

Comment by Friends of Lye Valley (FoLV) on :

**Re: Geotechnical Engineering, WARREN CRESCENT, HEADINGTON, OXFORD  
SLOPE STABILITY APPRAISAL, Report Ref: 36045 for by R J Leighfield & Sons Limited  
Date 09/10/2020. (Document achieved by Freedom of information request.)**

[For development at Land East of Warren Crescent, Oxford, **OX3 7NQ**. original application 13/01555/CT3 *Erection of 10 x 3-bed dwellings (use class C3) together with associated car parking, cycle and bin storage. Diversion of public footpath. (Amended plans and description)*]

**21.02.2021**

**Context**

At the site for these 10 houses given planning permission in 2016 (a levelled area called Warren Meadow, off Warren Crescent) various depths of made ground (dumped waste clay, sand and builder's rubble) exist, deposited in the late 1950s following the building of the Town Furze estate. To the south east this material results in a 'tipped embankment' which buries (up to 6-8 metres deep) the natural solid geology of gently sloping Beckley Sands and a spring line with dependent fen areas in the adjacent Lye Valley LNR/LWS. The valley bottom fen is now 10m below the top of this artificial bank/cliff to the east of the Warren Crescent site. Underneath all that dumped made ground, the natural geology of Beckley Sands under Warren Meadow has a shallow (original, historic) gentle valley slope angle of **23 degrees**, but that original surface is now completely buried. The material tipped on top of natural geology has produced a very steep embankment slope down into the valley to the south-east, beyond a planted tree line at the cliff edge. Springs buried are now forced to emerge out from under made ground much lower down in the valley bottom. The steep slope of made ground here of between **32 and 42 degrees slope angle** was calculated by Dr.Curt Lamberth for FoLV on 1<sup>st</sup> August 2018. The steepest slope angle of 42 degrees is opposite the bend at Warren Crescent where the planned houses are closest to the embankment edge. The main structures of these planned houses appear to be within 8-9m of the cliff-edge of that very steep slope section.



*Tipped embankment of made ground (left, slope angle 32 to 42 degrees) to the Warren Crescent site at top left behind the trees. View looking north from the boardwalk through fen in Lye Valley bottom.*

*13.01.2021 J.A.Webb*

The permission for the 10 house development off Warren Crescent was passed (in the face of many objections) at a planning review committee meeting on 30 March 2016; subsequent planning permission decision date was 26 Sept 2016. Traditional strip pad foundations are to be used for the houses, excavated down through the made ground to the Beckley Sands natural geology. Piling is not to be used as this may interrupt water flow in the Beckley Sands to the SSSI springs adjacent.

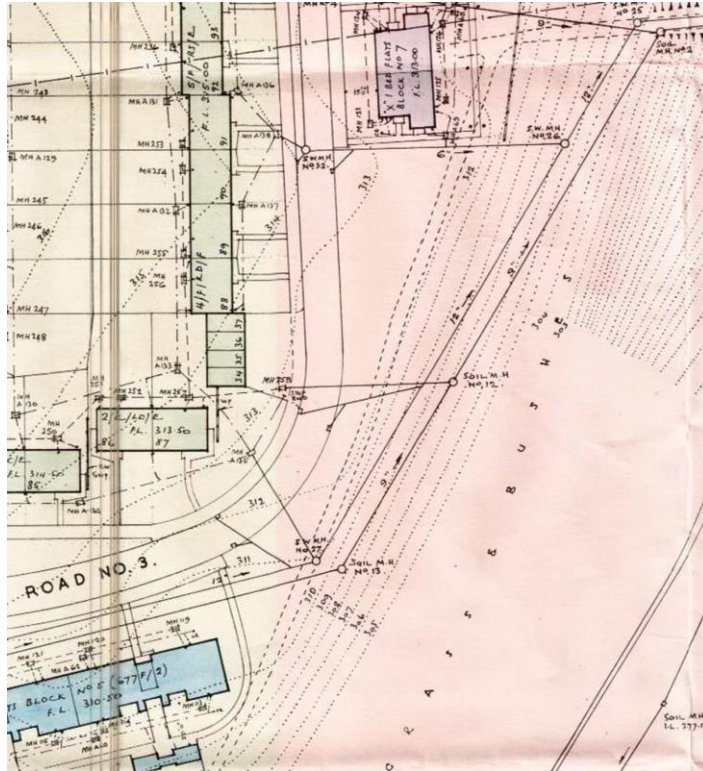
A condition (11) of the development is a water infiltration system of a SUDS swale approximately 50m long with a limestone gravel base. All roof and paving water is to be directed to this swale to ensure infiltration to supply the SSSI fen springs adjacent. The swale (a long narrow dry channel is to be excavated out of the made ground of the embankment down to the natural geology of Beckley Sands and the limestone gravel base is to be keyed into the natural geology. To reach the natural geology an excavation of 3-5m depth through the made ground may be required.

