Objection from Friends of Lye Valley, 11.01.2021

20/00463/FUL **2 Dynham Place** Oxford Oxfordshire **OX3 7NL**
Erection of 2 x 3-bed semi detached dwellinghouses (Use Class C3).
Provision of bin and cycle storage and alterations to landscaping (revised information).

1. **Stantec's Supplementary Technical Note, Job No 45340, Note No 001, dated 2 December 2020, re Stantec Hydrogeological Impact Assessment and Surface Water Management Plan (Report reference: 45340/5003/R001)**

2. **Stantec's Technical Note – Surface Water Flood Risk, Job No 45340, Note No 002, dated 2 December 2020**

This document comments on and objects to Stantec's response (1 and 2 above) to Natural England's request for specific additional information on this proposed development, and also refers to sewage network capacity and overshadowing of adjacent properties.

The context

The site is within the rainwater catchment of the very rare wetland habitat of Lye Valley SSSI and LWS tufa-forming alkaline fens and is in a critical position at the base of a 'funnel' of typical valley topography and actually over the old clay streambed of the historic Lye Brook course. The position has crucial implications for healthy natural water flow to the south, supplying the brook and fen areas. **Please see the objection by Headington Heritage** for a clear visual depiction of the development's position and the underground and surface water flows that may be impacted.

Wetlands live or die by sufficient water; it is their life-blood. Underground, invisible, water flow from the north supplies Lye Valley spring-fen areas. These underground flows are already severely reduced by previous urban hard surfacing development in the area surrounding the Valley. Development puts a concrete/tarmac/roofing 'lid' on the rainwater catchment, stopping rain penetrating the ground. Rain can enter the ground only in the green areas where it seeps into the soil and into underlying rock. Then it moves through permeable rocks like limestone or sand (aquifers) downslope towards the valley and it might take a year or more to reach the springs where it emerges, feeding the Lye brook and fens.

In 2011 the natural rainwater catchment of the Lye Brook was calculated to have been reduced from a 0.75ha green area to a 0.5ha green area – a **33% loss of infiltration area** – as a consequence of urban development (MWH report to Thames Water, Feb 2012, seen by FoLV). This loss of green permeable area has resulted in a reduction of underground water flow and some fen springs failing, the wetland/terrestrial vegetation boundary is retreating downslope by many metres. There are large areas of now dry historic peat, which will be oxidising (liberating carbon dioxide); every further development in the catchment makes this water-lack and peat oxidation worse. **The remaining undeveloped 0.5ha of green catchment should be a full Groundwater Protection Zone, with no further development.**

In winter time the fen looks nice and wet and it is difficult to see how there could be any problem. However, fen wildlife requires constant wetness; the big problems for it come in a hot and dry summer, when the fen surface dries out. Fen wetland wildlife will be lucky to survive at all in the face of accelerating Climate Change to hotter and drier summers, with reduced rainfall in the catchment to recharge the underground aquifer. **The latest news is that 2020 was the hottest year globally ever** (Copernicus Climate Change Service); global heating means the average current temperature is now 1.25 degrees above long term average (EU Climate Service data, Radio 4 news 08.01.2020). **Increases of 1.5 to 2.0 degrees and worse are predicted.** All habitats will be at risk of water lack with such temperatures. Oxford City Council has declared a Climate and Ecological Emergency.

In the context of these important declarations, improved degrees of protection from climate change are needed for such an important wildlife site. Every drop of rain that currently falls in the water catchment area around the Lye Valley is critically important to the life of the fens and must be allowed to reach them via invisible underground water flow.

It is the continuing stability of this underground water flow which concerns the Friends of Lye Valley (FOLV).

The pattern of water flow underground to the fens is complex and several previous studies have indicated the existence of an extremely unusual 'perched water table' underground, which explains the emission of water from springs at a high level on the sloping west bank of the SSSI fen area. Anything that causes disruption or re-direction of this higher level water-flow is likely to be as damaging to this fen area as a straightforward reduction in water quantity.

