Dear Sir,

I ask that the Grimston et al Neighbourhood plan is revised to extend the hydrological buffer zone applied to Roydon Common to further protect the Gaywood River and Derby and Sugar Fen SSSIs.

I believe that there is sufficient evidence provided by the original survey to demonstrate the community's wish to protect the neighbourhood plan area's rural assets. Furthermore, as reported in the Lynn News on 7 March 2022, a 1000+ signature petition was handed into the Environment Agency calling for improved water quality in the Gaywood River.

I also note that on 18 July 2023 that Lord Trenchard's proposed amendment 102 to the Levelling-up Bill to give protection for chalk streams in the planning process was agreed to be brought forward by Lord Benyon as follows:

102: Clause 143, page 172, line 9, at end insert—

"(e) protection for chalk streams in England so as to reduce the harmful impacts of excessive abstraction and pollution and improve their physical habitat"

Please find below the rationale and map (at the end of this letter) for the suggested buffer zone extension as provided by Ash Murray of Norfolk Wildlife Trust…

The hydrology of the fens (in particular Derby Fen) is complex due to heterogeneity of underlying glacial drift deposits and has received little detailed study. My understanding of their hydrology is as follows.

It is not known how significant levels in the Gaywood River are to sustaining the two Fens. I have drawn the buffer to protect the main surface water inputs to the Gaywood River in the Parish of Grimston. Regardless of whether these are of critical importance to the ecohydrology of the Fens, they are of vital importance to the maintenance of flows in the Gaywood and should be protected. There are several key springs that act as 'feeder streams' to the Gaywood River. In particular, those around White House Farm, The Springs and Sowshead Spring.

Both Fens are based on the Sandringham Sands and this is likely to be the principal groundwater feed. Overlaid on this are a series of near surface and surface flows that contribute to the overall water volumes irrigating the Fens and also to the hydrochemical balance of the Fens hydrology and, thus, their biodiversity in general.

A significant water source for the fens comes via spill-off from a band of Snettisham Clay to the east. This acts as an aquitard, restricting vertical water transfer and, thus, water above this flows laterally in response to the natural ground surface gradient (in a south westerly direction). Above this is a layer of permeable carstone which conducts water to the underlying Snettisham clay. This gives rise to a series of spring lines at the junction between the two which are particularly evident shortly after periods of heavy or prolonged precipitation. An additional groundwater feed presumably occurs from water issuing from the boundary of the Lower Chalk to the east where it is replaced by an impervious bed of Gault Clay, causing water issuing from the chalk-Gault junction to travel south west following the natural land gradient towards the Gaywood River (via a series of drainage channels and, presumably, seepage across a broad front).

This mix of waters (the lower pH and base-poor water from the Sandringham Beds & Carstone-Snettisham Clay and higher pH, base-rich waters from the Lower Chalk-Gault junction) is critical to

the ecology of the area. The relative influence of each with differ depending upon dominance of either source e.g. at times of high precipitation, the flows from the Carstone onto the Snettisham Clay will exert a greater influence, whilst at other times, the chalk water feed from the Lower Chalk will prevail). Reduction in the supply of either (or both) water inputs will alter the flora and fauna of the fens.

The data supporting the mapped boundaries is taken largely from the published British Geological Survey data on their geology map viewer and borehole log data (https://mapapps.bgs.ac.uk/geologyofbritain/home.html).

Using these data sources to define the boundaries of the underlying strata, I applied assumptions on their relative importance to the hydrology of the protected sites using a variety of published and unpublished data (e.g. Ingram, RGS. 2005). The impacts that changes to volume of flow, constancy of flow or chemical composition of water irrigating the sites were inferred from 25 years' experience as a Conservation Officer and Senior Reserves Manager for English Nature/Natural England and, subsequently, as Reserves Manager for NWT managing wetlands along the west Norfolk Sandringham Sands/Dersingham Beds outcrop, as well as from peer-reviewed publications, such as Wheeler et al. 2009..

The wetlands at Roydon Common, Sugar, Leziate and Derby Fens are fed via sub-surface aquifers, the catchment of which extends far wider than the boundary of those designated sites. This is related to the geological strata which support these aquifers and the hydrogeological function of each (as described in my first paragraph). The catchment boundaries for these aquifers have yet to be defined for this location (work has been done at other locations in the area e.g. Ingram 2005). As such, I have restricted the buffer to the area that is categorically within the catchment, rather than extending it to a putative catchment boundary (which may be significantly further from the site boundaries than the buffer indicates).

The ground water gradient defines the principal direction of flow in the ground water passing through the aquifer. This is widely considered to be from an east to west direction to the east of Roydon Common. However, localised, but significant groundwater gradients also occur from a north to south direction to the north of Roydon Common as a result of the presence of superficial (in a geological context) Lowestoft Till deposits present in that locality. For this reason, the buffer extends northwards and eastwards from the designated sites.

The neighbourhood plan cannot be used to assess individual developments either alone or in combination. My understanding is that the purpose of the Plan in this respect is to provide a buffer based on best-available evidence against which to flag up potential issues that should then be investigated further as they arise. Development (either alone or in combination) has the potential to impact on the aquifers and, thus, the wetland sites they irrigate in a wide-variety of ways.

Hard surfacing may reduce the surface area available for rainwater recharge of the aquifer or may alter recharge rates or residency times within the aquifer. This could lead to alterations in the periodicity, volume or chemical properties of flows. Drainage would effectively do the same by diverting rainwater recharge or speeding its passage through the system. Quarrying within the groundwater catchment would alter groundwater gradients and could alter recharge rates, volumes or flow or chemical properties of the groundwater. Even quarrying outside of the catchment can impact on the functionality of the aquifer feeding the Roydon wetlands by shifting the groundwater divide, effectively pulling water away from the aquifer, thus reducing its effective catchment size and reducing its recharge area from rainfall. This is particularly the case where dewatering is carried out

as part of the quarrying operations. This is just a small selection of the ways in which development could impact upon the aquifers feeding the Roydon wetland complex.

References:

Ingram, RGS. 2005. An integrated hydrochemical study of the Sandringham Sands, West Norfolk. Unpublished PhD thesis) on the physical and chemical properties of these strata and how they function as aquifers (e.g Allen, D J, Brewerton, L J, Coleby, L M, Gibbs, B R, Lewis, M A, MacDonald, A M, Wagstaff, S J, and Williams, A T. 1997. The physical properties of major aquifers in England and Wales. British Geological Survey Technical Report WD/97/34. 312pp. Environment Agency R&D Publication 8

Wheeler, B.D., Shaw, S. & Tanner, K. 2009. A Wetland Framework for the Impact Assessment at Statutory Sites in England and Wales. Science report SC030232. Environment Agency

Yours sincerely,

Michael de Whalley
Borough Councillor for Gayton and Grimston Ward

Suggested buffer to protect water resources for Sugar and Derby Fens (part of Leziate, Sugar and Derby Fens SSSI)