FOOTPRINT ECOLOGY

Overview of the impacts of roads and Stone Curlews and consideration of the implications in terms of the proposed S8 Marchfield Expressway and the Sandboden und Praterterasse SPA, in Austria

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Summary

This report has been commissioned by Leopold Haindl, Altes Dorf 16, 2282 Markgrafneusiedl in Austria to provide expert opinion and advice relating to the impact of roads on Stone Curlew and potential impacts relating to a proposed new western section of the S8 Marchfeld Expressway.

The planned route also runs close to the Sandboden und Praterterasse Special Protection Area (SPA), classified under European legislation for the protection of Stone Curlews.

There has been a large body of work conducted on Stone Curlews and roads in the UK. These studies consistently show a marked avoidance (of otherwise suitable habitat) near major roads, by Stone Curlew. Studies of road avoidance in the UK have largely been focussed in the Brecks, where there are no motorways and trunk roads are not necessarily dualled (or have only recently been upgraded to two carriageways). Many of the other roads are very rural and the area has a low density of housing compared to other parts of the UK. The indication is that traffic volume is the key factor, i.e. how busy the road is, with the extent of the avoidance linked to the traffic flow. Traffic flow in one study that showed strong avoidance was around 11,000 vehicles (daily flow, in one direction). This provides a level of traffic flow at which a major pattern of avoidance, at distances over 1km, was detected.

Studies have, in addition to the impact of roads, also shown a marked avoidance of buildings, with lower nest densities around buildings and reduced densities detectable at distances of 1500-2000m.

From photographs, the landscape character of the Sandboden und Praterterasse Special Protection Area (SPA) appears similar to the Brecks, being open, flat and with large arable fields on dry sandy soils. As such we see no reason why the findings from the Brecks, in terms of Stone Curlews and roads, would not be applicable.

Stone Curlews currently utilise land within 1km of the proposed route of the Expressway. Given the Expressway would be a new route with no similar roads nearby, the effect would be marked and we would anticipate impacts occurring within a kilometre and potentially out to two kilometres, depending on the volume of traffic. Such effects would be permanent and would result in lasting damage to the Stone Curlew population associated with the SPA. While there has been considerable research undertaken in the UK, we do not understand why the avoidance occurs (i.e. it may relate to the presence of people, structures in the landscape, noise, light etc. or some other factor). Given this lack of understanding, it is not possible to have confidence that mitigation measures (e.g. relating to noise screening or screening of lighting) would be effective. As such a precautionary approach is required and, in line with European legislation, the development should only proceed if exceptional circumstances are met.

Overview of the impacts of roads and Stone Curlews

We have reviewed the environmental impact assessment for the S8 Marchfield Expressway, and in my opinion this assessment is not adequate to rule out adverse effects on Stone Curlews. Other authors (separate reports by Zwicker and by Dragonetti) have provided a critique of the assessment. These draw on the best available scientific evidence and, in my opinion, are justified in highlighting major flaws in the assessment work undertaken.

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1. Introduction

1.1 This report has been commissioned by Leopold Haindl, Altes Dorf 16, 2282 Markgrafneusiedl in Austria to provide expert opinion and advice relating to the impact of roads on Stone Curlew *Burhinus oedicnemus* and potential impacts relating to a proposed new western section of the S8 Marchfeld Espressway. This expressway would potentially run from the border of the province (city) of Vienna and the province of lower Austria, to the border of Austria and Slovakia (close to Bratislava).

1.2 The planned route for the expressway crosses land farmed by Leopold Haindl. The planned route also runs close to the Sandboden und Praterterasse Special Protection Area (SPA), classified under European legislation for the protection of Stone Curlews. There is a strong body of evidence showing avoidance of buildings and roads by Stone Curlews, and there is therefore potential concern regarding impacts of the new road.

1.3 The road proposal has been subject of an environmental impact assessment which identifies the Stone Curlew as potentially threatened by the expressway but then goes on to dismiss impacts, from both the construction and permanent presence of the road. Potential impacts are dismissed because the assessment considers limiting construction to daylight will minimise construction impacts, while bunding will minimise noise and lighting once the road is operational.

1.4 Leopold has already commissioned two reports from other ornithologists working on Stone Curlews, which highlight a range of flaws in the environmental impact assessment. These reports are:

- Zwicker, E. (2016). Expert opinion: examination of the environmental impact assessment (UVP) of the western section of the S8 Marchfield expressway on the subject of stone curlew.
- Dragonetti, M. (2016). Analysis of the environmental impact assessment (UVP) of the western section of the S8 Marchfield expressway on the subject of stone curlew.

