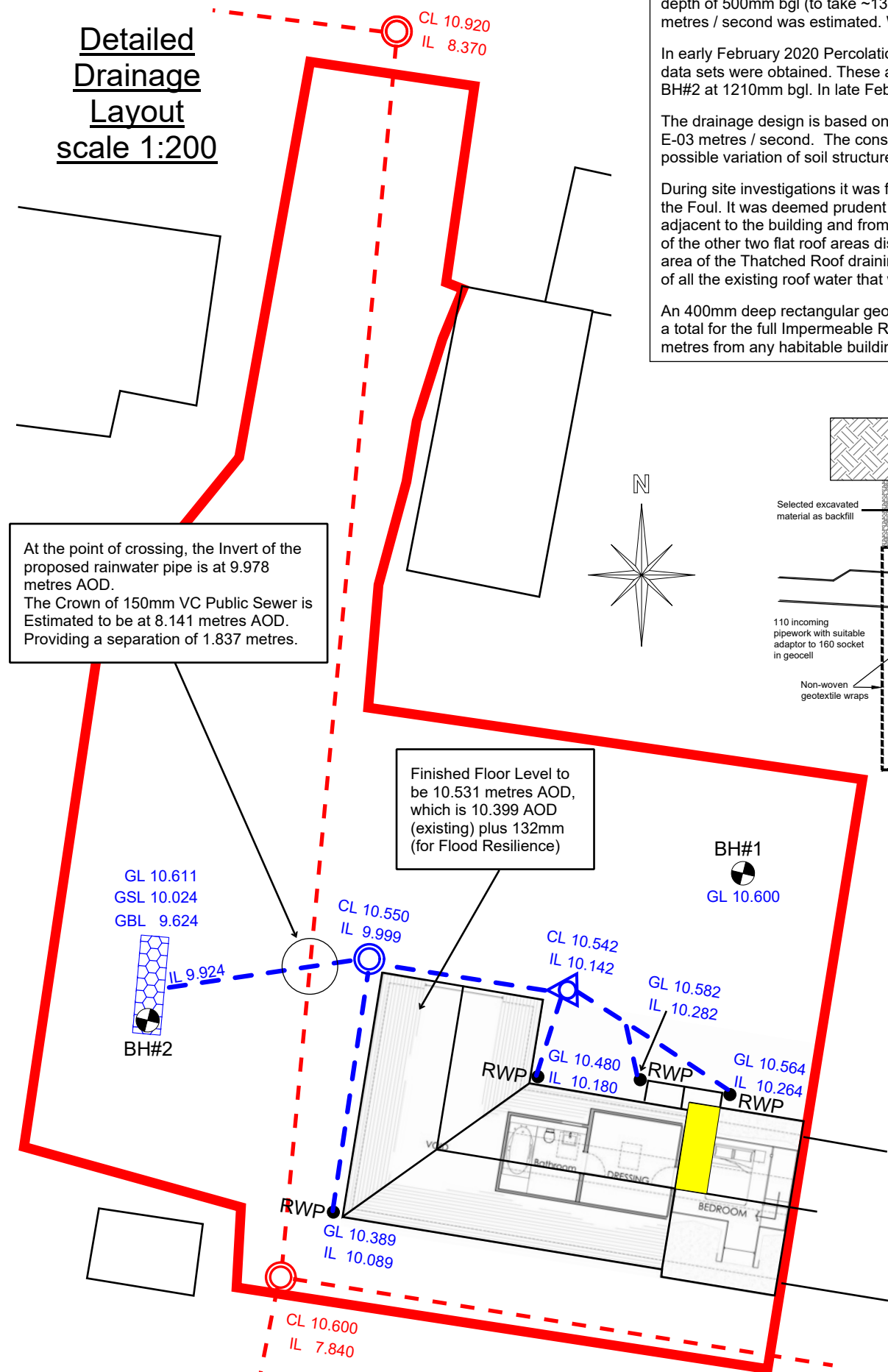


NOTE
This drawing had been produced for discharge of planning conditions only. All levels and details to be checked for Building Regulations approval and construction purposes

**Detailed
Drainage
Layout
scale 1:200**



Surface Water Drainage Design Notes

As detailed from the British Geological Survey, the Superficial Geological ground conditions here indicates Head Deposits of gravel, sand, silt and clay over Bedrock of London Clay. The London Clay was not encountered in either of the two test BoreHoles for Groundwater Monitoring or Infiltration Testing. Excavation of these boreholes indicated angular gravels in a silty clay matrix becoming medium / large angular gravels at depth.

