W.A. Adams Partnership

Claydon Marina

Follow-up report – Revision 3

858429

RSK GENERAL NOTES

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1 SCOPE OF THIS REPORT

This report aims to address several objections raised by the Environment Agency (EA) to the proposed Claydon Marina development at Claydon, Oxfordshire. As per the correspondence between the EA and Mr Bob Duxbury of Cherwell District Council dated 13th July 2018 (EA ref: WA/2018/125260/01-L01) four primary objections were raised by the EA;

1. Proposed development incompatible with flood zone;
2. Inadequate FRA;
3. Assessment and mitigation of the risks to nature conservation and fisheries are inadequate, and;
4. Use of non-mains foul drainage system in a publicly sewered area.

It is understood that the planning application was re-submitted along with further supporting documents and amended plans, including a Biodiversity Impact Assessment produced by RSK[1]. This application once again raised several objections as per correspondence between the EA and Bob Duxbury dated 24th April 2019 (EA ref: WA/2018/125260/02-L01). The EA upheld many of their original objections in addition to raising several more relating to the impacts of the development on the adjacent Wormleighton Brook.

This report provides the RSK response to the following questions concerning the risks to nature and fisheries relating to objection 3;

- potential impacts of the proposals on the watercourse adjacent to the site (Wormleighton Brook) and relevant mitigation, including concerns over placement of headwalls at the lake overflow and treatment works locations;
- enhancement options and mitigation for otters;
- proximity of the development to the North Claydon Disused Railway local wildlife site and potential options for habitat improvements or creation of complementary habitat to improve connectivity; and
- response to queries from the council ecology officer regarding calculation methods used in the RSK biodiversity impact assessment report.

[1] RSK, 856968 Claydon Marina Biodiversity Impact Assessment, February 2019

2 WORMLEIGHTON BROOK

Wormleighton Brook, a tributary of the River Cherwell, flows in a south-easterly direction adjacent to the northern boundary of the proposed development site. The brook is predominately bordered by farmland (a mix of arable and pasture) and flows for *c.*2.5 km before joining the Highfurlong Brook which in turn flows into the River Cherwell at Cropredy (*c.*5 km downstream of the proposed development site).

2.1 Walkover survey

On 13 May 2019 a RSK senior aquatic ecologist (Nick Monaco) undertook a walkover survey of the brook from *c.*250 m downstream to *c.*250 m upstream of the proposed development extent, a total distance of *c.*1.5 km. The survey methodology has been adapted from that outlined in Hendry & Cragg-Hine (1997[2]) such that it incorporates habitat types for all species of fish and for other species such as otter, water vole, crayfish etc. Throughout this report standard bank naming conventions will be used with the right-hand bank (RHB) and left-hand bank (LHB) determined when facing in a downstream direction.

Water levels appeared to be low at the time of survey with evidence of higher flows observed in the form of scouring on the banks and small depositional bars. The substrate throughout the brook was a mixture of clay, silt and pebbles with some areas of coarser substrate (cobbles) noted within areas of shallow, faster flowing habitat (riffle / run flow type).

At the upstream extent of the survey area (SP 45788 51385) the brook meanders through an area of woodland within the North Claydon Disused Railway Local Wildlife Site (LWS). This section is characterised by shallow water depth (*c.*5-20 cm depth), a silted, clay substrate and slow, or imperceptible flow; primarily a result of impoundment from several coarse woody debris (CWD) dams within the brook (Figure1). A surface film was noted at several impounded areas. Some small sections of very shallow run or riffle habitat with a silted pebble / gravel substrate were noted. The brook flows into a shallow culvert *c.*25 m long under Boddington Road before continuing downstream adjacent to the proposed development area.

[2] Hendry K & Cragg-Hine D (1997). Restoration of riverine salmon habitats. Fisheries Technical Manual 4 Environment Agency, Bristol.

