Re: OUFC Stadium Planning Application Ref: 24/00539/F

Objection 2 from

[redacted]

Date: 09.05.2024

This objection is in addition to my first objection. I ran out of time to present full evidence for my last point 10 in my previous objection.

What follows is further discussion and information to support conclusions in point 10 of my first objection. Here I present my site investigations and explore the implications of the installation of a Football Stadium on land known as the Triangle, dealing with the aspects of Drainage, Hydrology, Flood Risks, potential damage to Stratfield Brake East and West Ancient Woodlands and Sewage removal issues. In particular here I provide specific evidence of Triangle site flooding and local drainage over the last 7 months.

[with reference to application documents: ES Volume 1 Chapter 14 Flood Risk and Drainage by Mott MacDonald, and the ES Volume 3 Appendix 14.1 Flood Risk Assessment and Drainage Strategy by Mott MacDonald, and Appendix H Site Walkover Technical Note by Mott MacDonald]

Potential Negative Hydrological implications of Proposed Stadium Development on the Triangle

Summary

The Stadium is proposed for a site on heavy clay soil, (where no infiltration SuDS are possible) which is quoted in documents as lower than the surrounding roads by up to **1.5 metres**. I have discovered during heavy rainstorms it is receipt of some surface drainage water from those roads which is not included in calculations (evidence below). It has been **extensively flooded by surface rainwater for the last 7 months** (personal observations when on site biodiversity surveying).

From the available Stadium designs I think there is still unacceptable uncertainty how OUFCs proposed SuDS will actually work to control flooding in consideration of Climate Change induced current and future heavy rainfall storm events:

a) to prevent the site from flooding when in operation

b) to restrict run-off from the site to greenfield rate so as to not raise flood risk downstream
c) to not cause damaging hydrological changes to the adjacent Stratfield Brake East Ancient (Long-established Woodland, a Priority irreplaceable habitat

There is also complete uncertainty as to how the Stadium and Hotel **sewage** will be deal with (? Pumped upslope to the roundabout) and whether the Thames Water network has capacity to take it, including the currently overloaded Sandford Treatment Works which is emitting raw sewage to the Thames.

At the start of the ES on Flood Risk and Drainage it says:

'*The report concludes that the development is suitable for this location and can be safely developed to manage and control all identified long term residual flood risks in this area. The provision of a positive drainage system on the site may also contribute to a reduction in flood risk locally.*'

I think this is aspirational at best in view of the future Climate Change predictions of 50% less summer rainfall in 25 years' time, with consequently heavier winter rainfall. Although all SuDS designs currently assume 40% uplift in rainfall amounts, will this uplift be enough considering the extreme rainfall and flooding we have already experienced this last winter?

Detailed Discussion:

I find one needs to study a site for at least a whole year to grasp how the hydrology normally works. I'm and ecologist and with permission I have been visiting and recording the biodiversity on the Triangle regularly from 2023-2024 and thus have much experience of site ground conditions and hydrology from summer through winter and spring 2023-2024.

The site has had water lying all over it for the last 7 months. This has severely limited SGN's capacity to get on site with heavy machinery and repair the leaking gas main which travels under the site on its way to Yarnton (still gas leaking out despite attempted repairs). Any future site construction activities would be extremely difficult in winter.

From documents detailing topographical surveys the site levels are quoted to range from 63.6m AOD to 64.7m AOD. The surrounding highways are on **embankments raised above the ground level of the site by 1.5m** (Mott MacDonald Geotechnical and Geo-environmental desk study page 4)

Because of the clay geology on site, the document states:

'*groundwater flooding could pose a low baseline risk to the Proposed Development'.*

The Triangle area for effective drainage is quoted as **4.7ha** (this of course does not include the southern ancient woodland strip of Stratfield Brake East even though in Mott MacDonald

