<u>Objections to Spring Lane Amended Flood Report</u>

The amended proposal takes into account the latest 6 test pit results which were undertaken on the 31st August 2016. These were necessary as the original 4 test pits undertaken on the 20th April 2016 showed that Test Pit 1 failed due to lack of infiltration, Test Pits 2 and 4 were too slow to calculate infiltration and only Test Pit 3 had an infiltration rate of 0.0371 metres per hour. These test pits were located on the western side of the site with Test Pit 1 being located close to the site entrance at Spring Lane. However, Test Pit 3 and Test Pit 4 were not located within the current site as they had been located on land not owned by the applicant E W Pepper and therefore further tests had to be undertaken.

This test pit location map along with the test results can be seen in the Flood Risk Assessment dated September 2016 by M-EC in Appendix H. However, the location of these Test Pits (20/4/16) have not been located accurately on the map and therefore the comparison between Test Pit 1 (20/4/16) and the closest test pit undertaken on the 31st August 2016 which was also called Test Pit 1 cannot be undertaken with any accuracy.

Further test pits were dug at 6 locations over the site 3 of which were undertaken close to Test Pit 3 but further north within the site. Three further test pits were dug to the north-east of the site.

These test pit locations and test results can be seen in the aforementioned report also in Appendix H.

Test Pit 1 had an infiltration rate of o.oo4644 metres per hour.

Test Pit 2 did not reach the effective depth and is unsuitable.

Test Pit 3 did not reach the effective depth and is unsuitable.

Test Pit 4 had an infiltration rate of 0.018936 metres per hour.

Test Pit 5 had an infiltration rate of 0.04248 metres per hour.

Test Pit 6 had an infiltration rate of 0.09972 metres per hour.

Test Pit 1 did have some infiltration but was extremely slow. It would take 43 hours and 45 minutes to fall to 25% effective depth.

Test Pit 4 would take 10 hours 40 minutes to fall to 25% effective depth.

Test Pit 5 would take 4 hours 55 minutes to fall to 25% effective depth.

Test Pit 6 would take 2 hours 15 minutes to fall to 25% effective depth.

The results show that Test Pit 5 and Test Pit 6 have a reasonable infiltration rate with Test Pit 4 allowing infiltration at a rate approximately 5 times slower than Test Pit 6.

Test Pits 1 and 2 (20/4/16) were located at the northern boundary of the site and show that the area is impermeable. Test Pit 4 (31/8/16) is also located near to the northern boundary but at the eastern end of the site and shows that the permeability is very limited and therefore the northern boundary from western end of the site to the north-east corner should be considered to be impermeable.

Test Pit 4 (20/4/16) was too slow to calculate infiltration and although the test pit was outside the current site is should also be taken into account as it shows that the southern boundary should also be considered to be impermeable.

The Environment Agency produced a map showing the geology of the area which is attached which shows the extent of the Totternhoe stone hard-band which Spring Lane follows.

They gave me the following information regarding Spring Lane hydrogeology which is relevant to this proposal. It reads as follows:-

<u>Hydrogeology of the springs located around Spring Lane, Bassingbourn</u>

The site of these springs is located on the Lower Chalk geology, with no overlying drift. The edge of the Chalk is 3km to the North, where the Gault Clay outcrops. The spring-line occurs where the Totternhoe Stone hard-band of the lower Chalk, due to greater fissuring, provides a preferential pathway for groundwater flow, and therefore discharge. Below the Totternhoe Stone, the Chalk is more putty-like, and less permeable. Groundwater level from the nearest contour on the British Geological Survey Hydrogeological Map of the Area between Cambridge and Maidenhead, which uses data from Autumn 1976, is 30 m AOD, which is similar to the ground surface elevation, as might be expected. Groundwater flow is Northwards.

A number of Environment Agency Chalk monitoring boreholes exist to the South around Royston. Water level in these boreholes is often below 30 m AOD, and if the hydraulic gradient on the BGS mapping, approximately 0.00364, is applied, levels would be around 10 m below this at spring line 2.9 km to the North. Autumn 1976 was a period of low groundwater levels, and it is assumed that this hydraulic gradient is inaccurate, or does not reflect the usual situation, otherwise the springs would almost never flow. However, it is possible that spring flow is intermittent, and will generally stop when groundwater levels reach a low point in late summer and autumn.

The Lower Greensand aquifer at this location is confined by 70 m of Gault Clay, and will not contribute to spring flow. Borehole TL/34/011 monitors the Greensand.

As can be seen by this report the geology around Spring Lane is less permeable which agrees with the Test pit findings.

The topographical survey undertaken in February 2016 shows that there is a fall from the north-east of the site towards the south-west entrance of the site at Spring Lane. The highest point which is just at the north-east corner of the site is 32.931 metres. The lowest point is located at the south-west corner at the site entrance and is 29.026 metres. The fall from the north-east to the south-west equates to 3.905 metres over a length of approximately 320 metres from boundary, edge to edge, east to west. The average drop is between 2.5 and 3 metres. Surface water will therefore generally drain towards the south-west.

