Technical Note

Project:	Romsey Avenue, Fareham	SMA Ref:	5611
Subject:	Drainage	Revision:	01
Reference:	APP/A1720/W/21/3271412		
Prepared by:	T S Wood	Date:	17/08/2021
Title:	Response by Tim Wood of Stuart Michael Associates to the Final Submission and Direct Question raised by Dr Farrell on 15th August 2021		

1.0 RESPONSES

Question Raised by Dr P Farrell in email dated 15 August 2021:

1.1. Concerning your response to the question about the image of the main field with standing water on it. (Page 8 of submitted document PFfinal.pdf). Your response was that after rain, water may collect in tractor wheel ruts, but will quickly drain away from the top soil. My question is this; Given that the Image in question clearly shows evidence of long-standing saturation, as evidenced by the well-developed algal mats (*Vaucheria sp.)* or water felt, as its commonly known. Does this not indicate that the substrate beneath the top soils has also been saturated for a long period, and is unlikely to be a suitable location for infiltration?

Response by Mr T Wood (Stuart Michael Associates) 17 August 2021:

1.2. The intrusive ground investigations undertaken by Soils Ltd initially in January/February 2017 and later in May/June 2019 conclude that the strata beneath the site consists of 'Topsoil' or 'Made Ground' to a maximum depth of 0.65m below ground level over 'River Terrace Deposits' and 'Chalk'.

1.3. The typical description of the 'Topsoil' and 'Made Ground' given by Soils Ltd are "Soft light orangish brown slightly gravelly sandy SILT" and "Soft friable brown slightly gravelly SILT".

1.4. Silt is a **low permeability** stratum due to the very small size of fine silt and clay particles within it. The more silt is worked by activities such as farming the further soil particles are broken down and compressed resulting in an impermeable "crust" across the worked area. The movement of vehicles forms depressions within this "crust" layer forming channels into which surface water from the nutrient rich surrounding land drains and collects forming ponds within the depressions. These ponds will remain in-situ reducing slowly as the effects of evapotranspiration occur.

1.5. It is therefore entirely possible that standing water within the "tractor tyre marks" could remain long enough for algal mats to form.

1.6. With regard to the saturation of substrate beneath the topsoil the Soils Ltd Ground Investigation Report (16020/GIR) dated March 2017 states at paragraph 2.5 Groundwater:

Groundwater was not encountered within any of the twelve trial holes. Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in January and February (2017), when groundwater levels should be rising to their annual maximum (highest) elevation, which typically occurs around March.

1.7. Similarly, no groundwater or saturation was reported within any of the 17no test pit locations undertaken in May 2019 during the extensive infiltration testing at the site.

1.8. In conclusion, there is no evidence within any of the extensive ground investigations or infiltration testing undertaken at the site during January/February 2017 and May/June 2019 to indicate saturation of the substrate beneath the topsoil occurs. The results of both the shallow and deep infiltration testing undertaken clearly demonstrate that infiltration is a suitable means of discharging surface water runoff from the proposed development.

With regard to the additional information presented within Dr Farrell's final submission (red text page 7) I comment as follows:

"The revised drainage plan adopts a rate of 9.44x10-5 m/s for the new soakaway, which is even more overly optimistic, and based on the test pit result closest too it."

1.9. The revised drainage plan consists of dry-swales, infiltration trenches, an infiltration basin and soakaways in a series known as a SuDS Management Train which collects, treats and discharges surface water runoff via infiltration along its entire length. Each element of the SuDS Management Train is based on the equivalent worst case (BRE365) shallow or deep infiltration rate recorded at the closest trial pit. The infiltration rate referred to by Dr Farrell above (9.44x10-5m/s) refers to the worst case deep test result at Trial Pit TPSA18 conducted in the River Terrace Deposits at a depth of 2.37m below ground level. The best infiltration rate recorded at this location was 1.445x10-4 m/s. However, in accordance with best practice the worst case was used when designing and sizing the drainage system.

1.10. The infiltration rates used throughout the design are clearly identified on SMA drawing 5611.408 Rev A.

"The trial pits and infiltration tests were done in summer and the BRE 365 calculation method does not require factors of safety to be used (these are considered to be sufficient in the other parts of the method). It is reasonable to believe that infiltration rates would be greatly reduced or eliminated if the water table was close to the surface. Common sense indicates that a total reliance upon soakaways on land known to remain saturated over the winter months is unsound, as the water table is likely to be close to the surface rendering the soakaways inoperable. My view hasn't changed, I believe the Drainage Plan remains unsound."

1.11. The BRE365 method may not require a factor of safety to be used in the calculation of the infiltration rate but a factor of safety has been used when designing the individual elements of the drainage strategy.

1.12. Although the second round of infiltration testing was undertaken in May 2019 the initial site investigation was carried out in January and February 2017 when no groundwater or saturated ground was encountered within any of the trial pits to depths in excess of 2.5m below ground level. It is therefore reasonable to expect similar infiltration rates across the site throughout the year. There is no evidence to suggest that groundwater levels would rise sufficiently to affect the suitability and functionality of shallow infiltration systems proposed.

1.13. Finally, to reiterate the point raised in my previous statement;

1.14. Infiltration is recommended as the top tier method within the drainage hierarchy for providing surface water drainage by the current Building Regulations (Part H, page 39), the National Planning Policy Framework (NPPF) PPG on Flood Risk and the SuDS Manual (Ciria Report C753).