constructiveevaluation
Building and Material Test Consultants
Unit 5 • Vinnetrow Business Park • Runcton
Chichester • West Sussex • PO20 1QH
[redacted]

13th February 2014
Our Ref: 13.7841

Hastoe Housing Association – Marina House,
17 Marina Place,
Hampton Wick,
Kingston upon Thames,
Surrey,
KT1 4BH

**RE: Soil Infiltration Testing- Arun District Council**

**For the attention of Jane Gallifent**
Email: [redacted]

Dear Jane,

I write following the completion of further ground investigation works undertaken on the 11th and 12th February 2014 at four locations within the residential area of Wick, Littlehampton. The works have been carried out to assist with assessment of the soil soakage potential for each location in respect to the proposed planning applications for the area.

The letter report follows on from the previous investigation works carried in December 2013 (ref lett/13.7841/Dec 13) that included the completion of windowless sample boreholes with groundwater monitoring installation standpipes as well as the subsequent weekly monitoring records.

***Site Status***

As described in the previous letter (referenced above) the five proposed redevelopments are located within the residential area of Wick in Littlehampton. These areas are currently occupied by a mixture of hardstanding and grass verges and largely utilised for car parking areas by the local residents. Four of the five sites are located along the northern border of the housing area and parallel to the A259 to the north. These sites are referred to as Joyce Close, Land west of Joyce Close, Greenfields and Land West of Greenfields. The fifth site is located to the south within White Acre road and referenced as Clun Road



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however Constructive Evaluation has subsequently been instructed that no further assessment was required at this location.

***Investigation Works***

The soil infiltration testing was carried out within machine excavated trial pits to depths between 2.60m and 2.70mbgl (metres below ground level). It was requested that the trial holes were located away from hardstanding areas where possible and sited on grass verge locations. With minimal grassed areas at the four locations tested these were generally positioned adjacent to the window sample installations. Only one location, TP4, was positioned at a location away from the associated window sample borehole (WS4) as shown on the enclosed plan. This latter position was agreed with Hastoe Housing Association since little space was available to complete two test pits within the available grassed areas for this location (SK06).

Prior to any excavations taking place a CAT (Cable Avoidance Tool) was used to check for any underlying electrical services. In addition the service plans provided to CE were consulted prior to commencing works. The excavations were completed using a 3tonne tracked excavator with a 0.30m width bucket size. Length of excavations ranged between 1.80m and 2.50m.

Following consultation with the ADC Engineering team testing was to be completed within the soils above the highest groundwater level recorded within the standpipes. From review of the subsequent monitoring works to date the highest level to date was immediately prior to the infiltration testing of 3.22m in WS1. At all other installations (excluding Clun Road WS5) the groundwater has in general been recorded below the base of the installation depths of 3.82mbgl (i.e. levels have generally been recorded as dry).

Testing was completed in accordance with the methods described in BRE Digest 365 and after trimming and shaping the trial pit sides the pit were rapidly filled with clean water from a road tanker.

The result sheets are enclosed showing the fall in water level with time for locations TP1 to TP4.

***Geology and Ground Conditions***

The relevant 1:50,000 British Geological Survey (BGS) Map 317/337 (Chichester and Bognor) indicates the site to be underlain by Brickearth overlying the Upper Chalk deposits of the Cretaceous.



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- Brickearth – The composition of this unit is commonly determined by the formation on which it rests and the formation of the unit is controlled either by solifluction, flood deposits or as wind-blown loess. As a result the unit is comprised largely as an unstratified mixture of fine-grained sand or flint with clay.

- Upper Chalk - The upper Chalk of the Cretaceous Period consists mainly of soft, smooth, white massively bedded Chalk with flint nodules generally lying within distinct beds; thin beds of tabular flint and marl also occur.

Ground Conditions

Within TP1 to TP3, which were completed adjacent to WS1 to WS3 locations respectively, the ground conditions encountered were generally consistent with those previously described. In summary a thick deposit of upper cohesive clay deposits were encountered with a change in soils towards the base of the trial pits. These latter changes were described as a cream/light brown gravely clayey Silt in TP1 at approximately 2.20mbgl, a silty fine to medium Sand at 2.10mbgl in TP2 and a fine to medium silty Sand at 2.20mbgl in TP3.

Within TP4 location soil deposits were consistent to the maximum excavation depth of 2.65mbgl and described as light brown silty Clay.