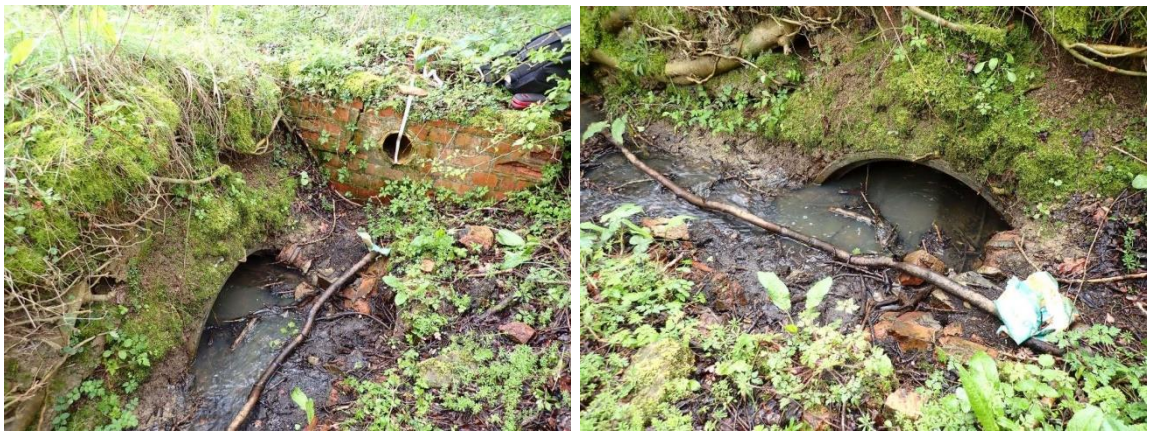
documents the red line site boundary is shown going over this woodland which is not part of the proposed development area).

The impermeable area from development is quoted as **3.6ha so this means 76.6% of the site will be made impermeable when in operation (assuming the pitch area impermeable).** The remaining 'permeable' area (although this is not much permeable on a clay soil) includes the soft landscaping areas, numerous swales, filter strips, rain gardens, ponds and attenuation basins. **Despite all these, I think rain run-off and site flooding (Pluvial flooding) is a potential big issue.**

Site Drainage and currently partially blocked marginal Frieze Way ditch

The ditches all around the site connect and drain from the lowest point on the west side ditch via an estimated 825mm diameter tube (Mott MacDonald measurement) – a concrete **culvert**, under Frieze Way to the deep ditch that runs westwards past Stratfield Brake West ancient wood section. This culvert pipe is said to be 85% blocked with silt (I agree, I have investigated and seen it so, but water still flowing out, photos below). Frieze Way opened between 1960 and 1963 and cut the original Stratfield Brake Ancient woodland into two halves. The culvert under Frieze way is approximately in the position of the original woodland ditch running along the original northern margin of the wood, before the road.

Water has been backing up in that western Frieze Way ditch going south to the culvert position because there is an access causeway to the Triangle field (maybe for agricultural machinery?) from Frieze way crossing that ditch. A drain pipe emerging from the causeway wall 30cm down shows no flow (no explanation for this) BUT I saw water bubbling up from deeper underneath the causeway so water is finding a way underneath, but flow not fast enough to lower ditch water level to north of causeway. See photos below.