In September 2019 the foundations of the northernmost house were dug and laid. Since then development has paused.

**FoLV have serious concerns that excavations for foundations of these 10 houses and associated infiltration SUDS of a long narrow Swale in the depths of made ground on a tipped embankment with a very steep slope down into the valley will lead to the destabilising of this embankment.**

## **Discussion**

**The appraisal by Geotechnical Engineering of slope stability** at the site in relation to the development involved a site walkover and review of existing borehole data. They quote previous investigations in June 2012 (PBA, 2012), July 2018 (WSP, 2018) and July 2019 (GEL, 2019). They do not seem to have viewed the British Geological Society (BGS) cores relevant to the site carried out in March 1973 in advance of the site being a possible new access route to the Churchill Hospital. Cores 3, 4 and 5 of the BGS series are relevant as they appear to be located on Warren Crescent green area and these three boreholes show 3-6m deep made-ground or 'fill' of: clayey sand, sandy clay, organic material with rock fragments, clinker and brick fragments. Also the Town Furze housing estate plan map of 1954 appears not to have been consulted. This map shows in detail the contours and topography of the original Beckley Sands slope now under the filled and levelled area of Warren Meadow (obviously produced before all the housing and the tipping of the made ground – this waste soil dumping is supposed happened some time later in the 1950s). Here is the relevant section of this 1954 map (Road No 3 is now Warren Crescent).



Extract from the 1954 plan for the Town Furze estate. Road 1 =Warren Crescent. Current 10 house development planned to the right of bend in the road at dead centre. Contours show natural geology Beckley Sands slope now buried under made ground tipped on the slope after the estate housing was constructed.

*No new ground investigations were carried out by Geotechnical Engineering.*

#### **Implications of this report for the Warren Crescent 10 house development and the slope stability and the Lye Valley fens adjacent**

The Warren Crescent development of 10 houses is required, (by Condition 11 of the planning permission) to have a water infiltration SUDS system to deliver all roof and paving water into the ground, to ensure re-supply of springs in the SSSI west side Lye Valley fen immediately to the south. The design for this SUDS is a long narrow Swale of length 50m, 1m depth and width 2m, with a permeable base of limestone gravel which goes down through made-ground of at least 2.5m (maybe up to 5m) and is keyed into natural geology of Beckley Sands underneath (the design passed at planning committee is **PBA drawing number 27920/005/005 dated 09.12.2015**) It is planned to be, in effect, a very large, long, narrow soakaway with a deep limestone gravel base. This PBA design is analysed and discussed by the firm **SDS Consulting** for discharge of Condition 11 for the construction firm R.J. Leighfields. **SDS Consulting state clearly that it is unlikely to work as intended.** Showers or moderate rain will not fill it, instead such events will put all the rainwater into the first section only, **concentrated in one area.** It is sized to cope with a heavy rainfall event (think a month's heavy rain falling in 24 hours as already happens with Climate Change, and future Climate Change making these events more extreme) only then will this swale will be filled to the brim, but this will dissipate (sink in) over a few days. The swale will never be a pond with water as is shown on all the landscaping plans. The plan of this design By SDS Consulting clearly shows the edge of the swale to be only 3m distant from the break of slope (cliff-edge) of the made-ground bank and in fact **over the root-zone of the line of trees** (field maples) presumably destroying the roots of these trees in construction, and with a bund of the made ground piled on their remaining roots, probably

suffocating them. These trees are meant to be protected by Conditions 8,9 and 10 of planning permission.