Figure 1 - Typical habitat (shallow glide) upstream of the proposed development

The channel downstream of the culvert is similar to the upstream channel with shallow areas of slow flowing glide or no perceptible flow. Short sections of shallow run or riffle were noted, particularly alongside depositional features such as side or point bars. Several CWD dams were present creating short impoundments of deeper (*c.*20 cm) glide. The development incudes plans for a small headwall within this section (outfall from the proposed clubhouse sewage treatment plant) approximately 250 m downstream of the culvert. The habitat around the proposed headwall location is a mixture of shallow glide and shallow run (<10 cm depth) over a mixed substrate of clay and silted pebble and gravel. The proposed headwall location is on the RHB which is tall, steep and vegetated (Figure.2).

Figure 2 – Facing upstream looking at the approximate proposed headwall location

A short distance downstream of the proposed headwall location the channel has been historically re-aligned for *c.*400 m, presumably during construction of the now defunct railway, of which little visible evidence still exists except for old fencing. Access is poor along much of this reach being inhibited by dense riparian vegetation. Sufficient gaps existed to permit a survey to be undertaken. Habitat does not vary significantly in this reach from that present upstream being predominantly a mix of shallow glide and very shallow run over a mix of clay and silted pebble / gravel substrates (Figure.3).

Downstream of this section the brook meanders gently with shallow run, glide and CWD present, before flowing into a deeper section of glide upstream of a culvert. A second proposed headwall is to be placed on the RHB *c.*60 m upstream of the culvert. The habitat at this proposed headwall location is broadly similar to that encountered upstream, mainly silted, shallow glide with a short section of very shallow, faster flowing run.

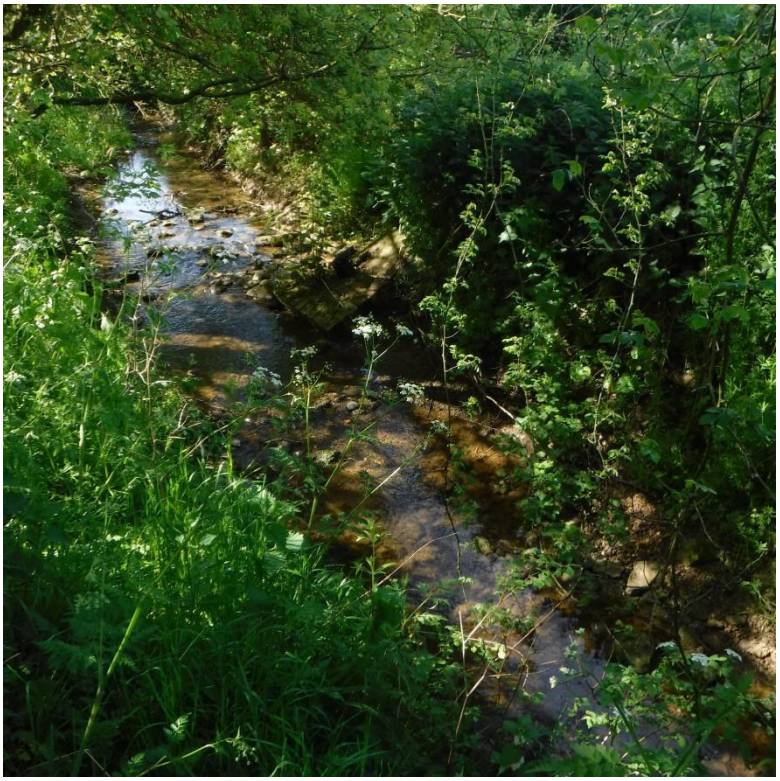

Figure 3 - Shallow run habitat within historic straightened section

As the brook exits the culvert it flows through an over-deepened section with the RHB being particularly steep and overgrown (Figure 4). Flows are sluggish throughout this section mainly comprising shallow glide (*c.*10 – 30 cm depth). This section represents the first part of the survey reach outside of wooded areas and as such shading is significantly reduced allowing emergent macrophyte species to grow within the channel. This section may provide potential water vole (*Arvicola amphibious*) habitat.