No groundwater was encountered within any of the trial pits. Please find enclosed full log details along with the hole location plan.

## Results

As you can see from the enclosed results sheets due to slow rate of soakage following the infilling of the trial holes only a single test was attempted at each location.

Following monitoring periods that ranged from 192minutes up to 349minutes it was evident that the rate of infiltration rate was decreasing over time to such that water levels were unlikely to reach 25% fill depth. TP1 dropped most significantly to a level of 41% fill depth which calculates to infiltration rates from 75-50% fill depth of the order of 5 x $10^{-6}$ m/s reducing to 2.5 $x^{-6}$ m/s from 50% - 41% fill depth. In all other tests fill depths between 71% to 88% only were reached describing even slower rates obtainable.



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Since the infiltration tests were not repeated and with 25% fill depths not reached within any of the trial pit locations the requirement to BRE guidance was not obtained. Subsequently the results suggest that these upper deposits, immediately above the groundwater level, show poor soil infiltration characteristics.

Kind Regards,

**Constructive Evaluation Limited**

.....
Dave C[redacted]
Engineering Geologist

Enclosed:

- Exploratory Hole Plan
- Soil Logs
- Investigation Images



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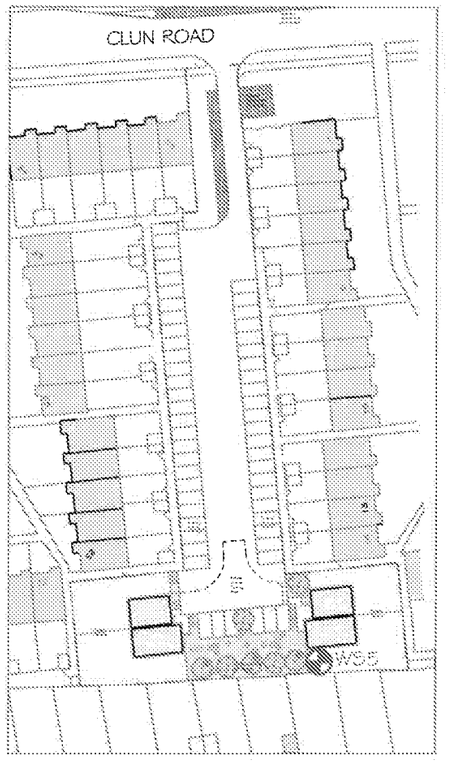
NOTES

1. Do not scale from this drawing except for planning purposes. Use figured dimensions only.
2. All dimensions must checked on site prior to commencement of work.
3. Where applicable this drawing is to be read in conjunction with other consultants drawings.
4. This drawing is the copyright of Constructive Evaluation Ltd.

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email-info@theconstructivegroup.com

Client.
ARUN DISTRICT COUNCIL

Project.
WICK ESTATE, LITTLEHAMPTON

Drawing.
TEST LOCATION PLAN

scale
NTS

| date FEB 13 | drawn D.Y | checked |
|---|---|---|
| drawing number 13.7841 | | revision |

