Re: Application 23/02262/FUL | Erection of a modular manufacturing building. Formation of a service road. Installation of 1no. Generator with palisade fencing and 1no. Electrical transformer. Provision of car parking and cycle storage. Alterations to landscaping. | Clinical Biomanufacturing Facility Churchill Hospital Old Road Headington Oxford Oxfordshire OX3 7JT

Objection to this Application from Friends of Lye Valley (FoLV)

19th April 2024

Introduction

We appreciate further documentation for this proposed development being presented on the planning website. Unfortunately there are a number of points in our previous objection that have just not been addressed and some of the new documentation contains confused and contradictory information or conflicting diagrams**.** There seems little real understanding that Lye Valley **contains an extremely rare groundwater-dependent habitat of Alkaline Fen, the west side of which is dependent on rainwater entering the ground on the Churchill site to create vital groundwater of correct chemistry and water volume emerging in the valley. This CBF rebuild site sits on the fen catchment area that feeds the western sloping fen from a high level spring/seepage zone from a perched aquifer.**

We remind readers – Lye Valley fen contains a 14,000-year-old **internationally rare and geologically/hydrologically dependent habitat -** a tufa-forming, valley-head, alkaline spring-fen with M13 Black Bog-rush-Blunt-flowered Rush vegetation association, **on 1-2 metres of peat (Irreplaceable Habitat of 'Lowland Fens' in the NPPF)**. The SSSI sections are **1.5 ha of only 19 ha of this rare wetland habitat left in all England** and the site supports 22 species of plant rare in Oxfordshire of which 14 are on the England Red List. It also hosts ten species of rare and 27 species of nationally scarce invertebrates, notably soldier flies and glow worms, as well as thriving populations of reptiles and amphibians.

As a **groundwater-dependent terrestrial ecosystems**, the rare wetland plants and invertebrates this fen supports are entirely dependent on the water table being **at or near the surface all year round**, which in turn depends on a steady, sustained supply of clean, mineral-rich groundwater sourced from rain falling on the surface of the catchment and percolating into the ground. There is also the peat deposit to consider; if the fen dries out due to reduction in groundwater volume, the carbon locked up in the peat oxidises and is released as Carbon Dioxide, contributing to Climate Change (Climate Breakdown) and affecting the City's Net Zero Targets.

Sketch map showing extent of spring fen wetland with peat (red cross hatching) identified in Lye Valley SSSI and LNR/LWS areas identified by site walkover by ecologist and peat expert Judith Webb. CBF site shaded grey to the west(82m from the spring line).

***<u>There is sufficient lack of attention to our concerns to mean we continue to object to this development</u>*.**

(This version supersedes our previous objection)

The proposal in this application is contrary to policy RE4. Extract from Oxford Local Plan Policy RE 4 'Sustainable and Foul Drainage, Surface and Groundwater Flow' plan pages 65-67.

'Within the surface and groundwater catchment area for the Lye Valley SSSI development will only be permitted if it includes SuDS and where an assessment can demonstrate that there will be no adverse impact on the surface and groundwater flow to the Lye Valley SSSI.' *(our emphasis)*

We don't consider that the **Hydrogeological Risk Assessment Document** presented has clearly demonstrated there will be **no adverse impact on groundwater flow to the Lye Valley SSSI fen so the requirements of RE 4 cannot be met. Impacts are not only on the Lye SSSI, but areas of potential restoration such as the LNR/LWS fen areas to the south of the SSSI** (why aren't these considered? don't these fen areas matter in terms of biodiversity and peat storage?)

We appreciate that the older buildings on the Churchill site were installed long ago before there was any knowledge of the adjacent valley fen or its high conservation importance or the hydrological connection to Lye Valley. We would have hoped re-building would have been more sensitive to the fen's needs now its high conservation importance is recognised.

Comments on proposed Infiltration SuDS and Location and Installation Depths

SUDS infiltration systems do not mimic natural water flows well enough and discharge too rapidly to allow calcification needed by Lye Valley spring water (needs 'super saturation' with calcium for tufa formation).