1.5 This report supplements the above two reports. We are not familiar with Austrian legislation and how European Directives have been transposed at a national level within Austria. However, whilst recognising the country specific implementation of the Directives, there should be consistency across Member States. European case law assists with interpretation of the principles within the Directives and how they should be applied. Our experience and expertise relates to Stone Curlew ecology, the impact of the built environment, including roads, and the relevance of this to the implementation of the European Directives. Footprint Ecology has worked for many years in the UK, focussing on Natura 2000 sites and the impacts of development on

birds. We have undertaken a range of studies to assess impacts of buildings and roads for Stone Curlew in both the Brecks and Salisbury Plain areas of the UK.

1.6 In this short report, we address the following:

- An overview of work on Stone Curlews and roads in the UK
- European legislation
- Implications in relation to the Sandboden und Praterterrasse SPA

2. Overview of work on Stone Curlews and roads in the UK

Stone Curlew ecology

2.1 The Stone Curlew is a mainly a summer visitor to England, which lies on the north-western limit of the species' global range. The species is now limited to Wessex (Porton Down/Salisbury Plain areas) and East Anglia (where the Brecks is the core area).

2.2 Stone Curlews tend to arrive in March. They nest on the ground, usually laying two eggs and they select open areas with short or limited vegetation, such as bare arable fields or tightly-grazed grassy heaths for nesting. Spring-tilled crops and in particular spring-sown beet and spring-sown barley are the most used crops in England, and fields that are fallow in spring are also selected (Green, Tyler & Bowden 2000). Observations of ringed-birds show that they do not exclusively nest on heathland or arable farmland but can switch between habitats (Green & Griffiths 1994). Pairs can re-nest in a given season if the first nest fails and some pairs raise two broods in a season. Chicks are very soon mobile but tend to remain near the nest until they fledge, they are fed by both parents and prey items include earthworms, woodlice and beetles.

2.3 Radio-tagging has shown Stone Curlews to be more active by night than by day, but not exclusively so. Adult Stone Curlews will fly considerable distances (up to about 3km; Green, Tyler & Bowden 2000) to forage. Radio-tagged birds were most often recorded to be active on short semi-natural grassland, spring-sown crops, sheep pasture and manure heaps.

Status in the UK

2.4 Numbers of Stone Curlew nesting in England reached a low of 139 confirmed breeding pairs in the early 1990s (Brown & Grice 2005). Declines were associated with habitat loss, lack of appropriate land management and changes in agricultural practices (see Brown & Grice 2005 for details). The population has since recovered, due to wardening/nest protection and better management of semi-natural habitats. The population estimate for 2016, is that the Brecks support 202 pairs, which is 55% of an estimated national population of 364 pairs.

Impact of roads and buildings

Green & Bowden (2000)

2.5 An effect of roads on Stone Curlew distribution was first picked up by Green & Bowden (2000), who found an effect of distance to the nearest major road or motorway has having a significant influence on the density of stone curlews per unit area of arable land (birds using spring-sown crops). Stone Curlew density was low next to major roads and motorways and reached a maximum 3.6km from the nearest road, where it was 6.3 times higher. This effect was still strong, even where suitable habitat was scarce, suggesting that the effect of roads was not simply a redistribution of stone curlews but affected their overall numbers. There was no effect of secondary (i.e. minor roads) and Green & Bowden ruled out direct mortality as a mechanism. They suggest instead that traffic noise, visual stimuli (lights) may be the cause.

Day (2003)

2.6 Following Green & Bowden's study, a PhD study (Day 2003) explored the effect of roads in more detail. Day compared different areas of the UK, different habitats and also looked for a change over time. Day's work found similar levels of avoidance of roads as those of the earlier study. Day found that the avoidance of major roads had changed over time, with greater avoidance as traffic flows increased. Larger traffic flows resulted in a greater avoidance by Stone Curlews. Where birds did nest in close proximity to roads, Day found no effect of roads on Stone Curlew reproductive success or adult survival. His findings did however suggest that the avoidance was strongest for the birds of highest reproductive ability, suggesting strong competition among Stone Curlew for breeding sites further away from roads. Using separate models of light pollution and noise pollution around roads, Day tried to tease apart which of the two was the key factor influencing Stone Curlew distribution. His results suggested light disturbance could be the more important mechanism.

Sharp, Clarke, Liley & Green (2008)

2.7 In 2008, Footprint Ecology (Sharp *et al.* 2008) were commissioned by Breckland District Council to consider the effect of buildings and roads on the distribution of Stone Curlews in the Brecks, the key area for Stone Curlews in the UK. The work was commissioned by the Council to ensure that their future housing and other policies would not have an impact on the Breckland Natura 2000 site (Breckland Special Protection Area).