The brook continues downstream passing under a footbridge before entering a pasture field. The footbridge lies at the extent of the proposed developer's land along the RHB of the brook. Evidence of bank slump is present throughout the pasture field along the RHB and is likely to be a result of historic cattle trampling. Although a small barbed wire fence was present along the top of the bank and no cattle were present at the time of survey. The habitat within this section is a continuation of the previous shallow, silted glide with sometimes dense emergent macrophyte coverage, particularly in marginal areas of the channel. The southeast extent of this pasture field, accessed from a public footpath represents the downstream extent of the survey area (SP 46998 50574). Further landowner permissions were not obtained beyond this extent and thus surveys could be undertaken past this point.

Figure 4 - Facing upstream - over-deepened section with glide habitat

2.2 Water Framework Directive (WFD) classification

Wormleighton Brook forms part of the Clayton & Wormleighton Brook, Source to Highfurlong Brook WFD waterbody (GB106039037370). The waterbody is classified as in 'poor' condition (2016), primarily due to elevated phosphate, high ammonia and low dissolved oxygen levels. Ecologically the waterbody is classed as 'good' for macroinvertebrates but 'poor' for macrophyte and phytobenthos leading to an overall 'poor' ecological classification (2014 – 2016)[3]. Possible causes of the catchment failing to achieve good ecological status include poor nutrient management (agricultural) and livestock practices and suspected sewage discharge[3].

2.3 Summary

The variety of in-channel habitats is poor, predominately a result of low-flows within the brook. The dominant habitat was silted glide and whilst areas of run (and in higher flows potentially riffle) exist the lack of depth over these habitats at the time of survey limits their functionality as fish habitat for most species. Although a fish community assessment was not requested for this survey a single fish species was observed within the brook during the walkover; three-spined stickleback (*Gasterosteus aculeatus*) were seen in small numbers throughout many of the glide sections. These are a hardy species tolerant of a range of environmental conditions and stressors.

3 https://environment.data.gov.uk/catchment-planning/WaterBody/GB106039037370

No signs of otter were observed during the walkover survey although previous surveys by RSK identified a footprint next to the brook[4].

Previous water vole surveys undertaken by RSK[4] found no signs within the brook but noted that potential habitat for water vole is present towards the downstream extent of the proposed development site as described in section 2.1 of this report.

No signs of crayfish were observed during the walkover survey however a thorough crayfish survey was not undertaken as part of this assessment. On-site conditions (silted, low oxygen[3]) and the site location with the River Cherwell catchment would suggest that should any crayfish present within the waterbody they are likely be the invasive non-native signal crayfish (*Pacifastacus leniusculus*) rather than the protected, native white-clawed crayfish (*Austropotamobius pallipes*).

2.4 Potential impacts and recommendations

RSK understands that should planning permission be granted a full construction environmental management plan (CEMP) will be produced by the client. The CEMP should take into account the findings of this habitat survey and RSK's previous preliminary ecological appraisal (PEA) report[4] and include appropriate mitigation to avoid negatively impacting upon Wormleighton Brook and its surrounding habitats during the construction phase of the development. Potential impacts may include:

- Site runoff - given the relatively shallow gradient of the proposed development site and its distance from the brook site runoff is likely to be minimal, particularly when compared to background issues within the catchment (agricultural runoff and current obvious siltation of the bed) however measures to prevent excess runoff should be included in the CEMP which may include the use of silt curtains (particularly upon headwall installation) and channelling of site runoff into silt traps, located away from the watercourse.
- Headwall installation – disturbance to the banks and bed of the brook should be minimised as much as practicable. Having an ecological clerk of works (ECoW) on site during headwall installation would be advisable to assess the exact placement locations for protected species (such as water vole & white-clawed crayfish) and provide advice to minimise disturbance to the watercourse.
- Sewage treatment plant discharge – discussed in further detail below.
- Lake overflow – RSK understands that upon completion all surface water from outside of the marina dam will drain into a large swale which will itself then drain into a purpose-built lake. An overflow will be present on the lake to drain excess water into the brook via a headwall. Given the size of the proposed lake compared to the area it is designed to drain it is considered unlikely that large volumes of water will be discharged from the overflow and into the brook. Planting of reedbeds (to act as additional filtration close to the overflow) and other aquatic vegetation combined with a lack of fish within the lake (no fish stocking is planned) should ensure that water is of sufficiently high quality to minimise any risks to the brook in the event of discharge from the overflow. A gaugeboard should be added

[4] RSK, 856968 Claydon Marina – Preliminary Ecological Appraisal, April 2018

to the overflow so that lake levels can be monitored and regular water quality testing should be undertaken on the lake. A sampling programme should be discussed and agreed with the Environment Agency.