It is very uncertain that the **SuDS feature proposed** (main purpose of such infiltration crates is a designed to reduce offsite flooding) will adequately compensate for loss of permeable catchment under the new build, as it **radically changing the natural pattern of rainwater entry to the soil** (collects roof/surface water from a large area and puts it all into the ground in a different location in a smaller area). Rainwater volume that would have naturally permeated well into the ground over a wide area, may have difficulty completely penetrating the restricted area of ground under the soakaway because of only **low to moderate permeability measured in the Soakage pit studies**. Depriving one area of catchment of water and overloading another small area of catchment does not mimic the natural situation. This is especially important due to the nearness to fen spring/seepage zone emergence area in the valley (82m). Why isn't this obvious?

Until evidence is provided of their effectiveness, Sustainable Drainage Systems (SUDS) are not accepted as mitigation for adverse impacts on lowland fens by the **Freshwater Habitats Trust (FHT)** in their Oxfordshire Fens Project , (see https://freshwaterhabitats.org.uk/projects/oxfordshire-fens-project/). This is because, SUDS are designed to minimise flood risk, not simulate the supply of groundwater in a manner compatible with the requirements of lowland fen ecology or hydrology. FHT are not aware of any evidence that SUDS can fulfil this role in the case of groundwater dependent terrestrial ecosystems. The CIRIA SUDS Manual (2015) https://www.fenland.gov.uk/media/12340/SuDs-manual-SustainableDrainage/pdf/CIRIA_report_C753_The_SuDS_Manual-v3.pdf provides no guidance on mitigating the loss of permeable, natural, catchment on fens and groundwater-dependent terrestrial ecosystems. In assessing the impact of possible development at Southfield (Oxford) Golf Course in the catchment of the Lye Valley Fens SSSI, Dr Curt Lamberth, an expert hydrologist, stated : '**Groundwater protection zones are not fully mitigated by the use of SUDS therefore development within these areas must be**

restricted or eliminated.' ('*Investigation of the possible hydrological effects on the Lye Valley Sites of Special Scientific Interest and the riparian zones of the Lye and Boundary Brooks as a result of development on Southfield Golf Course, A Pre-EIA Assessment'*, Oct 2007, Dr Curt Lamberth, available from the City Council website https://www.oxford.gov.uk/downloads/file/620/hydrology-report-for-lye-valley).

In this report he also says:

'*Surface water plays an important part in tufa formation. Carbon dioxide is formed as a natural process in active soils where the decay of humic material and the effect of plant roots and biological activity generate CO2 from respiration. This CO2 saturates rainwater percolating through the soil. In turn this CO2 rich water dissolved more calcium carbonate from the aquifer. Therefore, it is vital that catchments in the vicinity of a tufa spring have an active soil horizon [*]. Active soil horizons could be grassland, woodland or even an agricultural field but not hard-standing or a conventional SUDS system. Any man-made system must have an indefinite lifetime*.'

[*] Soil with growing plants, good humus content and aerated by root growth and activity of worms and other soil invertebrates.

Development with Soakaways might not cause too much groundwater damage at the very far edge limits of the calculated groundwater catchment, although any catchment green area lost should be resisted. However we feel strongly that soakaways so very near (82m) from the spring emergence zone on the west valley side are a completely different matter. The nearer the development to the spring line, the bigger the negative impact on groundwater.

We note Natural England have raised no objection, probably because they have not understood the above and have not interrogated the Drainage Design closely enough to detect the problems. We discuss these problems below.

Location of SuDS Soakaway Drainage feature unclear- confused conflicting diagrams

Understanding the new documents has been difficult. In the Mayer Brown **Technical Note on Drainage** On page 5 Fig 3.1 and in **Appendix C 'Proposed Site Layout'** - the **proposed soakaway is drawn sited in the SE corner of the site, under** the proposed 'wildflower meadow' adjacent to location of borehole BH3. However in **Appendix D: Proposed Drainage Strategy**, the Soakaway (infiltration crate) is in a different location to the south (area of Soakage test pit SA1) but also now under the access/service road. These conflicting locations are confusing and the two different locations will have different impacts on groundwater infiltration routes to the valley, **which is the correct planned location of this SuDS feature?**