# Soakaway Test Results & Soil Infiltration Rate

**Site: Wick, SK09 Joyce Close, East**

**Job No: 13.7841** **Trial Hole: TP1** **Test 1**

| Time in minutes | Depth in meters to water surface | Depth in metres of water | Percentage of water depth at start |
|---|---|---|---|
| 0.00 | 0.810 | 1.79 | 100.0% |
| 1.00 | 0.830 | 1.77 | 98.9% |
| 2.00 | 0.850 | 1.75 | 97.8% |
| 3.00 | 0.870 | 1.73 | 96.6% |
| 5.00 | 0.910 | 1.69 | 94.4% |
| 10.00 | 0.980 | 1.62 | 90.5% |
| 18.00 | 1.060 | 1.54 | 86.0% |
| 25.00 | 1.120 | 1.48 | 82.7% |
| 69.00 | 1.350 | 1.25 | 69.8% |
| 89.00 | 1.400 | 1.20 | 67.0% |
| 109.00 | 1.500 | 1.10 | 61.5% |
| 129.00 | 1.545 | 1.06 | 58.9% |
| 149.00 | 1.595 | 1.01 | 56.1% |
| 169.00 | 1.640 | 0.96 | 53.6% |
| 189.00 | 1.670 | 0.93 | 52.0% |
| 209.00 | 1.720 | 0.88 | 49.2% |
| 229.00 | 1.750 | 0.85 | 47.5% |
| 309.00 | 1.845 | 0.76 | 42.2% |
| 349.00 | 1.865 | 0.74 | 41.1% |
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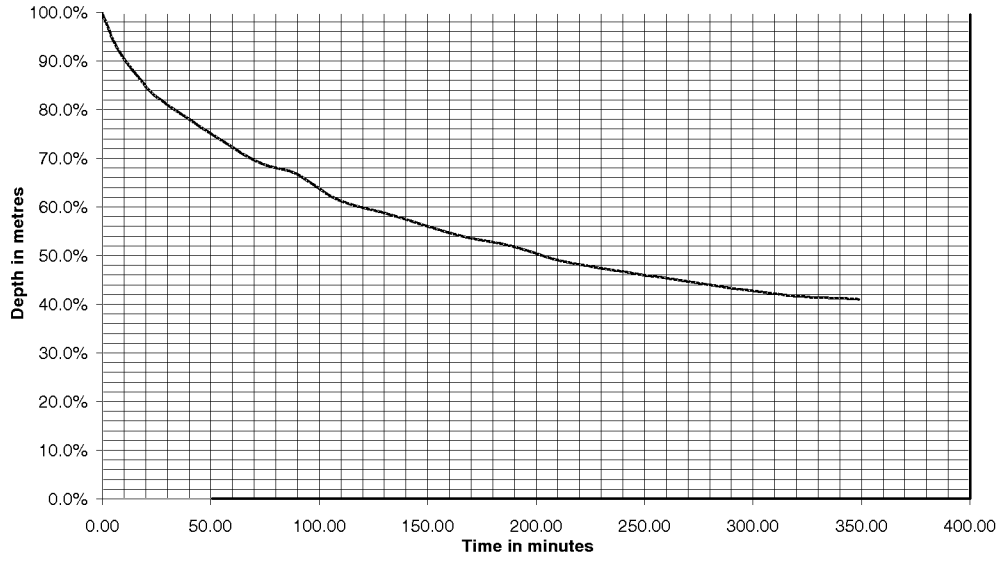
| 349.00 | 1.865 | 0.74 | 41.1% |

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to graph sheet for calculation

| Pit Size | | Time in mins | |
|---|---|---|---|
| Length | 1.80 | | 75% |
| Width | 0.30 | | 25% |
| Depth | 2.60 | | |

**Infiltration Rate** from75%-25% **not valid**

**Permeability Graph TP1**



# Soakaway Test Results & Soil Infiltration Rate

**Site: Wick, SK08 Joyce Close, West**

**Job No: 13.7841** **Trial Hole: TP2** **Test 1**

| Time in minutes | Depth in meters to water surface | Depth in metres of water | Percentage of water depth at start |
|---|---|---|---|
| 0.00 | 0.640 | 2.06 | 100.0% |
| 1.00 | 0.640 | 2.06 | 100.0% |
| 3.00 | 0.650 | 2.05 | 99.5% |
| 8.00 | 0.670 | 2.03 | 98.5% |
| 17.00 | 0.730 | 1.97 | 95.6% |
| 32.00 | 0.810 | 1.89 | 91.7% |
| 61.00 | 0.920 | 1.78 | 86.4% |
| 81.00 | 0.990 | 1.71 | 83.0% |
| 95.00 | 1.020 | 1.68 | 81.6% |
| 135.00 | 1.100 | 1.60 | 77.7% |
| 180.00 | 1.170 | 1.53 | 74.3% |
| 237.00 | 1.230 | 1.47 | 71.4% |
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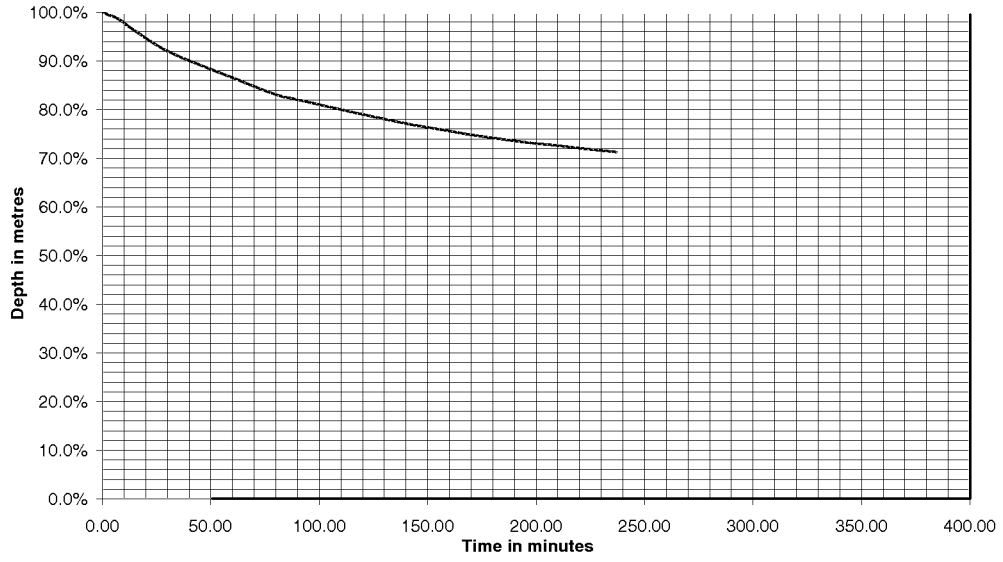
| 237.00 | 1.230 | 1.47 | 71.4% |