The most recent revision of plan with swale design and with re-routed footpath is by Kendall Kingscott dated 29.07.2020, (Revised Site Plan 2383340). The break in slope (cliff edge) of the tipped embankment appears to be indicated by the red line. A row of field maple trees are planted along the fence adjacent to the break in slope. Although they are not shown individually, the canopy extent of these trees is indicated and they are visible in the photo on page 1.

Geotechnical Engineering assume the roots of these trees will hold the adjacent made ground bank stable. This will obviously not be the case when the swale is constructed as the trees will have severe root damage and are likely to die.

Another serious issue for the line of trees is at the southern area beyond the planned houses is that to prevent heavy leaf fall from adjacent trees into the swale (which would compromise its infiltration function) this line of field maple trees will have to be severely cut back - stubbed (cut to chest height) or coppiced (cut to near ground level) and kept short as a hedge line in future. This treatment in combination with root damage is likely to result in complete death of some of these trees (stress exacerbated by summer droughts, climate change). We note that Conditions 8, 9 & 10 of the planning permission relate to protection of trees and their roots on the site. Protection cannot be achieved whilst digging the swale and protecting the swale from clogging by tree leaves.

Geotechnical Engineering report seeing no evidence of movement or instability in the bank upon their inspection. The excavations carried out so far for this development have been at the farthest point from the bank edge and trees; they have been for only one house (not ten) and no preparations for the swale have yet been made. What will be the stability situation when the full load of 10 houses and the 50m long swale are in place with the swale full of water?

Water flow under the site may be important in ground stability. **The old fen spring line is partially buried by made ground.** The highest the water levels recorded in boreholes in the Warren Meadow area would seem to be 4.14m below ground in the Beckley Sands, measured in a borehole in 2018. Most commonly water levels encountered were lower, more than 5m below ground (Geotechnical report p8). Water flows under the site have been inadequately assessed with bank stability in mind, spring flow under the made ground could form a slippage zone. A historic landslide has occurred (see accompanying document on The Bank by FoLV).

Geotechnical Engineering carried out quantitative modelling considering the buildings and the deep trench fill strip pad foundations in place. The results (quote, p10):

*'indicate Factors of Safety (FoS) of less than 1 across the steep slopes in the east of the site extending back from the break in slope by up to 3.7m (Section A-A).'*

they then state

*'A FoS of less than 1 is indicative of instability'*

**So the bank can be considered unstable for 3.7m back from the break in slope.**

Geotechnical Engineering carry on (p10):

*'consideration will need to be given for the potential of instability close to the break of slope.'*

Geotechnical Engineering then say, with regard to drainage from the proposed development:

*'additional or concentrated discharge of water in close proximity to the slope should be avoided. The use of soakaways in the rear gardens, for example, is inadvisable.'*

Geotechnical have either ignored, or were ignorant of the swale/soakaway, which is a crucial part of the development design.

Why weren't Geotechnical Engineering informed about the swale infiltration SUDS and supplied with the design drawing by PBA and SDS Consulting and asked to assess its effect on stability of the bank?

Considering that the absolutely necessary infiltration swale of 50m long by 2m wide is really an extremely large **soakaway**, receiving a concentrated water discharge after a storm and less than 3m from the break in the slope on the southern section of the bank.....

..with the stabilising vegetation of a line of field maple trees compromised by necessary severe cutting back, **FoLV fail to see how the swale can be safely constructed at all in the planned position, quite near to the break in slope, without destabilising the tipped embankment for at least 50m length.**

The SUDS swale is essential for this development, but to construct it will destabilise the bank.

Collapse of the bank down into the valley onto fen areas and near the footpath must be a possibility.

This proposed ten house development on made ground of builder's rubble with a dangerously steep slope will be unsafe. **We strongly suggest the development should be recognised as unviable.**

Warren Meadow may then be allowed to return to the attractive family picnic and play area it has been for the last 50+ years. **A valued Local Green Space.**