Natural England (NE) requested further information in their letter of 8 October 2020 which stated

> '…*a greater understanding of local groundwater flows at the application site is needed to understand the potential impact of development in this location on the groundwater fed fens, springs and baseflow of the watercourses flowing through the SSSI'.*
>
> Extract from letter dated 8 October 2020, ref. 328216, from Rebecca Micklem, Lead Adviser Sustainable Developemtn, Thames solent Team, Natural England, re 20/00463/FUL

In response, Stantec supplied:

- Supplementary Technical Note, Job No 45340, Note No 001, dated 2 December 2020, re Stantec Hydrogeological Impact Assessment and Surface Water Management Plan (Report reference: 45340/5003/R001) and also
- Technical Note – Surface Water Flood Risk, Job No 45340, Note No 002, dated 2 December 2020

Reasons for objecting to Planning Application 20/00463/FUL being approved

A. Failure to supply requested information on hydrology, unfounded assumptions

The information required by NE to enable them *'to understand the potential impact of development in this location on the groundwater fed fens, springs and baseflow of the watercourses flowing through the SSSI'* has not been delivered by Stantec in the additional information provided (mainly in the two technical notes referred to above and by revision of other documents). **No study of local groundwater flows is presented.** Stantec's approach is unacceptable in not providing much-needed actual evidence. It merely expresses wishful thinking.

Stantec claims there is no need for a full understanding of the hydrology of the area by simply stating, in effect, that it is irrelevant, as the Continuous Flight Augered (CFA) pile foundations proposed will not affect it. **This is a mere unfounded assumption. This proposed development is in a critical position as regards water supply to the SSSI and Local Wildlife Site fens. Development here cannot proceed with no evidence on the groundwater situation.**

B. Uncertainty about the effects of piling

CFA (continuous flight auger) pile foundations – new proposal by Stantec

CFA piles may be good for the houses, but they would seriously disrupt water flow to the fens.

Is there any evidence of another situation where CFA piling has been successful in protecting the pattern and quantity of groundwater flow to an alkaline, calcareous, tufa-forming valley-head spring fen? No. Of course not – such fens are too rare and precious to have been the object of such an experiment before.

Piling has not been allowed at the nearby Warren Crescent housing development (yet to be completed) due to concerns about interruption of important water flows within the Beckley Sands to nearby Lye Valley SSSI fen springs. 2 Dynham Place is an equally important position regarding crucial underground water flow towards the SSSI and LWS fen springs. **Why should any piling be allowed here, if not allowed at Warren Crescent?**

Spacing of the CFA foundations at 5 metres implies spacing of 5 metres centre pile to centre pile. The pile width may need to be 2 metres (though this is not stated) leaving gaps between the piles of about only three metres – through which underground or surface water flow will be concentrated. It is highly likely that piles will be inserted directly into/through the old clay layer of Lye streambed, which is directly below the midpoint of the development (see borehole logs for BH1 and BH2 for evidence of this clay streambed layer).

Consequently the CFA foundations may permit some water flow between them, but piles puncturing the streambed, with its impermeable layer of clay and water-retaining strata below, could lead to a loss of hydrostatic pressure and water loss both to the Lye water table at 89m and the downstream Town Furze allotment wells. This is because over time, with possible erosion, water may find a route down around piles.

Information is provided to show that CFA Piles will survive water flow. Presumably they will, for a time at least, but for how many years, considering we do not know what the water flow quantity actually is?

But what about the change of natural hydrological water flow pattern to the SSSI and LWS to the south? If water leaks down from a perched water table, finding its way through clay and limestone layers via the puncturing action of the piles to a lower level in the Beckley Sands, it may miss the fen spring level and emerge running 'to waste' at the lower level of the stream (the stream is gouged-out by erosion and does not wet the fen). Then, the 'normal' perched higher level supply of water to the fen from this source would diminish/be disrupted.