2.4.1 Discharge from package treatment plant

It is understood that the client is intending to install a package treatment plant (PTP) to treat waste water from the clubhouse drainage system rather than connect to the mains sewer system. RSK understand that revised calculations from the flood risk assessment and drainage consultants indicate that the maximum discharge will be *c.*2360 litres per day. This is equivalent to 3 four bedroom dwellings, a reduction from the initial estim ate of 20 dwellings[5]., The closest mains sewer is located *c.*870 m from the development and Environment Agency guidelines stipulate that connection to a mains sewer is required if a development exceeds 29 dwellings or is within 600 m of a mains sewer. According to these guidelines there is no requirement for connecting to the mains sewer system and it is understood that to do so would be a significant increase in cost.

In order to release treated effluent directly to the brook a discharge licence must be obtained from the EA. To obtain this licence various criteria must be met, one of which is that the PTP must meet current standards (BS EN 12566-3) and that a written management system detailing amongst other things inspection, repair and service arrangements and schedules should be produced. BS EN 12566-3 specifies upper limits for ammonia, suspended solids and biochemical oxygen demand (BOD) which all new PTP's must meet. Despite elevated phosphorous levels generally being a common component of treated effluent (and indeed one of the primary reasons for Wormleighton brook not achieving 'good' WFD status), phosphorous is not included within the standard.

RSK understand that the client plan to install a modern, four-stage PTP with a treatment capacity far exceeding that of the estimated discharge from the clubhouse. The PTP will be fully compliant with EA regulations and BS EN 12566-3 and will be subject to regular maintenance and testing. It is understood that installation, servicing, maintenance of the PTP and testing of final effluent will be undertaken by a specialist contractor at agreed intervals, in-line with the manufacturers and regulators requirements. The final effluent discharged from the PTP is expected to be significantly below regulatory limits for BOD, suspended solids and ammonia. Following further discussions between SBRice Ltd and RSK it has been agreed that final effluent will also be directed through a reedbed (*Phragmites australis*) before entering the brook to further reduce nutrient levels including phosphorous.

As stated previously Wormleighton Brook's WFD classification is currently listed as 'poor' (see Section 2.2) primarily due to elevated phosphate, ammonia and low oxygen levels all parameters which can be potentially exacerbated by the addition of an incorrectly sized or poorly maintained PTP. However, the steps proposed by the client of installing a fully compliant, oversized and rigorously maintained PTP with an additional reedbed filtration stage should ensure release of the cleanest possible discharge into the brook, significantly below regulatory limits,

[5] Pers Comm from Stephen Rice (SB Rice Ltd) to Nick Monaco (RSK) 03.07.2019

3 ENHANCEMENT OPTIONS AND MITIGATION FOR OTTER

As the results of RSK's habitat walkover of Wormleighton Brook show, it is considered likely to support only small, hardy fish species such as three-spined stickleback and as such is likely to be of negligible value as a feeding ground for European otter (*Lutra lutra*). However, otter are known to be in the area with a footprint being found *c.*100 m downstream of the proposed development site and a spraint present on the canal during RSK's PEA in 2017. It is therefore feasible that otters may use the brook as a corridor to access other parts of their range and as such the development should seek to minimise impacts along the brook corridor. RSK understands that excluding the placement of two small headwalls along the brook, the channel and surrounding woodland corridor will not be directly impacted by the development. Time required to install the headwalls should be kept to a minimum and an ECoW should be present on-site to assess habitat at the exact installation location prior to and during headwall placement (and prior to any de-veg works). Works should also be timed to account for any seasonal restrictions e.g. outside of breeding bird season.

RSK understand that the developer intends to use subdued lighting throughout the site and as such impacts on otter will likely be minimal, particularly if this is located away from the periphery of the site and positioned in such a way so as not to illuminate the brook corridor.