Installation Depth of SuDS Soakaway Geocellular Crates

Soakaway chamber depths must be more than 1m above groundwater. Ground Investigation Services study - Soakage Pit SA1 low to medium permeability in the Beckley Sands

underneath a layer of Made Ground. In the Mayer Brown Tech note on drainage Appendix D We note the 'Draft' diagram showing the cellular soakaway infiltration crate (an aggregate filled chamber) is to be installed with a **Cover Level (CL) of 91.5m AOD** and an **Invert Level (IL)of 89.0m AOD.**

We also note that the Ground Investigation Services study states that data from borehole BH3 (ground level **97.3m** AOD according to Topography mapping), near to both conflicting mapped locations of proposed SUDS geocellular infiltration crates say ground water was encountered at **4.0m depth** and that groundwater was **noted to rise to only 2.90m below ground in BH3 on date of boring in April 2022**. (Scitech Engineering Ltd Ground Investigation: 19 April 2022 CBF Building, Report No. S.5852 Churchill Hospital Oxford). With **1.30m of made ground** on top of the Beckley Sands and water table rising to 2.90 below ground. If BH3 is at a ground level of **97.3m AOD** with ground water 4.0m below but can have water table rising to 2.90m. Therefore groundwater level can rise to maximum of 94.4m AOD in this location in April 2022.

The proposed SUDS system proposed has a quoted tank top (CL) at 91.5 AOD, approx. 2m below the base of the measured groundwater level, and 4m below at its internal base (IL) at 89m AOD which is technically unallowable.

It is also relevant that with Climate Change, extreme rainfall events and duration will happen. We are experiencing this now. April 2024 has **higher groundwater levels over the whole country after the wettest 19 months on record** (National Hydrological Monitoring Programme data). Seems likely that **water level now in BH3 will be higher than in April 2022 when measured.** We suggest that measuring of **current high water tables** is **urgently needed** to inform the location and depth of any SuDS soak-away infiltration structure.

Water tables may be just too high in the available area for any SuDS soakaway to function properly. Possibly it is intended to remove all the made ground, but if so why isn't this stated and level differences explained?

We need to see a final accurate decided plan for this infiltration structure in a final decided location (with **current** estimated groundwater levels). As the infiltration crate in the south position is to be sited under a road and just to the north of a new small building, it is difficult to see how stated plans for the scenario of extreme heavy rainfall (which we will get with Climate Change) filling the crate will then be allowed to '**overflow from the crate downslope and sink into the soil'**. In the crate location specified in Appendix D, how will water emerge from under a road and will it not then inundate this small generator building rather than flowing gently overland downslope?

Loss of permeable area and groundwater flows to LV fen – not sufficiently discussed

Lye Valley fen is now surrounded on three sides by urban development and is perhaps the **worst example amongst the county fens of this type where Alkaline Fens have been degraded by urban development within their groundwater catchment** where

impermeable hard-standing, roads and buildings has sealed off the natural, permeable, catchment surface. This prevents the rainfall recharge and supply of clean, calcium-rich groundwater feeding the Alkaline Fen.

On the CBF rebuild site calculations show that the permeable groundwater infiltration area is going to be reduced by an increase in building. We agree with the assessment by Headington Heritage (see objection) in that a total loss of 3-4 tennis courts of infiltration area will happen. Site area of 1961sqm currently has 61% infiltration area (equivalent) which will be **reduced to only 4.9%** by this development, with a **95% sealed area** after development, with rain water to be diverted into one SuDS infiltration tank. **This could** be a serious loss of groundwater generation area to the valley fen adjacent; because the fen is now under severe lack of groundwater water stress every hot, dry summer we are experiencing with **Climate Breakdown** (2018 and 2022 were particularly damaging summers to the fen with extensive dry spring areas on the west side). The west side fen needs every square metre of permeable soil for rain catchment it currently has, the projected degree of reduction in permeable area will be likely damaging in future hot dry summers. **This issue is of vital importance and is just not addressed at all in the Hydrogeological Impact Assessment**.

