

Mr & Mrs Wagner,
The Green Farm,
Hallwood Green,
Dymock,
Gloucestershire,
GL18 2EE.

02 June 2020

Dear Mr & Mrs Wagner,

Ecological Assessment for proposed Air Source Heat Pump installation at The Green Farm, Hallwood Green, Dymock.

Further to my visit on 18th May 2020, I am writing with the results of my ecological assessment for the Air Source Heat Pump (ASHP) proposals (planning application refs. 200404/FH & 200405/LBC), including likely impacts on bats and other protected species, in order to address the requirements identified by Herefordshire Council's ecologist.

The assessment comprised an inspection of the proposed site of the ASHP and surrounding area, and the nearby former pig shed. A desk study has not been considered necessary for this assessment as existing records of roosting bats at the property come from our own surveys of the barn and former pig shed in 2009. We have reviewed these data from our previous surveys to inform this assessment, as well as the documents available on the planning portal website. Details of the Hall Wood Site of Special Scientific Interest (SSSI), which lies immediately to the north-west and west of the property, were reviewed online from DEFRA's Magic Map Application¹. There were no constraints affecting the assessment survey visit.

The assessment found that the proposed site for the ASHP comprises mown lawn, supporting creeping buttercup and grasses. This forms part of a lawn area approximately 5m wide which extends around the back of the house, and which separates the house from mature shrubs and the former pig shed on the woodland edge. The former pig shed is situated immediately inside the property boundary adjoining the Hall Wood SSSI, which is designated for its ancient woodland, including several unusual woodland habitat types, and notable species (though bats are not identified as a key feature of the SSSI). The former pig shed is approximately 8m west of the proposed ASHP site, on the far side of this lawn area, and is surrounded by mature shrubs including Laurel. The proposed site for the ASHP is approximately 13m from the SSSI

¹ www.magic.defra.gov.uk/MagicMap.aspx

boundary. You informed me that there is sometimes a bat roosting in the pig shed; from your description of it and the droppings found in the pig shed I can confirm that the species present is the lesser horseshoe bat. Given the behaviour of this species, it is very likely that the bat(s) use the open doorways on the west side of the building and/or the gap in the wall on the eastern side of the building as an access point. The former are on the far side of the building from the proposed ASHP and the latter is screened from it by a mature Laurel. The number of droppings present and the bat activity you have observed suggest that the former pig shed is used as a night roost and/or occasional day roost by one or more individual bats. This is consistent with the findings of our survey carried out in 2009. The proposed location of the ASHP would not obstruct bats' access to the former pig shed, and no potential access points for bats on the rear of the house would be obstructed.

The potential impacts of the ASHP on bats highlighted by Herefordshire Council's ecologist were disturbance through noise, changed air movement, and obstruction of roost access. Each of these is assessed below; no other potential impacts on bats or other protected species were identified.

The specification for the ASHP indicates operating noise output in the human frequency range (referred to as 'A-weighted' or dBA) of between 40 and 53dBA at 1 metre from the unit, depending on model and operating mode. Guidance produced by the Health and Safety Executive (HSE) indicates that these noise levels are equivalent to those in a quiet office or normal conversation. As such, the audible noise levels experienced within the closest part of the SSSI would be minimal. We have been unable to find any published information on high frequency noise output by ASHPs but there have been several studies of ASHP which have assessed the audible frequency output of ASHP and found that the noise output is greater at low frequencies and reduces towards the upper end of the human audible range (see, for example, *Acoustic Noise Measurements of Air Source Heat Pumps* (Building Performance Centre, Institute for Sustainable Construction, Edinburgh Napier University, 2011²)). For this reason, it has been suggested that ASHP noise should be assessed using 'C-weighting', which reflects the greater sensitivity of human hearing to low frequency noise, as well as the overall human frequency range (See: Hellgren *et al.*, 2017. *Improved Measurement Method for Heat Pump Noise*³). The components responsible for noise emission are the compressor and the fan. Consequently, although we have been unable to find data on ASHP noise outputs at frequencies used by bats, the available A-weighted data strongly suggests that high frequency noise outputs from ASHP are unlikely. Even if high frequency noise was emitted, at the frequencies used by echo-locating bats (and particularly lesser horseshoe bats) this would attenuate rapidly with distance from the ASHP unit. In addition, the structure of the former pig shed and surrounding vegetation would act as a partial barrier to noise from the ASHP, further reducing the sound levels within the roosting site or access points.

² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/48204/3307-acoustic-noise-air-source-heat-pumps-1.pdf

³ <http://hpc2017.org/wp-content/uploads/2017/05/O.4.8.4-Improved-measurement-method-for-heat-pump-noise.pdf>

The specifications for the ASHP model proposed do not include data on air flow rates during operation. However, the air intakes are on the side and rear of the unit, so air will be blown towards rather than sucked from the direction of the mown lawn and former pig shed. I have found some data on maximum air flows for other ASHP units available: a 5KW unit had a maximum flow rate of 2000m³/h and a 15KW unit had a maximum flow rate of 5500m³/h. Converting these rates into flow per second and dividing by the area of the discharge fan(s) provides an approximate indication of the 'wind' generated by an ASHP at the point of emission. For both 5KW and 15KW units the wind speed is within the range for number two on the Beaufort scale, i.e. a light breeze strong enough to be felt on the face, and to make leaves rustle. As the ASHP discharge fan is on the flat face of the unit rather than in a duct, this air movement would dissipate rapidly on emission from the ASHP, and would not be discernible either at the former pig shed or SSSI beyond.

As stated above in the description of the site, the proposed positioning of the ASHP would not obstruct any confirmed or potential roost access points on the rear of the house, and would not obstruct bats' access to the former pig shed. In addition, it is not considered that either noise or air movement emitted from the ASHP have the potential to obstruct bats' access to the former pig shed or other nearby roosts.

In summary, we do not consider that the proposed ASHP would have any effect on the nearby SSSI, as projected audible noise levels are not significant, high frequency noise (if emitted) would largely attenuate before reaching the SSSI boundary, and air movement would dissipate before reaching the SSSI boundary. We also do not consider that the proposed ASHP would have any effect on bats, including bats roosting in the former pig shed, for the same reasons and because no obstruction of roost or potential roost access points would occur.

I hope the above is helpful. Please do not hesitate to contact me if you have any queries regarding the above.

Yours sincerely,

A black rectangular box used to redact the signature of David Wells.

David Wells BSc (Hons) MCIEEM CEnv
Technical Director