In mid November 2019 two test BoreHoles were opened, BH#1 to a depth of 1145mm (9.455 AOD) below ground level and groundwater was not encountered at this depth, and BH#2 to a depth of 1070mm (9.541 AOD). Groundwater was monitored in these two open boreholes, on a weekly basis from late November 2019 to end February 2020. During the monitoring period, borehole BH#1 indicated two peaks, one in early February 2020 of 1050mm bgl and one of 1078mm bgl in late February 2020. The highest level of groundwater, of 1050mm bgl ie 9.550AOD, was recorded on February 2nd 2020. This highest level of groundwater precluded the use of infiltration at depths greater than ~1000mm bgl, since no Freeboard would then be available. Note the Met Office (the national meteorological service for the UK) determined February 2020 as being the wettest, month of February, on record.

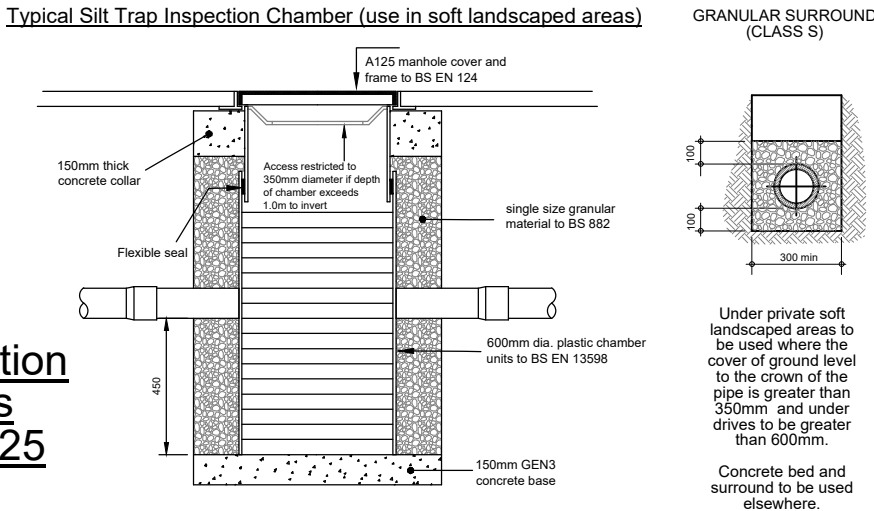
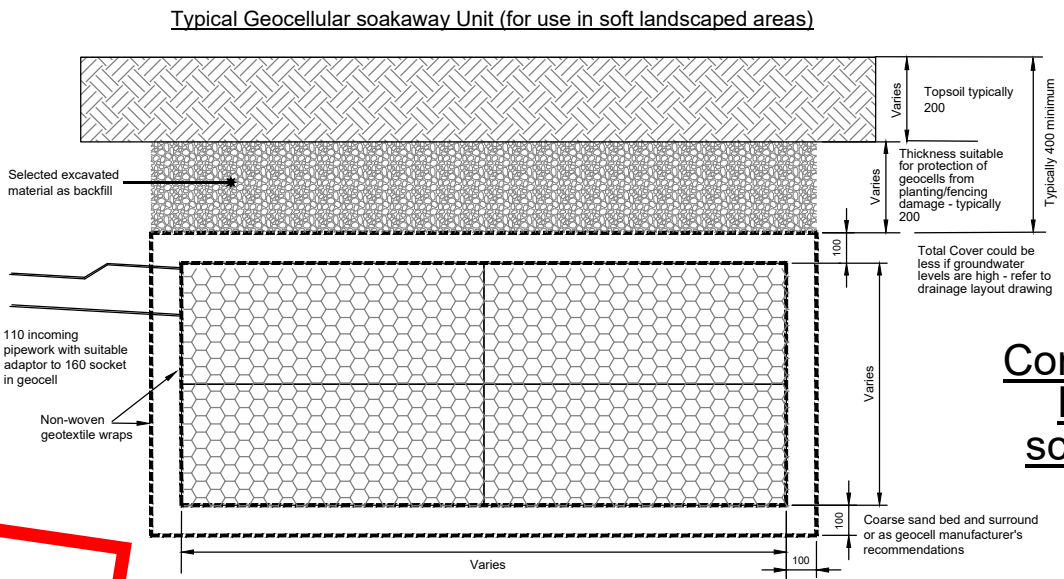
In borehole BH#1 three test were performed in late November 2019, all in quick succession. Test 1 had 25+ litres of water and tests 2 & 3 had 50+ litres of water poured into a 180mm diameter borehole to a notional level of water depth of 500mm bgl (to take ~13 litres). In all 3 tests the water drained out at the base of the borehole within 15 seconds making an exact calculation of an infiltration Rate very difficult. From the data produced a rate of 3.780 E-03 metres / second was estimated. Within borehole BH#2 only 1 test was performed, again using 50+ litres of water producing very similar results of 3.456 E-03 metres / second.

