APP/21/00893 (Land north of Long Copse Lane, Emsworth) objection.

Commenter:[redacted]

[redacted]

19/11/2022

Commenter type: Complainant

Stance: Object

Comment

Natural England (NE) released updated guidance for nutrient neutrality in February 2022 (ref. [1]). NE's latest consultee response to APP/21/00893 (ref. [2]) says that L&P's shadow HRA should detail the proposed timing of the building works at site H8 to ensure that appropriate mitigation will be in place in advance of any potential effects from the development i.e. in advance of dwelling occupation. This is to ensure that planners take nitrate travel time through groundwater into account. L&P produced amended versions of their shadow HRA (refs. [3] and [4]) in October 2022. This is an updated objection produced in response to these.

According to ref. [3], the proposed mitigation site at Horsepasture Farm “comprises a combination of Soilscape 18 (Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils which have impeded drainage and drain to stream network) and Soilscape 6 (Freely draining slightly acidic loamy soils which drain to groundwater and rivers)". Ref. [3] says that "It does not contain (for example) Soilscape 3 (Shallow lime-rich soils over chalk or limestone which drain to chalk or limestone groundwater). There is therefore no potential risk of a significant temporal lag between mitigation and the effects of development."

Ref [4] introduces a Hydrogeological Conceptual Site Model (HCSM), which models how precipitation falling on the mitigation site is partitioned between surface water and groundwater flows. Using the model, ref. [4] anticipates that “an observed change in nutrient concentrations could be seen within a year”.

Would that it were that simple. There is a large amount of scientific literature arguing against this.

Ref. [5], based partly on a study on the South Downs, says that "One known problem with catchment level solutions for nitrate is the lead time for seeing nitrate reductions in raw water due to the time of travel through groundwater"..... "Recovery times for groundwater can be long, potentially up to 40 years, so over the lifetime of the Local Plan (up to 2036) some reductions in nitrates would be expected but they would be relatively small (circa 10%)".

Ref. [6] says depth to groundwater (i.e. the depth of the unsaturated soil zone beneath the site's surface) is the most significant parameter affecting nitrate concentration in groundwater, with soil type being a secondary parameter.

Ref. [4] states that, at the nearest borehole logs, at Horsepasture Farm and Woodberry Cottage, the mean groundwater level is 15 m. The mean surface elevations of the Northern, Central and Eastern areas of the mitigation site are 46 m, 42 m and 32 m respectively. So the mean depths to groundwater in these 3 areas are 31 m, 27 m and 17 m respectively.

Ref. [7] measured nitrate concentration dynamics in the unsaturated zone beneath a fertilized crop field as a function of time and depth. Good agreement was found between observed nitrate concentrations and those simulated using a quantitative nitrate transport model. The study had a depth to groundwater of 18 m, similar to that of the Eastern area of the mitigation site and less than the Northern and Central areas. The authors found that it took 6 years for nitrogen to pass out through groundwater after agriculture on land above had ceased. Their study was on sandy soil. With the loamy/clayey soil present at the mitigation site, the time would be longer.

Regarding the HCSM model of ref. [4], it is important to note that this only models water flow in a qualitative sense. It is not a quantitative model. Furthermore, it does not model nitrate concentration dynamics in the unsaturated zone. Therefore, it is not possible to conclude (as ref. [4] does) that “an observed change in nutrient concentrations could be seen within a year”.

As a result, we object to L&P's simplistic estimate that there would be no significant temporal lag between mitigation and the effects of development. We believe that the actual time for nitrates to pass out through groundwater would be in excess of 6 years (ref. [7]) and could be significantly longer (order of decades) (ref. [5]).

As a precursor to a decision regarding APP/21/00893, it would seem reasonable to request that the hydrogeological systems at the mitigation site be properly modelled to provide more accurate estimates of nitrate travel times. The type of modelling required is described in ref. [7], and depends on site-specific parameters such as depth to groundwater, initial nitrate concentration, pore-water velocity and nitrate retardation. Where possible the modelling should be validated by monitoring.

In addition, we believe that better guidance is needed from NE to allow planners to model nitrate travel time through groundwater.

References

1. Nutrient Neutrality Generic Methodology. Natural England. February 2022.
2. APP_21_000893-CONSULTEE_RESPONSE_-_NATURAL_ENGLAND_1671886.pdf, NE, June 2022.
3. APP_21_00893-AMENDED_-_REPLACMENT_SHADOW_HRA_APPENDIX_4-1711472.pdf, Tetra-Tech, October 2022.
4. APP_21_00893_REPLACMENT_SHADOW_HRA_APPENDIX_4B_-_HYDROGEOLOGICAL_APPRAISAL_OF_LAND__PROPOSE -1711450.pdf, H2Ogeo, September 2022.
5. Chichester District Council Water Quality Assessment. Amec Foster Wheeler. 2018.

6. Lockhart et al 2013. Identifying sources of groundwater nitrate contamination. J. Contaminant Hydrology, 151, 140-154.
7. Turkeltaub et al. 2016. Real-time monitoring of nitrate in the deep vadose zone under a crop field - implications for groundwater protection. Hydrol. Earth Syst. Sci., 20, 3099-3108.