The northern boundary is higher than the southern boundary which indicates that run-off will also flow towards the southern boundary. The southern boundary though is slightly higher which would indicate that the run-off flow would continue towards the south-west until you approach the area around the first set of power lines (coming from the north-east towards the south-west) where the southern boundary is lower. This continues for a little way before the level rises again and stays higher all the way to the site entrance. The lower level would result in the flow continuing flowing towards the south-west but at this area could also flow towards the south when the run-off is higher.

The topography is different however when in the area to the rear of 41 Elm Tree Drive. The level before the direction change in the northern boundary line coming from east to west at 41Elm Tree Drive is 29.715 metres and as it goes southwards it drops to 29.176 metres and then rises to 29.346 metres, drops again to 29.082 metres before the boundary line turns again towards the north-west. It rises up to 29.155 metres, gradually drops to 28.496 metres, rises to 29.061 metres, and falls again to 28.645 metres and at the northern boundary rises to 28.841 metres. From this point along the wooden boundary fence the level starts rising from the 28.841 metres previously mentioned to 29.277 metres at the corner of the electricity substation.

The south western boundary is higher and although the flow from the north-east would flow towards the south-west the flows would also flow towards the lower levels of 28.645 and 28.851 metres to the rear of 41 Elm Tree Drive. The remains of a drainage ditch can be seen to run along the northern boundary fence from south-west to north-east but it disappears at the wooden fence that runs from the edge of the boundary at 41 Elm Tree Drive and 43 Elm Tree Drive.

There is a visible drop in level between the land to the rear of 43 Elm Tree Drive and the electricity substation in Spring Lane. There is a gravelled area surrounding the electricity substation and the substation and the various parts are sitting on concrete plinths about 4-6 inches above the gravelled areas. However, the substation's ground level is below the level of Spring Lane. The topographical survey at the southern side of the road in front of the Doctors Surgery has levels of 29.026 metres (lowest point at the site entrance) then 28.975 metres and finally 28.905 metres. However on the northern side of the road the levels are 29.046 metres, 28.956 metres and 28.855 metres. These levels are not directly opposite each other and as the land on the southern side is higher than that on the northern side this means that water will run towards the substation. The height of the plinths is not sufficient to protect this essential service from damage.

The Drainage Strategy site plan which can be seen in Appendix G of the Flood Risk Assessment dated September 2016 shows assumed impermeable areas outlined in pink.

It shows permeable paving coloured blue at each property all the way along the northern boundary. Test Pits TP1 and TP2 (20/4/16) show that these areas are impermeable. The plan also shows a large permeable area located near to the site entrance which was proven to be impermeable at Test Pits 2 and 3 and with a 43 hours 45 minutes infiltration rate at Test Pit 1 (31/8/16). These areas are impermeable.

The plan shows permeable roads coloured yellow located mainly along the southern part of the site. The only test pits along the southern boundary were TP3 and TP4 (20/4/16) outside the site. TP4 was too slow and TP3 took 6 hours to fall to 25% effective depth. There were no test pits along the southern boundary so there is insufficient data to assume that the area is permeable.

The drainage strategy is to channel the run-off from all the houses, roads etc. to go to the underground cellular storage tank located to the north-east area of the site which would contain 699 cubic metres of water. They also stated that excess run-off in an exceptional storm would channel towards the drainage ditch located on the land to the east of the site. In order to achieve this they would raise the level of the road from the south-west so that the flow would be gravity fed via the surface water drains towards the storage tank. However despite the interception of water from the houses via the drainage system, the level of the ground would still mean that excess runoff would naturally flow from the north-east towards the south-west. If the land is re-levelled throughout the site and all the flow is then channelled towards the north-east then any excess flow would travel towards the drainage ditch. This is totally unacceptable as it is passing the flood risk to another area. If the topography in the adjacent field follows the same trend as that of the site then the water from the east would naturally flow towards the drainage ditch. This small drainage ditch would be expected to cope with run-off from the proposed site and all the run-off from the field adjacent to the site with flooding as a consequence.

The area adjacent to the site on the western side floods which can be seen on the Environment Agency map. The area is classified as Flood Zone 3. This area is close to the Test Pits 1 and 2 which confirmed that the land is impermeable. Any excess water from the site which would naturally drain to the south west which would make the flooding far worse and as a result the site entrance would be flooded.

There have been reports of water discharging from Elm Tree Drive into the proposed site which do not appear to have been considered by this report. There appears to be the remains of a drainage ditch that ran through the property at 41 Elm Tree Drive northwards through the property at 34 Elm Tree Drive. The topography survey should have considered surveying the levels in Elm Tree Drive as the drop in levels can be seen very clearly by looking at the difference in height at the steps that lead from Elm Tree Drive to Pepper Close.

Conclusions

This proposal should be rejected as the area is unsuitable for housing and the risk of flooding is too high.

There is only one access road into and from the site and any flooding would in effect cut off the estate from the village.

The electricity substation would be in danger of flooding.

The proposal to allow flood water to drain into the drainage ditch on property adjacent to the site when necessary increases the flood risk for others especially when the topography shows that water from the adjacent site would drain into the same drainage ditch.

27.10.16