2.8 The study used data on Stone Curlew nest locations for the period 1988-2006. The results showed a clear, strong avoidance by nesting Stone Curlew of arable land close to settlements, with nest densities significantly lower up to 2500m from settlement boundaries. There was also a significant avoidance of trunk roads, with effects detectable to 1500m. For non-trunk A roads, there was a significant effect up to a distance of 500m.

2.9 Sharp *et al.* developed a Poisson regression model to predict the number of Stone Curlew nests on arable land within a grid of 500m cells. A range of different combinations of housing and road variables were tested. The model applied different weightings to derive single variables to reflect distance to housing or roads. The weightings were based on a half-normal kernel distribution, reflecting a tailing off with distance. Testing different weightings allowed Sharp *et al* to work explore the effect of distance. The best model included a weighted housing variable (weighting applied to area of buildings, standard deviation =1000m), a weighted variable for the level of traffic (square root; weighting standard deviation=1000m) and the presence of an A road (weighting standard deviation=250m). These findings suggest that road traffic levels on busy roads was the key factor in relation to roads, but that there was an additional effect of the presence of other main roads. The study indicates a negative impact of trunk roads on stone curlew nest density on arable land up to a distance of at least 1000m and maybe up to 2000m. Traffic flows on the A11 (the main trunk road crossing the area) were around 11,000 vehicles per day (uni-directional flow) or above.

2.10 The above report was used as the basis for a paper (Clarke *et al.* 2013) discussed below, which used the same data but included some additional analyses, including further checks for spatial autocorrelation.

Clarke, Sharp & Liley (2009)

2.11 The modelling results from the above study were applied to a road development in Brecks. The main trunk A road crossing the area is the A11, and the proposal was to upgrade this road from a single carriageway to a dual carriageway. The road widening was predicted to result in a marked increase in traffic –of around 70%. We were provided with updated traffic figures and applied previous models to the data. In-line with the previous work, this new modelling found a significant effect of both nearby housing and road traffic, but with the new traffic data no significant additional relationship with non-trunk A-road traffic was detected. The impact of the increased traffic was predicted to be a 5% reduction in Stone Curlew nest density, a loss of 11 nests. This result is important as it shows a marked change for Stone Curlews as a result of traffic increases. The road was already present and there was already some avoidance by Stone Curlews, yet additional traffic would still result in a predicted impact over and above the existing effects on Stone Curlew. While measures to reduce light and noise impacts were considered and incorporated into the design, assessment work could not rely on these as suitable measures to fully mitigate for the predicted effect. The project went ahead, due to the national significance of the road, and further measures for Stone Curlew included creating new habitat sufficient for 11 pairs of Stone Curlew.

Clarke & Liley (2013)

2.12 In 2013, Footprint Ecology were again commissioned by Breckland Council to conduct further analysis. Breckland Council had established a 1500m protection zone around the Breckland SPA, within this constraint zone there was a presumption against new building development that created additional housing. The policy had proved contentious and Breckland Council commissioned further work, incorporating more recent data, to build on the previous work. While roads were included in the different analyses, this more recent work was very much focussed on impacts of housing.

2.13 Clarke & Liley (2013) used nest data covering the period 1985-2011 and involving 5116 nesting attempts by Stone Curlews across the Brecks. Simple analysis comparing nest density on arable land at different distances from settlements found significant effects of development out to distances of 2km. The effect was stronger for larger settlements (i.e. those with more houses).

2.14 There was no consistent pattern of avoidance in relation to roads, when all roads were considered. However, with data for trunk roads only, regardless of the levels of buildings nearby, the density of Stone Curlew nests was always lowest within 0.5km of the road. Poisson models, similar to the previous work, were developed. The best fitting model involved the double square root of the distance to the nearest trunk road and the double square root of the local total building density variable, both variables with a weighting based on a half-normal kernel with a standard deviation of 1250m.

2.15 These findings suggest, with respect to roads, that

- It is major (trunk roads) that are of most concern;
- Impacts from major trunk roads trail off with distance but extend to over 2km.

3. European Legislation

3.1 European legislation is set out within the Habitats Directive (Council Directive 92/43/EEC) and the Birds Directive (Council Directive 2009/147/EC). These key pieces of legislation seek to protect, conserve, restore and enhance habitats and species that are of utmost conservation importance and concern across Europe.

