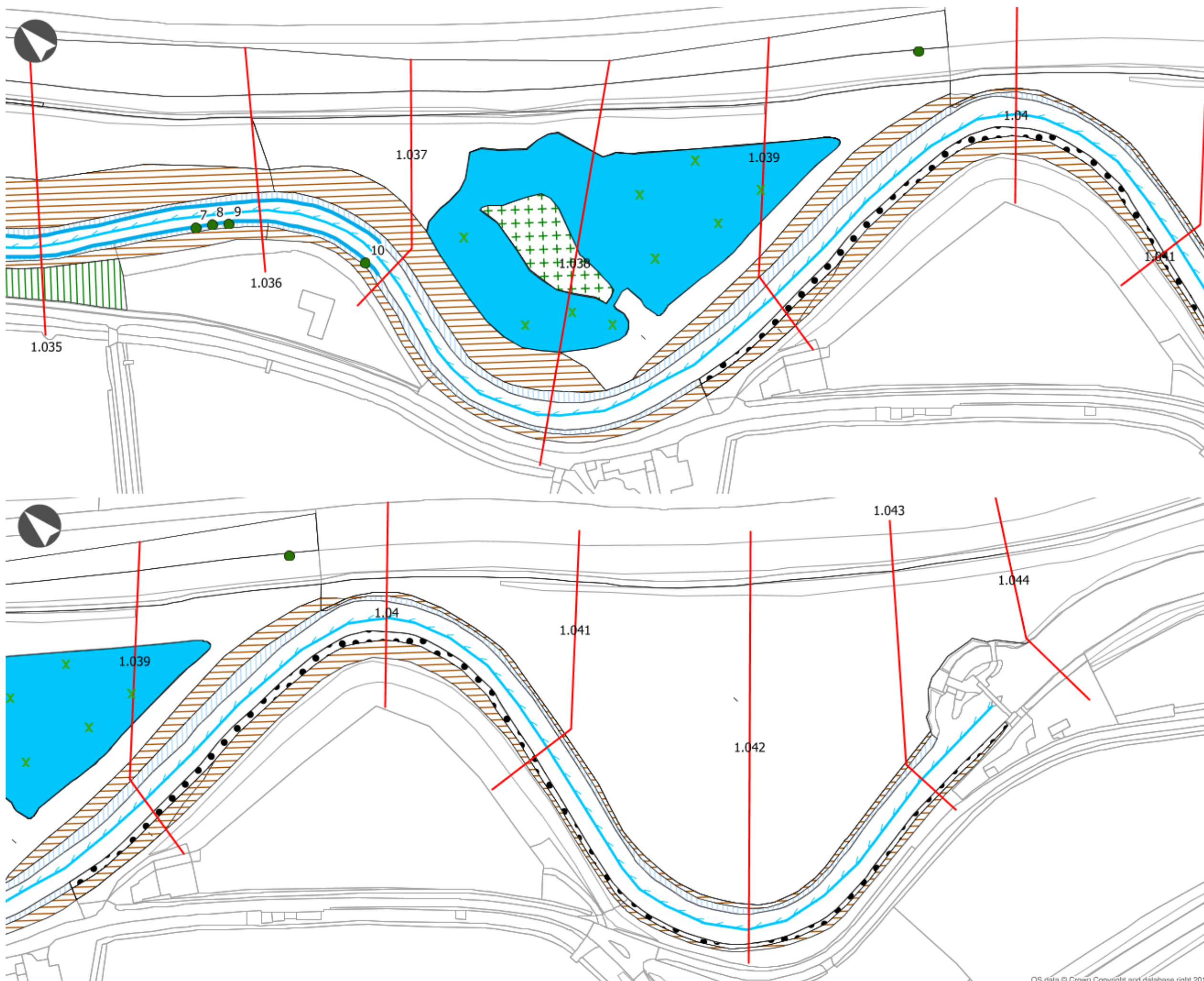
CHECKED BY

JW

DATE ISSUED

15/6/2018

- Broadleaved tree
- x Scrub
- Target note
- G2 - Running water
- A Aquatic macrophytes
- ▨ A1.1.2 - Broadleaved woodland - plantation
- ▨ B4 - Improved grassland
- ▨ B6 - Poor semi-improved grassland
- ▨ C3.1 - Other tall herb and fern - ruderal
- ▨ F2.1 - Marginal and inundation - marginal vegetation
- A J1.2 - Cultivated/disturbed land - amenity grassland











CLIENT
Somerset Levels Drainage Boards Consortium

PROJECT
Oath to Burrowbridge Dredging

TITLE
Survey sheets 13 and 14

SCALE @ A3	CREATED BY	CHECKED BY
1:1,750	MM	JW
REFERENCE	REVISION	DATE ISSUED
J00256.s13/s14		15/6/2018

-  Broadleaved tree
-  Scrub
-  Target note
-  G2 - Running water
-  Aquatic macrophytes
-  A1.1.2 - Broadleaved woodland - plantation
-  A2.2 - Scrub - scattered
-  B4 - Improved grassland
-  B6 - Poor semi-improved grassland
-  C3.1 - Other tall herb and fern - ruderal
-  F2.1 - Marginal and inundation - marginal vegetation
-  G1 - Standing water
-  J4 - Bare ground
-  Oath_To_Burrowbridge