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Via e-mail: Andrew.Bell@arcusconsulting.co.uk

15 July 2022

Our reference: 2483510 – Lundwood Treatment Works (TW) – eDNA Survey Results

Dear Andrew,

LUNDWOOD TREATMENT WORKS (TW)

This letter presents the results and conclusions following an environmental DNA (eDNA) survey of ditches at the Lundwood treatment works. This survey was carried out to inform decisions concerning the proposed installation of ground mounted solar photovoltaic (PV) panels on the site. The proposed solar panel installation is expected to cover c. 0.6ha of the 5.68ha site and is likely to be located on an area of land on the western side of the site, utilised as a spoil heap during the construction of new filtration beds on site, Catlow (2020¹).

A preliminary ecological appraisal (PEA) of the Lundwood TW site was conducted by BL Ecology in January 2020. The PEA identified two ditches; Ditch 1 along the site's southern boundary, and Ditch 2 along the sites western boundary, which may offer suitable aquatic habitat for breeding great crested newts (Figure 1). A habitat suitability index (HSI) assessment was carried out by BL ecology to establish the suitability of the ditches for great crested newts (GCN) (*Triturus cristatus*), with the Ditch 1 found to have 'good' suitability for GCN. Ditch 2 was inaccessible at the time of the PEA walkover due to dense vegetation growth, meaning an HSI assessment was not completed. To establish the likely presence or absence of GCN in the ditches, it was recommended that an environmental DNA (eDNA) survey should be undertaken.

RSK Biocensus undertook an eDNA survey of both ditches on 12 May 2022. Detailed methods and results of the HSI assessment and eDNA survey are provided below.

¹ Catlow A., (2020). *Solar PV site screening project, site 8 – Lundwood treatment works, preliminary ecological appraisal report*: BL Ecology, Clayton.

Habitat Suitability Index (HSI) Assessment

The suitability of Ditch 1 for GCN was assessed by BL Ecology on 13 January 2020. This was done using an HSI assessment developed by Oldham *et al.* (2000²). It is a numerical index, between 0 and 1, where 0 indicates unsuitable habitat and 1 represents optimal habitat. The HSI for the GCN uses ten factors (suitability indices (SI) 1 to 10), which are thought to affect GCN, as follows:

- geographic location (SI 1);
- surface area (SI 2);
- hydrology (drying) (SI 3);
- water quality (SI 4);
- shade (SI 5);
- presence of water fowl (SI 6);
- presence of fish (SI 7);
- number of adjacent water features (SI 8);
- terrestrial habitat (SI 9); and
- macrophyte cover (SI 10).

Each factor is scored, and the scores are converted to SI scores on a scale from 0.01 to 1 from graphs given in Oldham *et al.* (2000). The HSI result is calculated using the following formula:

$$\text{HSI} = (\text{SI1} \times \text{SI2} \times \text{SI3} \times \text{SI4} \times \text{SI5} \times \text{SI6} \times \text{SI7} \times \text{SI8} \times \text{SI9} \times \text{SI10})^{1/10}$$

Further research by Brady (unpublished) has developed a system for using HSI scores to define pond suitability for GCN according to the following categories:

- HSI < 0.5 = poor
- HSI 0.5 – 0.59 = below average
- HSI 0.6 – 0.69 = average
- HSI 0.7 – 0.79 = good
- HSI > 0.8 = excellent

There is a positive correlation between HSI scores and presence and abundance of GCN in ponds. Generally, ponds with high HSI scores are likely to support larger populations. However, the relationship is not sufficiently precise to conclude that a pond with a high HSI will have a large newt population, or that a pond with a low HSI score will only have a small newt population or no newts at all.

² Oldham R.S., Keeble J., Swan M.J.S. & Jeffcote M. (2000). Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*). *Herpetological Journal* 10(4), 143-155.

It should be noted that the HSI system was not specifically designed for use on ditches and is typically not as effective in assessing the value of ditches, owing to the fact that it overinflates the size of the available habitat and does not take account for the lack of open water. As such HSI scores for ditches should be considered with caution.

The findings of the HSI assessment are detailed in *Table 1* below:

Table 1: Habitat Suitability Index (HSI) summary

Ditch number	Description	HSI score	Suitability	eDNA Survey Result
1	Relatively large, shallow and fast flowing water course, assessed as unsuitable for GCN during eDNA survey visit, initially scored at 0.75 'good' suitability on HSI during PEA walkover. 	0.75	Good	No result - unsuitable
2	Relatively deep drainage ditch, found to be dry at time of survey with no recent evidence of having held any water. 	Not assessed	Unsuitable	No result - Dry

eDNA Survey

An eDNA survey visit was completed by RSK Biocensus ecologists Tom West and Elizabeth Fenn on 12 May 2022, however both ditches were found to be unsuitable for eDNA sampling, Ditch 1 because of its fast-flowing nature and Ditch 2 owing to the fact it was dry. Although the absence of GCN cannot be definitively confirmed, the ephemeral nature of Ditch 2 makes their presence as a breeding

population highly unlikely, particularly as the ditch was found to be completely dry during the main GCN breeding season. Occasional drying can otherwise in some cases prove beneficial for GCN as it limits the numbers of larval predators, such as dragonfly nymphs, which require permanent standing water.

Ditch 1 was assessed as being unsuitable for GCN owing in particular to its fast flow, which would inhibit its use as a breeding location. No eDNA sample was taken for this reason, effective sampling also requires still or slow flowing water and therefore was not appropriate in this instance. HSI assessments are subjective and reflective of conditions at the time of survey, it is possible the assessment in the PEA, which categorised Ditch 1 as offering 'good' suitability, overestimated the potential value of Ditch 1 owing to differing flow conditions.

As both of the ditches on the site were assessed as being unsuitable to support a breeding population of GCN, no further presence/absence and population size-class assessment surveys are required for this site.

Conclusions

Ditch 1 was found to be a relatively large and fast flowing water course during the eDNA sampling survey, making it both unsuitable for eDNA sampling and for use as a breeding location by GCN. Ditch 2 was found to be dry at the time of the survey, with no indication of having recently held any water and as such was also considered unsuitable to support a breeding population of GCN. No other waterbodies are within 250m of the site therefore it is unlikely GCN are present within the proposed development area. No specific measures are required for GCN, however any development should consider the potential risk to other protected species and recommendations provided within the PEA produced by BL Ecology Ltd.

We hope you find these results and recommendations useful. If you require any further information, please contact me on 07584 314385 or email joseph.mould@rskbiocensus.com.

Yours sincerely,



Joseph Mould, Assistant Ecologist

Technical review by



**Will Holden, Principal Consultant
On behalf of RSK Biocensus**

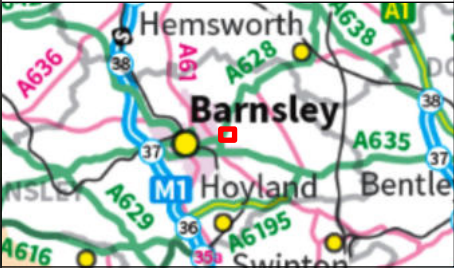
Figures

Figure 1 – GCN Survey Map



Legend:

- Site Boundaries
- Site_Boundary_250mBuffer
- GCN Ditches
 - Not Surveyed - Assessed as Unsuitable
 - Dry in 2022



01	12/07/2022	2483510	RPH	SW	JM
Rev	Date	Description	Drn	Chk	App

Yorkshire Water Solar Sites



TITLE: Figure 1:

Lundwood
Great Crested Newt Survey

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Metres

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