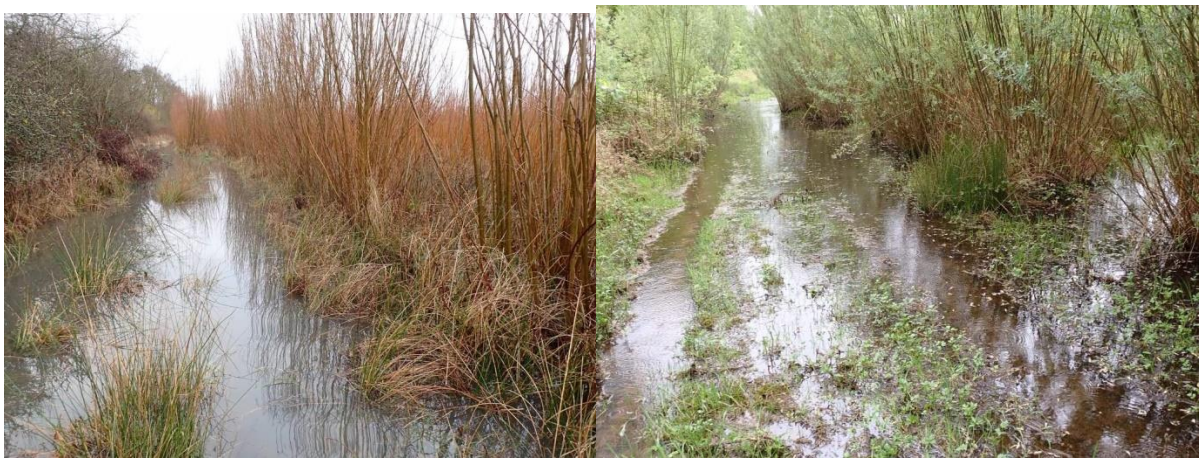


Two views of the Triangle/Frieze Way ditch with big culvert to left, set low down which takes ditch water (can be seen flowing) under Frieze Way from the Triangle ditches 29.03.2024 J A Webb photos. Brick wall to access causeway visible with pipe (no water flow).Water is backed up in ditch on the northern side of causeway but emerging from under causeway.

This blockage & backing up (combined with extremely heavy rainfall) in that Frieze Way ditch has meant the lowest area of the Triangle site on the west side has not drained but been

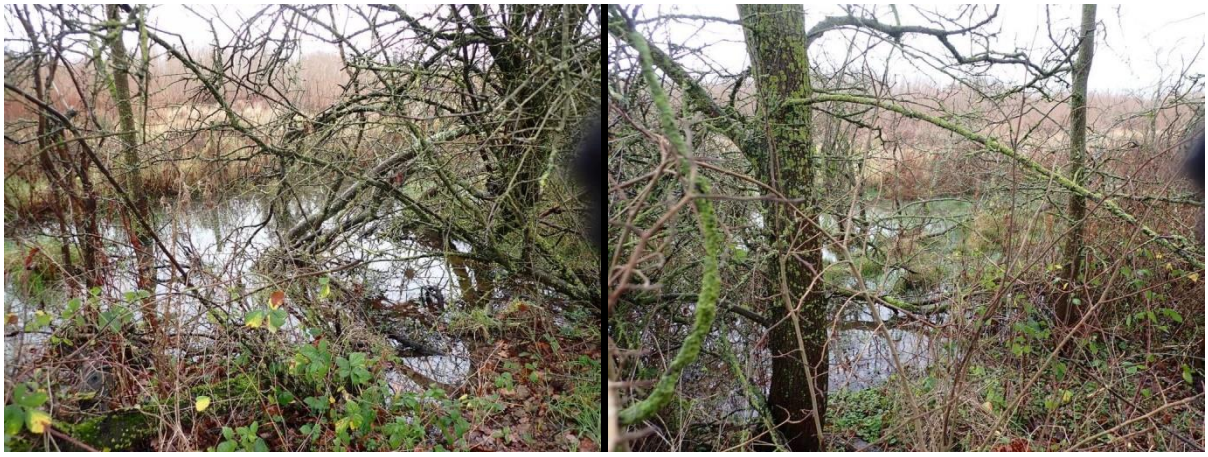
deeply flooded this last very rainy 4 months - to over the top of my wellies at more than 39cm deep at one point.

Mott MacDonald calculate from topography surveys (complete topography survey is in their scoping submission in Appendix I Site Location Plan, with enough resolution to see the spot heights in mAOD. SUBMISSION Scoping Report 16.08.2023pdf) that this lowest area of this flooded western zone in the Triangle is at 64.2m AOD. To get the stadium out of any surface flooding in this area they propose raising the ground and putting it on a platform which will raise the ground to 64.8m AOD, said to be the level of the drier parts of the site. So over a big area of western side they will have to raise ground **by 0.6m of imported material** (**64.8-64.2mAOD = 0.6m, my calculation**). Will 0.6m of imported waste soil and rubble be enough to get it out of surface water flooding in future, even if the impedance to west side ditch drainage is sorted? With Climate Change heavier, longer, deluges?



West side of Triangle in lowest land area adjacent to ditch to Frieze Way. Left view seriously surface water flooded on 02.01.2024. Water deeper than the top of a wellie boot at 39cm. 02.01.2024. Right view on 06.05.2024 still impassibly flooded. Photos J A Webb.