The **cumulative impact of incremental catchment development** on this priority lowland fen is not effectively assessed and considered in this application. What are the future plans on the Churchill site for other old building areas in the process of being cleared and, in particular, the former demolished building site to east of CBF site and even nearer to Lye Valley fen spring line? Lowland fen catchments are often very small, the impact of several small, separate applications on lowland fen catchments if considered cumulatively would likely be adverse even though each development claims no impact due to being a tiny proportion of total catchment. **Re-developments of this whole east side of the Churchill site need to be considered together** regarding impact on Lye Valley fen rather than in piecemeal re-development proposals.

In order to build the CBF new building with big problems for its SuDS location compensation for loss of open, rain- permeable ground for infiltration could be achieved nearby. A commitment to good degree of **re-greening** on the Churchill site areas for the benefit of the fen to compensate for past and current planned loss of groundwater recharge area would be good to see. How about the area of the former (now demolished) building site to east of CBF site being allocated for re-permeating and re-greening? Re-creating the green 'sponge' it used to be before any development? This area could have breaking up the crumbling old hard surfacing, re-greening to allow more rainfall to enter to feed the adjacent springs, which are critically, extremely near.

Comments on the Hydrogeological Risk Assessment document by CGL

This (presumed) desk study suffers from lack of enough knowledge of the site or (apparently, these are expert geologists and hydrologists) much knowledge of the needs of the Lye Valley type of calcareous rare spring-fen. This report seems suitably expert for calculating risks FOR

THE CBF REBUILD SITE. It does not provide us with any reassurance that this CBF site re-build is not a risk to Lye Valley fen, despite claims to the contrary. See full discussion in Appendix.

Notably absent is ANY calculation or diagram depicting groundwater flows (direction and volume) from the site towards Lye Valley. No discussion of implications of lack of groundwater recharge by great increase in impermeable area by the re-build. Interestingly what it does show (in seven different diagrams) is that surface water flows from the CBF site are shown channelling through the approximate positions proposed for the infiltration geocellular SuDS crates to be installed. Potential flooding of the SuDS by surface water after extreme rainfall? Not discussed.

The final answers on hydrogeological risk factors are in a table in Appendix **A. All of the risk factors discussed relate to risks ON THE PROPOSED CBF REBUILD SITE. Not one of the risk factors discussed relates to the risks of development to Lye Valley** SSSI/LNR/LWS adjacent. No identification of any problems or issues to do with groundwater flow or chemistry to Lye Valley are discussed. High nitrate is a very serious groundwater contamination risk to Lye Valley fen as more than four fifths of all its important spring areas currently in the SSSI/LNR are **heavily nitrate polluted** and the City Council has been supplied with all evidence (three different studies). **Not discussed**.

It would seem that this firm have been given an incomplete brief or instruction as to what is needed. Is this report emphasis on site risks only really what the Council's Ecology Officer requested?

No answer or fulfilment of the requirements of Planning Policy RE4 requesting evidence of protection of Lye Valley water flows.

This document is useful only in the context of risks on the CBF site and is therefore unacceptable as evidence fulfilling requirements that there will be no damage to Lye Valley SSSI/LNR/LWS from this proposed development.

Again we request details should be provided by the applicant to demonstrate that the development will not result in a change in the specific water quality conditions supporting the features of interest within the SSSI. The fen needs water very high in Calcium and very low in nitrate.

Sewage

We mentioned in our previous objection the high degree of **nitrate water pollution** already experienced by the SSSI and LWS/LNR fen springs on the west side of the valley adjacent (Measured nitrate levels in springs emerging along the top of the fen west side ranged from **6.5ppm NO3 to 58.9ppm NO3** – an Environment Agency assessment in 2016 by their groundwater specialist Craig Hampton). The rare alkaline fen needs **less than 0.5ppm Nitrate, so the worst spring is emitting 117x what the fen needs in terms of nitrate concentration and limiting any restoration of rare fen habitat here. Springs were**

estimated to be emerging about 89m AOD estimated (from Lidar) by the EA, said to be consistent with a limestone band horizon).

