New Mains of Guynd Solar Park: Invertebrate Addendum

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1 Invertebrate Addendum

Caledonian Conservation Ltd was commissioned by BWE Partnership to carry out baseline field surveys and an appraisal of the potential effects of the proposed New Mains of Guynd Solar Park. A full and detailed Ecological Appraisal was completed for this project, and submitted in support of the planning application (Cathrine and Norris 2014). This document should be read alongside the original Ecological Appraisal, and to which it provides a revised appraisal of potential operational effects on aquatic invertebrates, in response to limitations to commercially available solar PV technology. Note that if the revised mitigation described below is implemented, the outcome of the appraisal remains the same as in the original Ecological Appraisal, and **no significant negative effects are predicted** for invertebrates.

1.1 Potential Operation Effects

Insects which lay their eggs in water (e.g. mayflies, caddisflies, various true-flies, water beetles etc.) have been found to confuse certain surfaces with similar polarized light reflective properties with water. Insects do confuse solar PV with water, as well as other artificial materials such as glass buildings, asphalt, car paint etc. (Kriska *et al.* 1998; Kriska *et al.* 2006; Kriska *et al.* 2008; Horváth and Kriska 2008; Horváth *et al.* 2010). There is therefore a risk that invertebrates may attempt to lay eggs on the dry solar PV panels (Horváth *et al.* 2010; RSPB 2011). However, research has shown that the use of white borders dramatically reduces the risk of invertebrates confusing solar PV panels for water (Horváth *et al.* 2010). As such, the original Ecological Appraisal recommended the use of white bordered solar PV panels in order to mitigate any potential effects. Unfortunately, it has been found that white bordered solar PV panels are not commercially available, and so this is not an option.

Aquatic invertebrates detect water for egg laying through perception of polarized light (Schwind 1991; Schwind 1995; Horváth and Kriska 2008; Lerner *et al.* 2008; Bruce-White and Shardlow 2011; Lancaster and Downes 2013). Solar cells polarize light and so are attractive to aquatic invertebrates, which mistake the cells for water. White non-polarizing borders have been shown to make solar panels unattractive to aquatic insects (Horváth *et al.* 2010). This is likely to be because the cells themselves, which remain polarizing, are of a small area, and the insects therefore perceive these are small puddles and not larger water bodies suitable for egg laying. It should be noted that research has only been conducted comparing white non-polarizing borders and polarizing borders – there are no published studies comparing the effect of other colours of non-polarizing borders (Horváth *et al.* 2010). Therefore, as aquatic invertebrates detect water for egg laying using polarized light, and not visible wavelengths, it is reasonable to expect that the critical property for a border is that it is non-polarizing, and that the colour itself is unimportant. Water polarizes ≥30% light, and aquatic beetles and bugs have been shown to select breeding sights with polarization of ≥35% (Schwind 1995). However studies have found that invertebrate taxa such as mayflies and tabanid flies that breed in habitat for which the solar PV panels may be confused (e.g. ponds) will select waterbodies for egg laying that polarize ≥20.7% of light (Kriska *et al.* 2009). Therefore the borders must polarize less than 20.7% light in order to break perception of the panels so that aquatic invertebrates do not view them as suitable egg laying habitats (Horváth *et al.* 2010).

Furthermore, there are no aquatic habitats onsite. However, in order to limit any potential risk to invertebrates with an aquatic phase, non-polarizing borders will be used at this site. Therefore, a **long-term negative effect** of **negligible magnitude** and so **very low level of significance** is predicted.

Therefore **no significant negative effects are predicted.**

2 References

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