A **surface water flooding map** is available in the documents which clearly identifies this western low area of the Triangle. What it fails to show is the significant surface water pooling on the eastern side of the Triangle as well – probably from the Oxford Road highways ditch (flooding regularly visible from the bus on Oxford Road). This area would probably therefore have to be land-raised as well as this is planned for an access point. **The need to raise this eastern land area (by how much?) not recognised or accounted for in plans.** Even if Highways dug out that ditch, this is still a low site area in the Triangle where water pools. Who knows if cleaning this ditch would solve the issue? Mott MacDonald could not identify an outflow point from this ditch in the south-eastern corner.



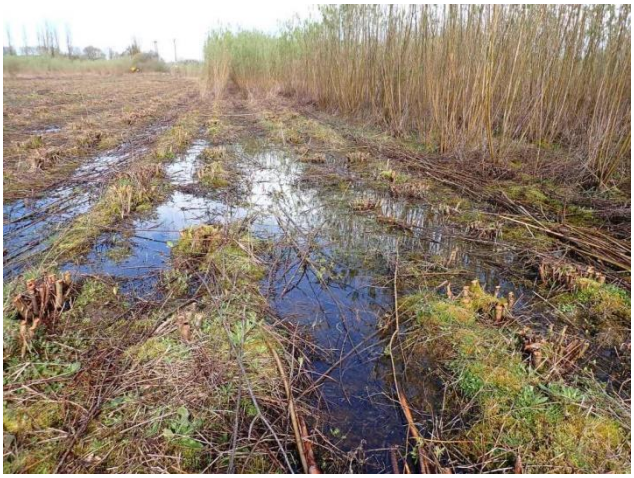
*Triangle area on the **east side** extensively flooded on 02.01.2024. Views into the Triangle from the verge on Oxford Road. Photos J A Webb.*

Plans for development resulting in increased surface water leaving the site – rain-gardens, geo-cellular underground crates, attenuation ponds, 'hydrobrakes' and 'greenfield rates'

It is stated the impermeable area will be **3.6 ha** after development (76.6% of the site). This area will have been stripped of all natural vegetation and 'land raised' to probably a minimum of 0.6m (discussed above) to form a level platform for building and get buildings out of floodwater by the introduction of vast amounts of waste soil/builders rubble from building activities in other sites. So this area will **no longer hold back significant amounts of rain water as it does now**, but shed much more water offsite much faster from roofs and paving/parking areas.

In its unbuilt, natural, well-vegetated state, as now, the Triangle site:

1. **Currently acts as a <u>big rain-water storage area all autumn winter, and spring</u>**. Ruts up to 40cm deep from vehicle access for willow management are all over the site, running NE-SW mean that the site is currently covered in micro-topographical variation which holds back and stores much rainwater. The ruts become essentially a large number of **linear temporary pools** full of water that last all winter into spring (still full of water in May '24). In some of these ruts water can be observed very slowly draining southwards towards the ditch, many more ruts were observed to just hold standing stationary water, functioning as mini-ponds, from which water leaves only by evaporation in drier weather. These are thus attenuation features, vastly reducing run-off from the whole site.



Water held stationary in ruts in the site centre, not draining away 29.04.2024, photo J A Webb

2. All the vegetation including willow coppice stools from this area return much rain water to the atmosphere by **evaporation (transpiration) from plant leaves;** even in winter there is some of this natural loss by evaporation from willow twigs, returning water vapour to the atmosphere and reducing run-off.

These two actions mean current site run-off water volume under Frieze Way is the minimum that could ever happen, a true 'greenfield rate', well 'attenuated' by processes described above (even after the wettest 18 months on record – ref; National Hydrological Monitoring Program). **The site currently both stores rainwater and returns it to the atmosphere**, functioning as **one huge natural Sustainable Drainage System**.

Rainwater leaves the Triangle site ditches (or at least the western and southern ditches, not the eastern ditch) via the western side large culvert under Frieze Way, then runs in a deep ditch westwards alongside Stratfield Brake West woodland and then by inverted siphon under the canal, presumably to Kingsbridge Brook which eventually discharges to the Thames).