This fen nitrate pollution (which really mainly originates from the Churchill site as a result of sewage leakage where ammonia converted to nitrate by soil bacteria) has not been commented on or addressed in these new planning application documents, even in the Hydrological Risk Assessment. It is issuing into the SSSI from **groundwater**, not surface water. The source of the high nitrate pollution measured in Lye Valley fen on this side can only be from ageing ground pipework infrastructure with leaky joints - old sewer or drinking water pipe network. In the past few years we have heard of one instance of a sewer total collapse on the Churchill site, with no doubt unavoidable pollution of groundwater by sewage. How will this sewage pollution to vital groundwater risk be reduced/avoided or betterment achieved in future in the rebuilding of this CBF building? No mention of this.

Mayer Brown Drainage Strategy technical note – in para 2.13 we find ' *foul effluent is discharged to a public Thames Water foul sewer in close vicinity to the site*' we note a total peak foul flow rate from the development is calculated as **0.033 l/s**. But there is no answer to our question in our previous objection **-We asked where the sewage will go from this development**?. Will it or won't it add to the foul effluent load in TW sewers that **actually run south through the SSSI North fen**?. It is of great concern to the FoLV group that these old sewers are not overloaded such that raw sewage issues from hatchways situated within the SSSI fen, this would be hugely damaging to the rare fen habitat. Sewage needs to go in a different direction and not add to that in the pipes running through the fen.

We note there is as yet no permission achieved from TW to connect to the existing foul sewer network and that this is to be achieved at the 'detailed design stage'. Presumably this means the route of sewage from the site is not known. **It is needed to be known at this stage, never mind later after permission, as this information is needed to understand any sewage risk to Lye Valley fen.**

Due to the **severe nitrate groundwater pollution of fen springs on the western side of Lye Valley fen SSSI,** during CBF rebuilding one way to provide betterment of water quality would be to install **completely sealed sewerage pipes** that allow for no leakage of sewage to ground from the pipes as there are no joints. We request such sealed pipes.

Biodiversity Net Gain and proposed Habitat creation on site

There seems to be little understanding that a key feature of this development is **reduction of natural rain infiltration to the ground area** on site and that this may result in **reduced groundwater flow to the valley springs adjacent**, even with the mitigation SuDS. The Hydrological Risk Assessment does not really deal with this issue (discussed further***)

Any reduction in groundwater flow from the site towards the fen will negatively affect water-dependent plants and invertebrates in the fen by making it drier. Water chemistry is also crucial for the fen. Chemical testing of the Beckley Sands underlying geology in the

Ground Investigation study indicated highly alkaline pH soil conditions **(8.0pH – 9.2pH**) - this is ideal for giving infiltrating rainwater the strongly alkaline chemistry, loaded with calcium from limestone layers. This alkaline calcium-rich chemistry produces tufa (limescale) formation in the fen and fulfils the requirements of the rare plants and invertebrates there. Any reduction in important water-dependent biodiversity of species in the hydrologically-linked fen adjacent cannot be compensated for by small areas on the building site of wildflower planting, scrub and a hedgerow. **You cannot compensate for loss of rare wetland species by planting dry-land flowers, scrub or a hedge.**

A new hedge may be welcome if native species and managed properly in future. We see that new areas of 'mixed scrub' are proposed in amenity grassland on the western side of the new building and between it and the existing nearby building. This seems a totally unrealistic proposal. The shade from both buildings will mean species planted will not thrive due to insufficient light.

Light pollution

In our previous objection we commented on the need for **no increased light pollution** from this development to the Valley which is much used by bats for hunting and features a good moth population (also food for bats) and an important population of glow worms. **This issue is not addressed in the new documents** – any mention of modification of lighting in and around the building to **Bat-friendly lighting** for protection for the valley flying insect population from being attracted to lighting in this area and killed by exhaustion. There needs to be far greater recognition of the impact of buildings on the Churchill site on the current mostly dark zone appreciated by wildlife in the adjacent valley.