CFA piling is a type of foundation that is susceptible to encountering doggers (lithostratigraphic rock units) and "hard" rock layers, and may not be suitable; a borehole refusal in the Beckley sands on site is noted for exactly this reason. **The applicant cannot prove that this risk will be eliminated by the proposed design.**

Stantec states groundwater was not encountered in the Made Ground, but its own Borehole log data by GIS shows a water strike **within** the Made Ground clay at around 2.70m with water rising to 2.50m in BH1. This made ground is directly **above** the 40cm depth of natural old soft sandy clay streambed (from 3.10m-3.50m).

In BH2 by GIS the water strike is at 5.10m within the soft peaty clay of the old streambed and this water then rises to a standing level of 3.80m within the clay of the old stream bed and just under the bottom of the Made Ground starting at 3.50m. This shows a water pressure underground within the old Lye streambed silty clay layer that is here **1.4m deep** (between 3.50m-5.20m) on top of the Beckley Sands.

A perched water table under the site at around 91.1 – 91.3 AOD is evidenced from the GIS borehole water strike data.

How will piling affect the **five wells below Girdlestone Road in Town Furze allotments** (the only water supply for allotment tenants). Will the wells be either starved of water or flooded with water? The outcome is unpredictable but would Oxford City Council be willing to pay for the installation of an alternative water supply?

Concluding comment on CFA piling foundations proposed

With NO idea of what the actual volume and speed of water flow under the site actually is, there can be NO idea of whether or not the suggested piling design will or will not significantly disrupt water flow to Lye Valley fens. This needs to be assessed in a **wet winter**, as well as a dry summer, as a spot measure gives no idea of annual variation.

Stantec can have NO idea as to whether the houses will be safe from erosion around piles in future.

Doubt and uncertainty are all that may be expected for the fens and future house residents.

It seems clear that any piling at all, **of whatever design,** would unavoidably puncture important underground strata of clay or limestone layers and cannot possibly be acceptable owing to its unpredictable and negative effects on underground water flow towards Lye Valley fen springs.

C. Uncertainty of effectiveness of infiltration drainage (SUDS) strategy proposed

(**See** updated infiltration drainage strategy plan and calculations provided within Appendices C and D respectively to **Stantec's Supplementary Technical Note No 001, dated 2 December 2020,** re Stantec Hydrogeological Impact Assessment and Surface Water Management Plan.)

The new proposal indicates that rain run-off from buildings is to be dealt with by a new design of soakaway for infiltration of roof run-off water (the 'infiltration blanket'). This is an 18m long, 0.3m thick, layer of gravel wrapped in a permeable membrane and buried 30cm underground, to be located at the north of the buildings within the made ground in the back garden in front of the fence. Infiltration evidence is provided for this area in a previous document; the made ground is apparently sufficiently permeable – but the test infiltration pit providing evidence (TP1) did not go down below 1.20m. **What happens in the ground below that?**

Stantec's comment that made ground is highly permeable disregards the likely presence of the old clay streambed immediately below the made ground, which will be **impermeable** and So retains water.

According to the borehole data slightly to the south, it is likely that under this made ground where the infiltration blanket is proposed is a layer of alluvial clay of the old stream bed. Water from roofs will thus infiltrate nicely into the made ground but then it will hit the clay layer and travel on top of the clay downslope to the south, where it will sit underneath the buildings around the piles OR flow between them along with other groundwater and surface water.

If the piles puncture strata such as the clay of streambed and any hard limestone layers or doggers underneath (as discussed above), it may also find its way down through the broken layers to a lower level in the Beckley Sands than it naturally would – maybe below the level that feeds the fens, so that it would be lost to the base of the stream.

With the use of this infiltration system in conjunction with piling, all benefits of infiltration to the fens (especially the west side of SSSI and LWS) could be lost and the fens would lose their crucial chemically-special high-level water supply.