Many Rain-gardens are drawn in the application plans to slow water flow from hard surfacing but these work best if they can release water to penetrate into permeable ground. The clay soil here is nearly impermeable and actually waterlogged all winter, so that can't happen. I cannot find details of where all the rain gardens water ends up.

There is planned be massive amount of **attenuation pond** and **underground storage capacity** for run-off water - a storage volume of between 3164 to 4220 cubic metres of run-off water in total is quoted. This includes a total from all the planned geo-cellular crates under the car park and all the volume of attenuation ponds giving a total storage of **3,715 m3** of rain water to be stored on site and evaporated or released slowly**. All the SuDS structures need regular desilting maintenance for optimal functioning or storage will decline, I can't find any details of this planned essential maintenance.**

All the run-off from the site will go to the western ditch along Frieze Way and have to have flow rate impeded by **hydrobrakes** to leave the site at the necessary '**greenfield rate'** of **11.6 litres per second** so as not to increase flood risk elsewhere (for the 1 in 100yrs plus 40% for climate change storm event). All the roof water from the Stadium will go to one of the attenuation ponds at the south, but **might be stored in tanks first and no design plans yet**

of size or where these tanks will go are presented (too much uncertainty!). It is stated they don't yet know if this rainwater is going to be used for washing down things or used to flush toilets. **By 2050 England is quoted to have a water shortfall of 5 billion litres a day,** they should absolutely be storing and using rainwater, not running it off to the attenuation pond. But is there room on this cramped site for large storage tanks to take volume from the roof?

The pitch is to be natural short grass. After rain, run-off from the pitch area will contain fertilizer, silt and possibly pesticides. If pitch surface is changed later to plastic Astroturf there will be pollutants in run-off like plastic microparticles or rubber crumb - chemical pollution in the water depending on choice of material. All potential pollutants will go to the 'attenuation ponds', reducing any value they would have for wildlife (contrary to claims). Add to the pollutants reaching these ponds **salt** placed on car parking and other areas in icy weather another problem for aquatic wildlife.

The open water SuDS '**attenuation ponds**' at the south side, next to Stratfield Brake East Ancient Woodland will perhaps be separate to the south drainage/boundary ditch there (? presumed, this is not discussed). They are stated to hold a total volume of **1769 cubic metres** and be **lined to prevent groundwater ingress. What will stop them receiving surface water overland flow from paving after a deluge rainstorm?** Flow from the attenuation ponds to the western ditch outflow position is stated to be controlled by **a hydrobrake** to a greenfield rate of **11.6 l/s** (or stated to be a revised rate to be agreed with Oxford County Council and Oxford City Councils- if this is the maximum safe amount, why would this be changed?).

' **Hydrobrakes**' are mechanisms within pipes which slow flow and can be clogged by detritus - things like **leaves and twigs** (which will be constantly falling into those ponds from the oak trees of the adjacent wood that over-hang this area). Even if they chop back those poor trees' branches, leaves will be constantly blowing in from the wood. Hydrobrakes will need checking and cleaning incredibly frequently to maintain function. It is a very bad idea to site attenuation ponds with hydrobrakes near or under trees for this reason. In accounting for any drainage failure problem, their stated plan is to **let the car park nearby flood:**

'*The drainage strategy and the drainage design will include provision for the safe failure of the drainage systems during extreme events. In these circumstances,* ***surface water will be retained within the proposed site car park'.*** (ES Mott MacDonald, 14.88).

On blockage of any Hydrobrake in an outflow system, their stated plan is to just let surface water out by means of a **bypass system** directly to the drainage ditch along Frieze way. **So there are probably going to be times of intense rainfall and blockage when water leaves the site at an uncontrolled rate and NOT restricted to the 'greenfield rate' of 11.6 l/s, increasing flood risk elsewhere:**

'In the event that the Hydrobrake flow control device becomes blocked, a bypass in the form of an overflow will be included such that any water unable to pass through will be diverted via an overflow pipe to the outfall. Likewise for the pond structures, in the event that the main outlets become blocked overflow pipes will divert storm water safely to the outfall.' (ES, Mott MacDonald, 14.89)

A very large, ancient, 10-trunk oak outgrown coppice stool tree in a nearby section of Stratfield Brake East overhangs the proposed car park area in the south west Triangle corner. Undoubtedly this will contribute detritus to the attenuation ponds, but no cutting back or damage to this historic multi-trunked tree that is many hundreds of years old should be considered.