Lizard Translocations

Thank you for the information that four Common Lizards were removed and placed in the reptile receptor area. A quick visit to the development site in early April 2024 to look at this reptile receptor site with hibernaculum revealed that reptile exclusion fencing (black plastic) fencing does not now enclose the proposed CBF rebuild site. Instead it seems to be erected on **three sides only of the adjacent empty site** to the west, next to the reptile mitigation area, **not around the CBF site**. As the exclusion fencing is not currently been complete around the proposed CBF development site, Common Lizards, now active in spring, are free to move from the mitigation reptile receptor area (and indeed from the Lye Valley LNR/SSSI) back into the CBF development site (despite the fact that there has been a lot of site clearance animals could still have returned as there is now no effective barrier in place). It is possible Common Lizards will again need to be cleared from this site before any development can start.

Also we would like to know what guarantee exists that this **reptile receptor area with hibernaculum and wildflower turf** will be safeguarded from future planning applications, for example for the demolished building site immediately to the east of the proposed CBF building site?? We would like to know that these reptiles now have a secure home.

Transport Issues

This is in an area of high traffic congestion. We see no calculation or information regarding the uplift in staff numbers adding more pressure to the transport network. How will this development mitigate this increased commuting and not contribute to more congestion?

For all the above reasons, please refuse this planning application

Yours sincerely

The Committee of the Friends of Lye Valley (FoLV):

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Appendix-

Detailed discussion of the Hydrogeological Risk Assessment Document by CGL

Plate 1. **'Superficial deposits in site area'** our site ground investigations show **fen peat** deposits are far more extensive than depicted in this diagram, indicating spring issue points much nearer the CBF. The diagram presented is inaccurate. Peat and tufa deposits extent much nearer to the CBF site (see the diagram we have produced in our introduction above).

Plate 2 '**Bedrock Geology in site area'** has a reassuring arrow pointing to the area just to the east of the proposed CBF rebuild stating '*large recharge area of the Beckley Sand Member minimally affected by the proposed development'.* What this fails to indicate is that this **cannot actually be a 'large recharge area' where the arrow points for groundwater flowing to the valley** because a large proportion of that Beckley sand geology indicated is not exposed to rainfall but in fact covered by Churchill development sealed surfaces of – tarmac and concrete and made ground of unknown permeability. No understanding that all small pockets of exposed green vegetated soils between sealed surfaces in this area on Beckley sands are vitally important for recharge because of much soil sealing.

Section 2.2 '**Geomorphological setting**' is just wrong. The proposed CBF site is not on a floodplain terrace of the Lye Brook. No terrace gravel sediments such as depicted in Plate 3 are present at all. Under the peat and tufa in the valley sides and bottom are mostly clays and bedrock. The steep-sided

Lye Valley (more than 10 metres height drop from the top to brook in the bottom) was probably carved out of the 160 million year old Jurassic limestone and Beckley Sand geology during a previous Ice Age by high energy summer meltwaters. The tiny Lye Brook is a gentle remnant of those past ferocious erosive summer streams.

Section 2.4.1 **Infiltration constraints summary layer.**

This fails to mention that a site **infiltration constraint** might be the **high natural water table** on the proposed CBF rebuild site encountered in borehole BH3 (did these consultants look at the stratigraphy of BH3?)

2.4.4 **Ground water protection summary layer.**

Here we might have expected this document to comment on the already known severe groundwater pollution by nitrate to the fen from leaking sewers on the Churchill site that we explained in our previous objection (did nobody tell them of this, and our reports on this, and Brookes student studies and EA studies on this, **all supplied to the City Council and to Natural England**??)

Section 5

Is all about depicting topography in various clever ways and showing **surface water flows** - no less than **seven diagrams** (plates 27-33) depicting more or less the same **surface water flow patterns** from the Churchill site into Lye Valley fen and the stream. We are well aware of these surface flows – we see and walk through them every week during conservation activities, but it is interesting that there is **such strong flow through the very south of the CBF site approximately where the geocellular crate infiltration SuDS structures are planned to be sited** (choice of two locations in documents).

Surface water is important but it is not calcified. What are far more important are calcified ground water flows – where are the diagrams showing this?

Is it really a good idea to be siting these SuDS geocellular crate infiltration structures in an area clearly identified as a key pathway for surface water flow?