Vegetation covering the banks of the brook along the north-eastern boundary should be allowed to grow and be left undisturbed post-construction to provide cover for otter and increase the potential water vole habitat which was previously noted by RSK within this section. Following discussions between RSK and SBRice Ltd the strip of LWS land between the northern red line boundary and the hedge / fence line which is currently used as an access track will now be planted, to enhance the LWS and provide additional cover for, and reduce disturbance to otter along the brook corridor. Revised planting plans for this LWS strip are discussed in further detail in section 4 of this report.

As the proposed development is unlikely to impact upon any existing holts (as none were found on or adjacent to the site) RSK do not consider it a necessity that an artificial holt is constructed but can provide guidance on design and placement if required.

In summary RSK propose the following mitigation and enhancement options:

- ECoW present on site to assess exact headwall locations prior to de-veg and during installation.
- Use of subdued lighting is already planned, ensure this is located away from the watercourse so as not to illuminate the brook corridor.
- Planting and maintenance of additional habitat outside of the sites northern red line boundary (part of the North Claydon Disused Railway LWS) to provide additional cover and habitat connectivity between the watercourse and the boundary of the proposed development.

- Leave the banks along the north-eastern boundary of the site (adjacent to the brook) undisturbed and uncut to encourage vegetation growth for otter and water vole.

4 CONNECTIVITY WITH LWS

The North Claydon Disused Railway local wildlife site is located along the northern boundary of the development (Figure 1), encompassing the now little used agricultural access track and part of the arable field and the woodland corridor through which Wormleighton Brook flows. The LWS is known to contain areas of scrub and rough wet grassland[6] with the section along the development boundary composed predominately of rough grassland. Scrub is noted by the Thames Valley Environmental Record Centre (TVERC) as an uncommon habitat throughout much of Oxfordshire[5], and current proposals plan to incorporate scrub habitat within the development site which will include at least three woody species, no weeds or invasive species and will have a good age range and a well-developed edge[7].

Following discussions between RSK and SBRice Ltd the developer has agreed to plant and manage the LWS strip in a manner which improves connectivity of the LWS to the surrounding habitats including those proposed within the development site. RSK propose that hedgerow / woody scrub species are planted along the existing hedge / fence line to increase the scrub habitat within the LWS and provide an additional buffer against disturbance of the river corridor. Across the remainder of the LWS strip between the proposed hedge to the north and existing development boundary to the south wildflower planting is proposed.

Figure 1 shows the location of the local wildlife site (LWS) to be enhanced as part of the proposed development. As stated the LWS is outside of the development boundary and the proposed enhancements relate to improving connectivity and strategic creation of habitat opportunities. As these factors are not included in the current version of the biodiversity calculator, it has been deemed inappropriate to use the calculator to assess the potential biodiversity gain from the LWS habitat improvements.

[6] TVERC, background data search TVERC Ref: TVERC/16/760, 2017.

[7] RSK, 856968 Claydon Marina Biodiversity Impact Assessment, February 2019


Site boundary
Indicative location of Local Wildlife Site (LWS)
Spa
Daventry
Southam
Towcester
Silverstone
Banbury
Brackley
Claydon Marina
RSK
Figure 1
Location of Local Wildlife Site to be Enhanced
Scale = 1:3,000 @ A3
© 2019 Microsoft Corporation © 2019 DigitalGlobe ©CNES (2019) Distribution Airbus DS

5 BIA REPORT CLARIFICATIONS

Clarification and further information on the calculations used and conclusions drawn in the RSK Biodiversity Impact Assessment (BIA) report[8] have been requested by Cherwell / South Northants Council Ecology Officer Dr Charlotte Watkins[9]. The clarifications refer to the 'time to target condition' and 'difficulty to create habitats' multipliers as well as the distinctiveness value of the marina and irrigation lake.

When carrying out the original calculations it was felt that the negative multipliers for time to target condition and difficulty to create habitats were too cautious for the simple to create habitats being proposed. The proposed works would be completed and established in less than five years which was the lowest multiplier for time to target condition and most of the habitats would have been easy to create in the proposed conditions, so the multipliers were set as one.