10 trunk ancient Oak out-grown coppice stool tree rooted in Stratfield Brake East woodland leans out and shades the south west Triangle corner. Over or near proposed car parking area/attenuation ponds. Photo 06.05.2024 J A Webb

The landowners of the ditch leading from the west side of Frieze Way to the siphon device taking run-off drainage water **under the canal** are said to be the Woodland Trust and are said to be responsible for maintaining this ditch from being blocked and impeding outflow. But the Woodland Trust **do not own this site**, they merely have a long lease from Oxfordshire County Council. Why should the Trust have to be responsible for this drain maintenance for the Stadium? As a long term member of the Woodland Trust I'm not happy for my subscription money to be used to help an offsite development get rid of waste water. The County Council own the land and perhaps they will have to do this maintenance, also the regular clearance of the culvert under Frieze Way (not sure if this will be responsibility of Council or Highways).

'The receiving network downstream of the drainage discharge point from the site will be unblocked and maintained by the landowner(s) to provide free and unimpeded flow from the SuDS outfall away from the Site.' (ES Mott MacDonald, 14.90).

The inverted siphon under the canal is likely to be a pinch point where water will back up and it will need more maintenance than currently. If there is any offsite flooding as a result of uncontrolled outflow from the Stadium development, Mott MacDonald say flooding will be limited to the constructed pond' in the Woodland Trust wetland area just near the siphon. This is considered by them to be an unimportant area to flood.

I have walked the canal-side paths for many years. I consider it possible flooding could happen to the path leading to the footbridge over the canal and floodwater could flow into the drainage ditch on the eastern side of the canal. This runs alongside the canal and finally connects to the canal I think near Dukes Lock. Has this possibility of overflow of site floodwater in an uncontrolled rate to the canal been considered? This east canal-side ditch

drains the Woodland Trust wetland complex so currently water quality looks reasonable and there is much vegetation. Ultimately the water which goes by siphon under the canal flows to the Kingsbridge Brook which ultimately discharges into the River Thames, increasing water volume there.

Potential hydrological damage to both East and West sections of Stratfield Brake Ancient (Long-established) Woodland may result from this development.

With this proposed development I consider adverse hydrology change (alternation between flooding and over-drying every year) to both sections of Stratfield Brake ancient (Long-established) woodland (Priority Habitat and Irreplaceable in NPPF) is possible.

Any ditch dug through a section of land lowers the hydrological gradient in an area adjacent to the ditch, causing soil drying nearby. Stratfield Brake East Ancient (Long-established) Woodland already has old east-west running ditches on the north and south margins. The southern one takes run off from the adjacent arable field, the northern one takes run off from the Triangle area (results of personal observations on site last winter). In addition, as Frieze Way carved its way through the middle of the wood in the early 1960s, two new ditches were dug, one either side of the road, each running N-S; these will have increased drainage and drying within the wood sections in summer, increasing stress on the old oak and other trees, some of which are already stressed by tree diseases.