In early February 2020 Percolation Testing was performed in both holes using 50+ litres of water for each test and with 2 people each pouring 25 litres to minimise "Lag Times" whilst filling the borehole, and falling head reading data sets were obtained. These are detailed in the table below. In mid February 2020 both boreholes were extended with BH#1 to 1250mm bgl and BH#2 to 1320mm bgl. Groundwater was encountered in BH#1 at 1145mm bgl and BH#2 at 1210mm bgl. In late February 2020 a similar testing regime was performed in both boreholes, producing a reading set for each borehole. These readings are detailed below.

The drainage design is based on percolation tests carried out in late November 2019 to late February 2020 to BRE365 principles within two 180mm diameter test boreholes. Testing produced a minimum soil infiltration rate of 2.767 E-03 metres / second. The consequence of failure is "no damage / minor inconvenience" would normally require a Factor of Safety of 2 to be applied, however in this circumstance allowing for the first estimation of results, any possible variation of soil structures across the site and Infiltration Testing not being performed in true BRE365 Test Pits, a Factor of Safety of 8 has been applied to the minimum rate achieved from both test holes.

During site investigations it was found that drainage from the existing porch east side was discharging straight onto the ground adjacent to the building and from it's west side was discharging into the outside kitchen gulley then into the Foul. It was deemed prudent to include this existing porch into the design. Again during site investigations it was found that drainage from the south side of the existing tiled pitched roof also discharged straight onto the ground adjacent to the building and from the north side of the existing tiled pitched roof also discharged into the outside kitchen gulley then into the Foul. It was deemed prudent to incorporate this existing roof area into the design. The rest of the other two flat roof areas discharged either directly onto the ground adjacent to the building or into another outside foul gulley adjacent to the building. These roof areas are replaced by the proposed new extension. The small area of the Thatched Roof draining directly onto the existing porch east roof is also included in the calculation, but the rest of the Thatched Roof has no formal drainage and has not been included. The design achieves the removal of all the existing roof water that was draining into the Foul System or, excluding the Thatched Roof, that was discharging directly onto the adjacent ground.

An 400mm deep rectangular geocellular soakaway has been designed, 3.50 metres long x 1.00 metres wide, with a cover of 587mm, which will be suitable to drain the proposed new extension plus the included existing roof, giving a total for the full Impermeable Roof Area of 92.4 square metres, without flooding above ground level, on a 1 in 100 year rainfall return event, plus 40% climate change addition. The soakaway should be sited a minimum of 5 metres from any habitable building to avoid any saturation of the ground and settlement affecting the building structure, and a minimum of 5 metres from the Public Foul Water Sewer.



**Construction
Details
scale 1:25**

- KEY**
- Existing Public Foul Water Sewer of 150mm VC pipe at Depth of Invert over 2.50 metres bgl.
 - Existing Public Foul Water Manhole
 - Proposed surface water drainage. 100mm diameter PVC pipe. Minimum fall of 1:100
 - BH Open Test BoreHole for Groundwater Monitoring and Soil Infiltration Testing.
 - Proposed silt trap inspection chamber
 - Proposed 250mm diameter surface water inspection chamber. Osma shallow IC or similar approved.
 - Proposed Geocellular Soakaway. 3.50 metres long x 1.00 metre wide giving a footprint of 3.50 square metres of 400mm deep geocells.
 - GL #### Ground level at detailed items
 - CL #### Cover level of surface water chambers
 - IL #### Invert level of surface water drains
 - GSL #### Soffit (top) level of Geocell structure
 - GBL #### Base level of Geocell structure
 - + 5.999 All levels are to AOD unless otherwise stated

Winter Soil Infiltration Testing Results

BH#1 (1145mm deep bgl -- extended to 1250mm bgl)
November 28th 2019 -- 3.780 E-03 m/s
February 6th 2020 -- 4.291 E-03 m/s
February 29th 2020 -- 3.696 E-03 m/s
BH#2 (1070mm deep bgl -- extended to 1320mm bgl)
November 28th 2020 -- 3.456 E-03 m/s
February 6th 2020 -- 2.767 E-03 m/s
February 29th 2020 -- 3.125 E-03 m/s

The minimum Rate used in the calculations from All the tests within both boreholes was 2.767 E-03 metres / second from BoreHole BH#2. This was the location deemed suitable for the proposed siting of the Geocell Soakaway structure.

Allowing for Estimation Errors, the potential of local variations in the superficial soils and Infiltration Testing not within true BRE365 Test Pits, a Factor of Safety of 8.0 was used in the calculations for the design. This does not imply any significant 'Consequence of Failure'.

Mate GeoTechnic Services

02	Final	RC	30-4-20
01	Original	RC	21-4-20
Rev.	Description	Drn.	Date

Project
**Proposed Side Extension
#2 Tudor Cottages**
Tudor Drive
Westergate
P[O20 3YT

Client **Mr & Mrs B. Smithen**
Drawing Title **Surface Water Drainage**

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Scale	As Shown	Drawing Original	A3
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Drawing Number **MGS -- AL/77/19-rev02**