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to grpah sheet for calculation

| Pit Size | | Time in mins | |
|---|---|---|---|
| Length | 1.90 | | 75% |
| Width | 0.30 | | 25% |
| Depth | 2.70 | | |

**Infiltration Rate** from75%-25% **not valid**

**Permeability Graph TP2**



# Soakaway Test Results & Soil Infiltration Rate

**Site: Wick, SK07 Greenfields**

**Job No: 13.7841** **Trial Hole: TP3** **Test 1**

| Time in minutes | Depth in meters to water surface | Depth in metres of water | Percentage of water depth at start |
|---|---|---|---|
| 0.00 | 0.620 | 2.08 | 100.0% |
| 1.00 | 0.630 | 2.07 | 99.5% |
| 2.00 | 0.064 | 2.64 | 126.7% |
| 5.00 | 0.660 | 2.04 | 98.1% |
| 15.00 | 0.730 | 1.97 | 94.7% |
| 36.00 | 0.840 | 1.86 | 89.4% |
| 65.00 | 0.920 | 1.78 | 85.6% |
| 100.00 | 1.010 | 1.69 | 81.3% |
| 157.00 | 1.090 | 1.61 | 77.4% |
| 240.00 | 1.170 | 1.53 | 73.6% |
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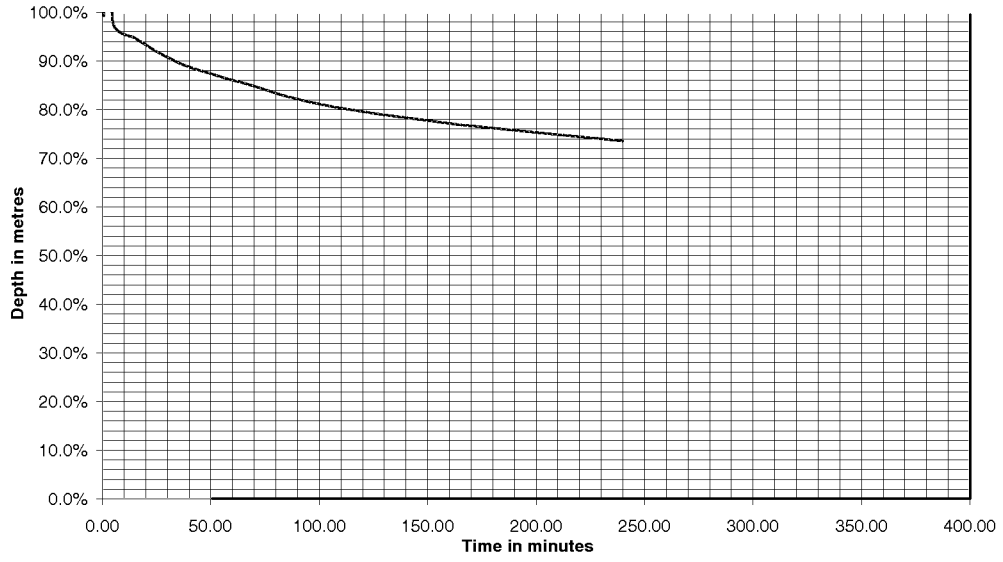
| 240.00 | 1.170 | 1.53 | 73.6% |