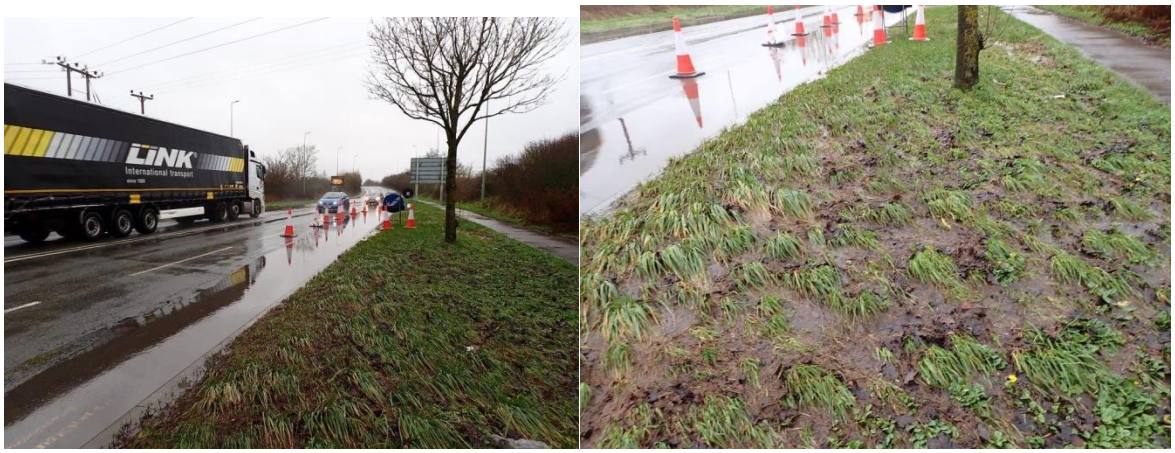
If the ditch running alongside Stratfield Brake West section ancient (Long- established) Woodland) is over-deepened in order to take the extra Stadium water run-off, this risks over-draining the West section wood adjacent in drought summers – more damaging drought stress to trees as I have seen happening in woodlands in the a drought summers of 2018 and 2022. The deeper the ditch, the more it lowers groundwater levels nearby. Old trees suffer most.

Potentially, woodland flooding might happen in autumn-winter-spring. Personal observations are that the lowest point of Stratfield Brake East Ancient (Long Established) woodland is in the **south west corner of the site** adjacent to an old original ditch where rainwater pools (I observed it doesn't flow out until ditch nearly full) and adjacent to the proposed Triangle stadium/hotel car park. In the Mott Macdonald Appendix page 36 it says the lowest point of the car park is 64.2mAOD. **This is the same as the lowest point in the Stratfield Brake East woodland west end adjacent, and much of it is less than 20cm above that**. If the car park is allowed to flood, this adjacent ditch and woodland with valuable veteran outgrown oak coppice stools (such as the 3m wide basal diameter one in photo above) and sheets of bluebells, is at risk of flooding as well, with death of trees and ground flora (oak trees and bluebells have no tolerance of flooding).

Road Drainage adjacent into the site: unable to cope with current rainfall intensity, let alone future intensity induced by Climate Change.

It has been **the wettest 18 months across England since records began in 1871** (National Hydrological Monitoring Programme). This will not be the worst we will experience in future with Climate Change – rainfall events will be heavier for longer.

Oxford Road is stated in documents to have its own road drainage gullies leading to a separate drainage system, so in theory should contribute no run-off water to the Triangle site. However on 02.01.2024 after very heavy rain, I observed road water pooling on Oxford Road, restricting traffic flow and there was evidence of it having overtopped the 125mm kerb and having flowed directly over the verge and **into the Triangle drainage ditch on the eastern side**. Would more gully clearing be enough to prevent this in future or will future intense storms overwhelm the road drainage system constantly, with water regularly pouring into the Triangle?



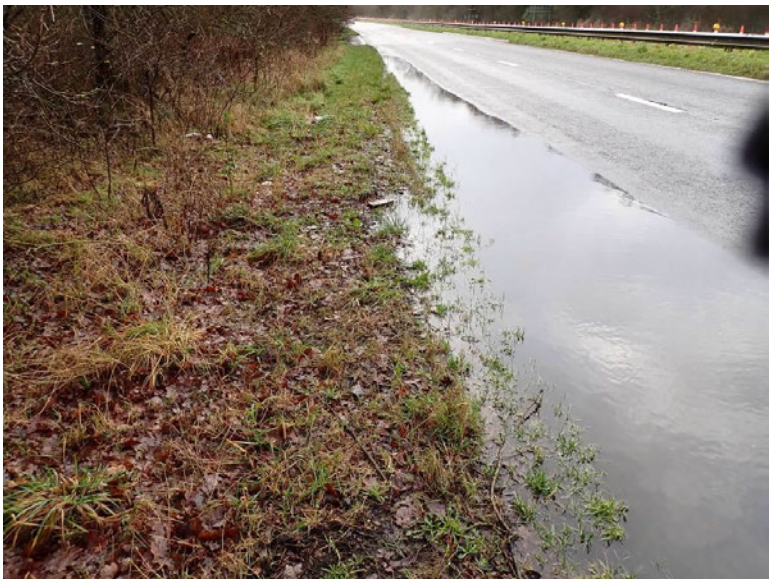
02.01.2024 Oxford Road next to Triangle partially flooded after very heavy rain, evidence of flood flow over verge (grass leaves direction) and footpath into the Triangle on east side. Photo J A Webb.