3.2 The provisions of the Birds Directive include:

- Conservation measures for all wild bird species (including their eggs, nests and habitats) naturally occurring in the territories of the EU Member States (Article 1);
- Maintenance of the population of the wild bird species across their natural range (Article 2) with obligations to take measures to preserve, maintain or re-establish bird habitats (Article 3);
- The identification and classification of Special Protection Areas (SPAs) for endangered, rare or vulnerable species listed in Annex I of the Directive, as well as for all regularly occurring migratory species, paying particular attention to the protection of wetlands of international importance (Article 4).

3.3 The key objectives of the European Habitats Directive include the preservation, protection and improvement of the quality of the environment, taking measures to conserve deteriorating habitats and creating a coherent European ecological network of sites in order to restore or maintain those habitats and species of community interest as a priority. Article 6(2) of the Habitats Directive, which applies to SPAs classified under the Birds Directive as well as SACs designated under the Habitats Directive, requires member states to take appropriate steps to avoid deterioration of natural habitats and the habitats of species, as well as disturbance of the species for which the site has been designated or classified in so far as such disturbance would be significant in relation to the objectives of the Directive, which includes the maintenance of a coherent European ecological network.

3.4 It is clear from the Directives that the purpose of the legislation is not only protective, but also about the restoration of habitats that may be damaged, and the establishment of measures that avoid any future deterioration, conserving sites as part of a bigger, ecologically functioning network across Europe. Areas of habitat outside the designated sites should play a critical role in supporting the European site network, with the Habitats Directive notably requiring land use planning and development policies to encourage the management of features of the landscape which are of major importance for wild fauna and flora (Article 10).

3.5 The Directives require a clear step by step approach for decision makers considering any plan or project that has the potential to harm European sites. Such an assessment

must rule out an adverse effect on integrity of the European site in order for the plan or project to proceed, unless exceptional circumstances are met. It is for the decision maker to be convinced, beyond all reasonable scientific doubt, that the plan or project can proceed whilst being in accordance with the legislation. Caselaw such as Waddensee C-127/02[1] and Sweetman C-127/02[2] confirm this principle.

[1] Judgment of the Court (Grand Chamber) of 7 September 2004 - Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels v Staatssecretaris van Landbouw, Natuurbeheer en Visserij. Reference for a preliminary ruling: Raad van State - Netherlands C-127/02

[2] Judgment of the Court (Third Chamber), 11 April 2013 - Peter Sweetman and Others v An Bord Pleanála. Request for a preliminary ruling from the Supreme Court (Ireland) C-258/11

4. Implications in relation to the Sandboden und Praterterrasse SPA

4.1 We have viewed a range of landscape photographs showing the general area around the proposed route of the Expressway and the Sandboden und Praterterasse SPA. The images shown reflect a landscape with many parallels to the Breckland area of the UK. The two areas seem similar in character in terms of the wide, open and flat landscape, characterised by large arable fields, lines of conifers and dry, sandy soils. We see no reason why the findings from Breckland, relating to the impact of roads on Stone Curlew, should not apply. Breckland does not have the gravel mining sites that are in the Sandboden und Praterterrasse area and these are likely to influence the distribution of Stone Curlews within the landscape.

4.2 The various studies, summarised previously in Section 2 above, consistently show a major effect of roads on Stone Curlew distribution. Such effects occur over considerable distances.

4.3 The Sandboden und Praterterasse SPA is classified for breeding Stone Curlew. My understanding is that the population is small and isolated, and the Standard Data Form for the SPA indicates a maximum population of 7 pairs[3].

4.4 Referring to the report of Dragonetti, it is clear that Stone Curlews currently utilise land within 1km of the proposed route of the Expressway. Given the Expressway would be a new route with no similar roads nearby, the effect would be marked and we would anticipate impacts occurring within a kilometre and potentially out to two kilometres, depending on the volume of traffic. Such effects would be permanent and would result in permanent deterioration of habitat suitability and therefore lasting damage to the Stone Curlew population associated with the SPA. Given the research available, it is not possible to have confidence that mitigation measures (e.g. relating to noise screening or screening of lighting) to be effective.

4.5 We have reviewed the environmental impact assessment for the S8 Marchfield Expressway, focussing on sections 4.1,4.2, 5.1 and 5.2. In my opinion, this assessment is not adequate to rule out adverse effects on Stone Curlews. The assessment suggests mitigation measures that are not proven to be fit for purpose, and a risk to the Stone Curlew population therefore remains. The critiques provided by Zwicker and by Dragonetti draw on the best available scientific evidence and, in my opinion, are justified in highlighting major flaws in the assessment work undertaken. On the basis

[3] http://natura2000.eea.europa.eu/Natura2000/SDF.aspx?site=AT1213V00

of current evidence, it is our view that the decision maker cannot rule out adverse effects on site integrity.

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