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to grpah sheet for calculation

| Pit Size | | Time in mins | |
|---|---|---|---|
| Length | 2.00 | | 75% |
| Width | 0.30 | | 25% |
| Depth | 2.70 | | |

**Infiltration Rate** from75%-25% **not valid**

**Permeability Graph TP3**



# Soakaway Test Results & Soil Infiltration Rate

**Site: Wick, SK06, Land West of Greenfields**

**Job No: 13.7841** **Trial Hole: TP4** **Test 1**

| Time in minutes | Depth in meters to water surface | Depth in metres of water | Percentage of water depth at start |
|---|---|---|---|
| 0.00 | 0.640 | 2.01 | 100.0% |
| 1.00 | 0.650 | 2.00 | 99.5% |
| 2.00 | 0.660 | 1.99 | 99.0% |
| 3.00 | 0.670 | 1.98 | 98.5% |
| 4.00 | 0.680 | 1.97 | 98.0% |
| 5.00 | 0.680 | 1.97 | 98.0% |
| 10.00 | 0.690 | 1.96 | 97.5% |
| 20.00 | 0.710 | 1.94 | 96.5% |
| 32.00 | 0.740 | 1.91 | 95.0% |
| 54.00 | 0.760 | 1.89 | 94.0% |
| 81.00 | 0.790 | 1.86 | 92.5% |
| 95.00 | 0.810 | 1.84 | 91.5% |
| 104.00 | 0.820 | 1.83 | 91.0% |
| 138.00 | 0.840 | 1.81 | 90.0% |
| 155.00 | 0.850 | 1.80 | 89.6% |
| 192.00 | 0.870 | 1.78 | 88.6% |
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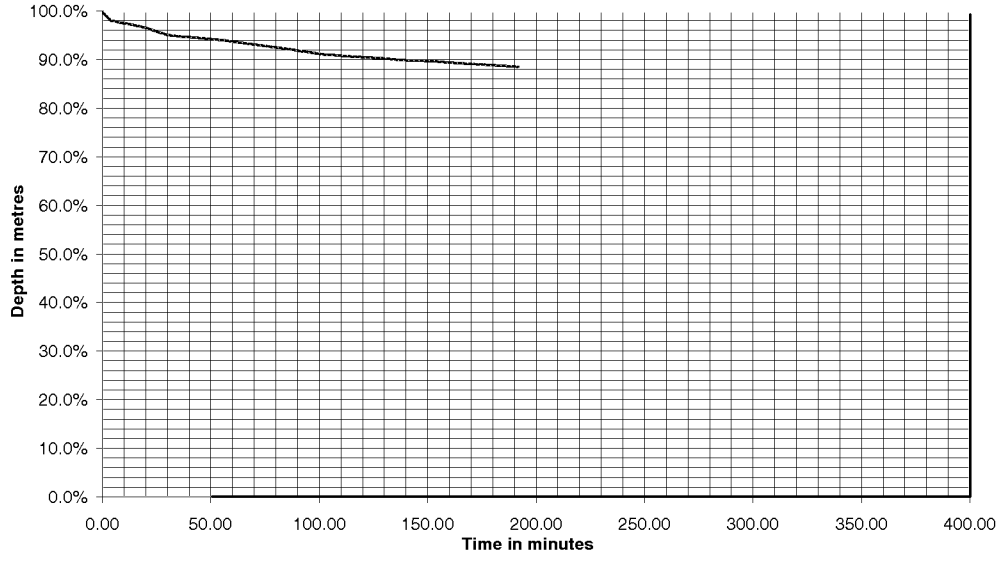
| 192.00 | 0.870 | 1.78 | 88.6% |

WARNING DOES NOT FALL TO 25% OF START DEPTH-Refer to grpah sheet for calculation

| Pit Size | | Time in mins | |
|---|---|---|---|
| Length | 2.50 | | 75% |
| Width | 0.30 | | 25% |
| Depth | 2.65 | | |