Even if the infiltration blanket of gravel did work to allow rainwater from roofs to infiltrate at installation, **since no regular maintenance regime is proposed**, **silting up would be the inevitable ultimate outcome over a number of years.**

Enforcement of SUDS maintenance is not possible in a private development such as the one proposed at 2 Dynham Place. Rainfall infiltration in perpetuity is required for the health of fen springs. This infiltration gravel blanket without maintenance will not provide it.

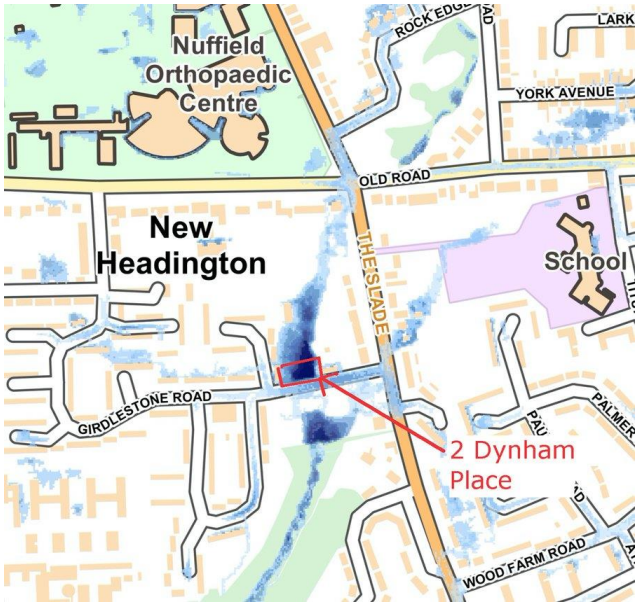
We quote again Dr. Curt Lamberth's (2007) hydrological study of the Lye Brook and fens where catchment issues are discussed (report paid for by Oxford City Council). This is what he recommends in his conclusions:

> '*MITIGATION AND ENHANCEMENT OPTIONS - SUMMARY*
>
> *Groundwater protection zones are not fully mitigated by the use of SUDS*
>
> *therefore development within these areas must be restricted or eliminated'*

D. Surface water flow evidence inadequate

(Stantec's Technical Note – Surface Water Flood Risk, Note No 002, dated 2 December 2020)

The surface water flow map (SFRA) is the most detailed and accurate projection so far seen, conforming exactly to surface contours. The relevant part of it is shown here.



The map shows the development site dark blue as a sump where water is likely to collect from the shallow valley topology in gardens to the north, beyond the Girdlestone Road causeway. The gully in these long gardens acts as a funnel directing water south to 2 Dynham Place. Storm drains collecting and taking water round the site may be overloaded with heavy rainfall (envisage a month's rain falling in 24 hours, already an occurrence with Climate Change), so what is the overland flow onsite in this circumstance? Will the 2 Dynham Place development be in line for severe flooding, eating away at the piling?

During such sudden heavy rainfall events it is imperative that the 2 Dynham Place rear garden, i.e. this proposed development site, continues to function as a sump or water-holding area for excess overland surface water flow.

Stantec did not interview local landowners of long gardens above the site to discover actual evidence of surface water flow or bogginess in the bottoms of those gardens. They merely looked through all the objections to the previous housing proposal from locals for any comments on wetness in gardens. They found none, unsurprising because unless relevant landowners are asked specific questions about gardens, answers on boggy conditions will not be provided. Absence of evidence is not evidence of absence.

Also they failed to find the comments in the objection by **Headington Heritage** on interviews **actually conducted with the landowners** of the long gardens which **did** provide evidence of water flow and boggy conditions in long garden bottoms.

This again highlights the importance of local knowledge and research.

E. Sewage network capacity in the area nearing capacity, further loading will make leaks and surcharging more likely

FoLV have concerns relating to the capacity and age of the sewerage network in the whole area and the consequences any groundwater pollution would have for the fens. The context here is that **two sewers are routed actually through the SSSI and LWS fens**. Many of the other sewers in the area around the north end of the valley were installed with housing estates that were built more than 70 years ago and are ageing. Joints are known to leak with age. Blockages and surcharging, with emissions from hatchways, can occur. **This is not hypothetical**. This week **two sewer leaks are being investigated by Thames Water** on land adjacent to the fens not far from Girdlestone Road. Sewage produces a damaging level of nitrate pollution to the fen habitat.