In the ES section 7.2.2 **Highway Drainage** Mott MacDonald dismiss this possible highway flooding over the kerb and verge to the Triangle as '*not considered to be an issue'*, but the actual evidence of water overtopping the kerb over a substantial section on Oxford Road is in photographs above. It will be an issue in the Climate Change induced deluge rain events to come.

Maybe the installation of a new cycle track on-going at the moment along this verge will solve this issue, or maybe not.

Frieze Way is drained on the Triangle side by linear filter/trench drains in the middle of the verge which likely slow water flow into the main ditch on that side (or exit somewhere else?) but on 02.01.2024 after heavy rain water I have observed water pooling on the road at a low point and **flowing directly over the verge over filter drain and into the main Triangle drainage ditch**. This might be minor, but it all adds to input to a site all, needing to exit via the culvert under Frieze Way.

Maybe the installation of a new cycle track as required by the County Council along this Frieze Way verge will solve this issue, or maybe not; considering there is **not enough width in this verge as it goes through Stratfield Brake woodland** to install the required path width without the death of at least 3 ancient coppice stool oaks, which should receive protection.



Pooled water on Frieze Way flowing over verge and directly into Triangle ditch at point in centre of photo on 02.01.2024 after very heavy rainfall. Photo J A Webb.

Uncontrolled surface water Overflows from the adjacent roads during deluge rainstorms (which will be worse in future) are therefore not factored into calculations of greenfield rate outflow from a developed Stadium site into the culvert under Frieze Way.

Sewage Removal

Information from Mott MacDonald's documents indicate the **sewage from this proposed Stadium/hotel development** will have to be disposed of via a pipe going north to connection north of the roundabout. As this is upslope (it will have to get up to more than 76.195 AOD (north east corner of site) from around 64m AOD (in south of site) so up at least 12m in land height. It is stated that either they will have to dig very deep to get gravity flow to the sewer connection at the north or it will have to be **pumped uphill; or it will have to go in another direction. Complete uncertainty. Sewage pumps are within pipes and are prone to failure unless there is scrupulous control over only pee and poo going into toilets.** No wet-wipes, sanitary towels, disposable nappies etc. - these all likely to jam/damage pump and cause failure & sewage back up & upwelling on site. Unlikely such control over what goes into the sewage so it's possible very regular unblocking of the pump will be needed, with intermittent system failure.

And at the time of writing the Mott MacDonald docs, Thames Water had **not confirmed the capacity of the network to take the sewage which is estimated flow rate of 37 l/s from stadium and hotel.** Of course going to the Sandford Treatment works is already over loaded and regularly emitting raw sewage without all the coming developments that are not yet built. Maybe Thames Water has said yes by now.....But I have read somewhere that they have no plans to upgrade the Sandford Treatment works any time in the near future..

Conclusions

Nothing about any of the drainage plans provides any confidence at all that this development will not increase flood risk elsewhere and I consider there is a high risk of potential damage to Stratfield Brake Woodland East and West sections of the District Wildlife Site from hydrology change.

My personal view is that ground conditions and site's current hydrology and size constraints make this site completely unsuitable for development of any kind (even if some of the blocked drainage is sorted on the west side). Land-raising may get buildings out of the water that currently pools all over the site, but there is insufficient room for the entire Stadium run-off water temporary storage on site needed; and there is the potential after deluge rainstorms for SuDS exceedence flooding of Stratfield Brake East section ancient woodland habitat adjacent. If ditches alongside the woodland are deepened to cope with taking more water away, then the risk to both east and west sections of the Stratfield Brake Woodland is extra drying in a hot drought summer. Such alternating stresses annually may mean the death of some of the old oaks and ground flora in an Irreplaceable Priority Habitat.