**Infiltration Rate** from75%-25% **not valid**

**Permeability Graph TP4**



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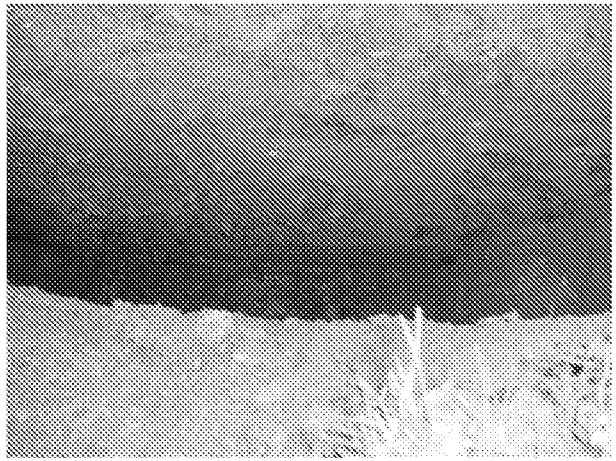
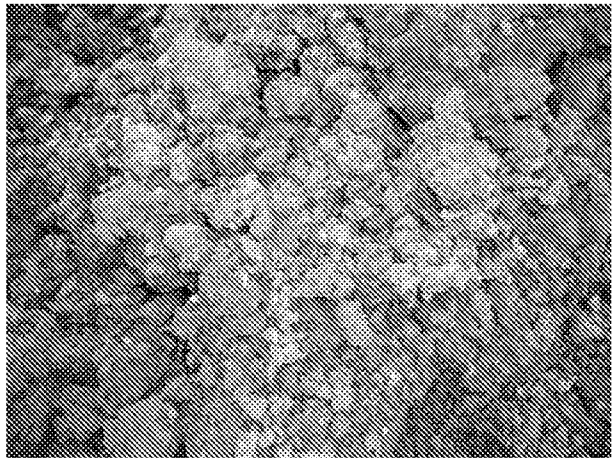
# Site Investigation Photographs Wick Estate, Littlehampton

A.



B.



C.

D.

A. TP1 GL – 2.60mbgl

B. TP1 Basal material from pit

C. TP2 GL – 2.70mbgl

D. TP2 Basal material from pit

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Building & Material Test Consultants

**Date of Site Works:**

11/12-2.14

Wick Estate, Littlehampton

**Client:**

Arun District Council

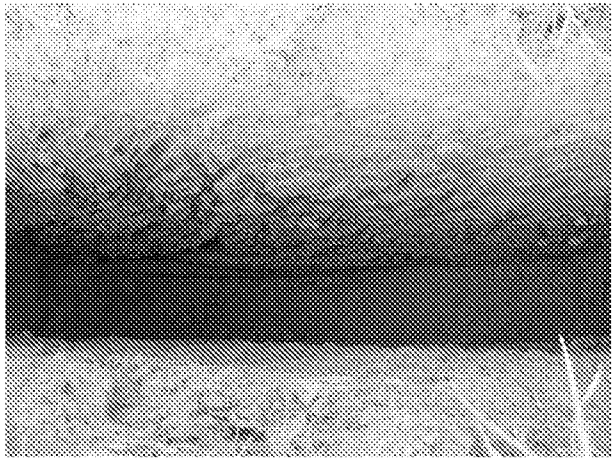
**Job/ref no.**

13.7841/DC

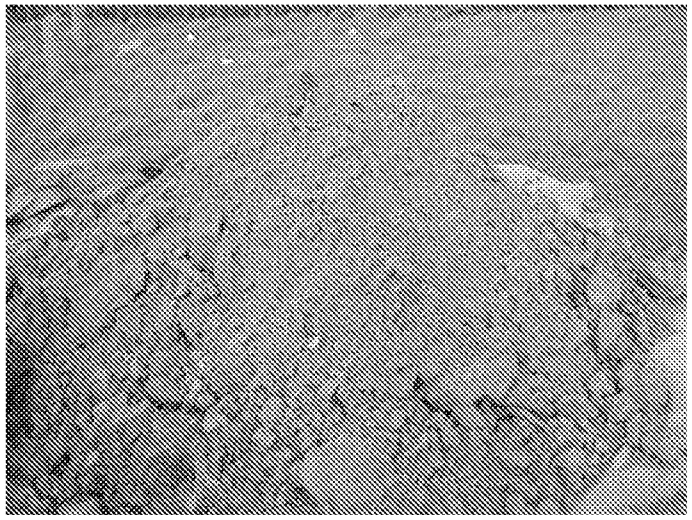
ARUN DISTRICT COUNCIL LW/223/14/PL

# Site Investigation Photographs Wick Estate, Littlehampton

**E.**



**F.**



E. TP3 GL – 2.70mbgl

F. TP3 Material from excavation

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Building & Material Test Consultants