This potential development would add yet more sewage into a network that is ageing and already showing leakage problems. The SSSI and LWS fen areas show pollution with nitrate from contaminated groundwater is frequent (EA reports and Brookes student projects show this). Urban development always causes groundwater pollution over time from sewage and drinking water infrastructure leaks. Such calcareous alkaline fens should have the lowest of the low nitrate level for health (less than 0.5ppm) yet some springs in the SSSI currently emit 70x this required low level with consequent habitat damage.

Sewers of 22.5cm diameter **travel actually through the best parts of the SSSI and LWS fen areas, emission from their hatches must not happen**. Yes, it is only two more houses adding sewage, but every additional dwelling adds to the problems already being experienced.

Thames Water is on site at the moment solving two sewage leaks adjacent to the fen, one from the pipe system that the 2 Dynham Place houses are planned to link into, which travels through the fens.

F. The development is over-shadowing and overbearing for adjacent properties

The natural base of the proposed housing is 94m AOD approximately with a 102.5m AOD ridge height – or 8.5m high, massively overshadowing the garden of 4 Dynham Place from the south. The proposed development is only 2.5-3.5m from the garden boundary. This is may be totally unacceptable for the residents of 4 Dynham Place and conflict with planning guidance.

What is needed?

- A full hydrological study and report on the WHOLE Upper Lye area (North of Girdlestone Road to Old Road) to assess actual amounts of groundwater flow under the site and the means by which groundwater flows, and their associated hydrostatic pressures are maintained.

- Demonstration by an independent report that the CFA piling foundations will not cause loss of hydrostatic pressure to the upper Lye area water table or to the downstream Town Furze allotment wells by leakage, or by blockage caused by the proposed foundations.

- Demonstration that the proposed foundation design will not encounter refusals due to hard limestone layers or doggers etc. leading to a departure from any approved design to a yet more damaging one.

- A design of SUDS that will be **guaranteed** to replicate natural infiltration **in the context of nearby piling** and which has adequate annual maintenance enforced to ensure efficient functioning in perpetuity.

- Demonstration that No Harm will come to the Lye Valley SSSI as a result of this development or excavations in connection with it.

If all of the above cannot be achieved and it cannot be demonstrated that this development will cause no harm to the Lye Valley fens, this application should be refused.

***The Lye Valley SSSI fens must be protected under the 1981 Wildlife and Countryside Act. They are the rarest habitat in all England and should not be sacrificed for this development when literally thousands of new dwellings are being built around Oxford. The Lye Valley North fen is the specific responsibility and in the guardianship of Oxford City Council*.**

Endorsement of the objection submitted by Headington Heritage

We fully endorse the well-illustrated objection by Headington Heritage and encourage a study of the diagrams presented to aid understanding of the complex issues involved.

This document is submitted by the Committee of the Friends of Lye Valley - 11 Jan 2021

Judy Webb, PhD, B.E.M. Chair FOLV, 2 Dorchester Court, Blenheim Road, Kidlington, OX5 2JT

Terry Wood, PhD 50 St Anne's Road, Oxford, OX3 8NL

Heather Armitage, MA (Oxon) PGCE, 50 St Anne's Road, Oxford, OX3 8NL

Steve Woolliams, HNC Applied Biology, 103 Dene Road, Oxford OX3 7EQ

Steve Dawe, BA, M Phil, 53 Bulan Road, Oxford, OX3 7HU

Dr Hazel Dawe, LLB, PGCTLHE, SFHEA, 53 Bulan Road, Oxford, OX3 7HU

Jennie Hopkins, HND, 8 Rock Edge, Oxford OX3 8NE

Website http://www.friendsoflyevalley.org.uk/