It has also been suggested that due to disturbances of people and boat movements the marina would have less biodiversity value than a typical body of standing water. Similarly, the lake is an irrigation lake and could be drained at times. Whilst it is not guaranteed that a marina would provide habitat of the same quality as a more naturalised, less-disturbed stillwater and the presence of a large concentration of people and boats can lead to additional environmental issues (i.e. pollution, litter) a marina can still provide an important habitat for aquatic organisms such as fish and macroinvertebrates. The presence of floating and tethered structures such as boats and pontoons provide refuge for juvenile fish and stands of submerged or marginal emergent macrophyte provide habitat for fish and macroinvertebrates. The proposed development incorporates planting of aquatic macrophyte species, notably surrounding a spit of land jutting into the marina which has been designed for wildlife. With regards to the irrigation lake the client has confirmed that this will not be fully drained and should provide beneficial habitat for macroinvertebrates and birds away from the disturbance within the marina itself.

To be extra cautious we have redone the calculations including the default multipliers and reduced the distinctiveness value of the marina and irrigation lake to medium. This still results in approximately 5% positive gain in biodiversity. The full calculations can be found in appendix A.

[8] RSK, 856968 Claydon Marina Biodiversity Impact Assessment, February 2019

[9] Requests forwarded by Clare O'Hanlon (Principal Planning Officer) to Stephen Rice dated 20 March 2019 via email.

6 APPENDIX A

	Existing habitats on site Please enter all habitats within the site boundary			Habitat distinctiveness		Habitat condition		Habitats to be retained with no change within development		Habitats to be retained and enhanced within development		Habitats to be lost within development		
T. Note	code	Phase 1 habitat description	*Habitat area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	*Area (ha)*	*Existing value*	***Comment***
		Direct Impacts and retained habitats			A		B	C	A x B x C = D	E	A x B x E = F	G	A x B x G = H	
1	#N/A	Arable	16.51	Low	2	Poor	1					16.51	**33.02**	
2	#N/A	Rough Grassland	1.23	Medium-Low	3	Moderate	2					1.23	**7.38**	
		Total	17.74				Total	0.00	0.00	0.00	0.00	17.74	40.40	J
													∑D + ∑F + ∑H	
											Site habitat biodiversity value		40.40	

	Proposed habitats on site (Onsite mitigation)			Target habitats distinctiveness		Target habitat condition			Time till target condition		Difficulty of creation / restoration		***Habitat biodiversity value***	
T. Note	code	Phase 1 habitat description	*Area (ha)*	*Distinctiveness*	*Score*	*Condition*	*Score*		*Time (years)*	*Score*	*Difficulty*	*Score*		***Comment***
		Habitat Creation	N		O		P			Q		R	(N x O x P) / Q / R	
	#N/A	Scrub and Tree Planting	2.06	Medium	4	Poor	1		5 years	1.2	Medium	1.5	**4.58**	
	#N/A	Dense / Continuous Scrub	0.88	Medium-Low	3	Moderate	2		5 years	1.2	Low	1	**4.40**	
	#N/A	Amenity Grassland	4.82	Low	2	Poor	1		5 years	1.2	Low	1	**8.03**	
	#N/A	Grassland, Wildflower Planting and Margins	2.53	Medium-Low	3	Moderate	2		5 years	1.2	Medium	1.5	**8.43**	
	#N/A	Marina	3.44	Medium	4	Poor	1		5 years	1.2	Medium	1.5	**7.64**	
	#N/A	Buildings/hardstanding	1.86	none	0	Poor	1		5 years	1.2	Low	1	**0.00**	
	#N/A	Lake	2.15	Medium	4	Moderate	2		5 years	1.2	Medium	1.5	**9.56**	
		Total	**17.74**											
		Habitat Enhancement						Existing value S (= F)					((N x O x P) - S) / Q / R	
		Total	**0.00**								Trading down correction value		0.00	
											Habitat Mitigation Score (HMS)		**42.64**	
													HBIS = HMS - HIS	
											Habitat Biodiversity Impact Score		**2.24**	Gain
											Percentage of biodiversity impact loss			