**Date of Site Works:**

11-12/2.14

**Site Address:**

Wick Estate, Littlehampton

**Client:**

Arun District Council

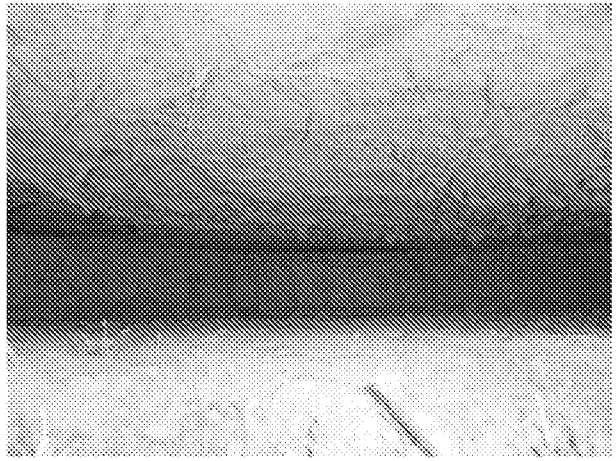
**Job/ref no.**

13.7841/DC

ARUN DISTRICT COUNCIL LU/223/14/PL

# Site Investigation Photographs Wick Estate, Littlehampton

I.



J.

I. TP4 GL – 2.65mbgl

J. TP4 Material from pit

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Soil & Material Test Consultants

**Date of Site Works:**

11-12/2.14

**Site Address:**

Wick Estate, Littlehampton

**Client:**

Arun District Council

**Job/ref no.**

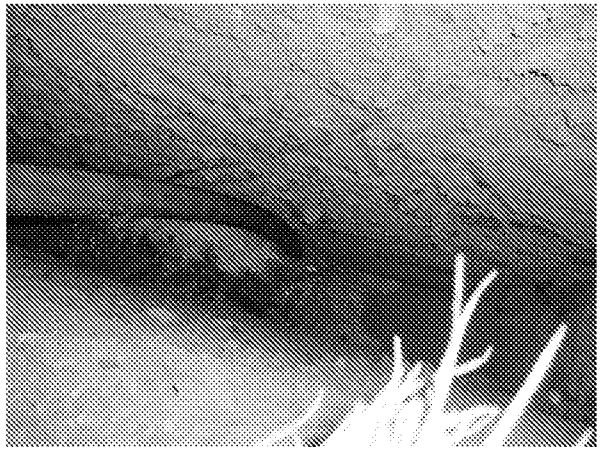
13.7841/DC

ARUN DISTRICT COUNCIL LW/223/14/PL

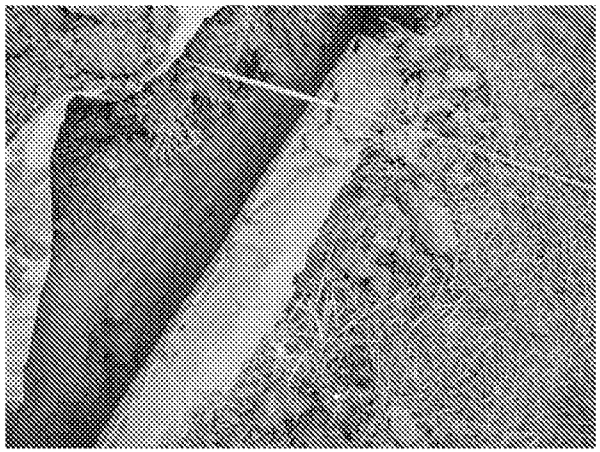
# Site Investigation Photographs Wick Estate, Littlehampton

M.

N.



O.



M. Example site set up TP4

N. Rapid infiltration of clean water from road tanker

O. Infiltration monitoring

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Building & Material Test Consultants

**Date of Site Works:**

11-12/2-14

**Site Address:**

Wick Estate, Littlehampton

**Client:**

Arun District Council

**Job/ref no.**

13.7841