Summary – October 2019
October was wetter than September with 163% of the long term average rainfall for the South-east of England. As a result of the high rainfall, recharge was almost double the October average and soil moisture deficits fell during the month, although there was a very wide spatial variation in both recharge and soil moisture deficits across the South-east. Flows at all of the indicator sites responded to the rainfall and there were 66 fluvial flood alerts and 1 flood warning issued during the month. Groundwater levels rose at most sites although levels at the slow responding Chalk continued to fall, albeit more slowly.

Rainfall
October was wetter than September with 163% of the long term average (LTA) for the South-east of England. This was reasonably evenly spread across all 4 Areas although Thames area (THM) received the highest percentage of the LTA. The highest daily total was 47mm recorded at Pinner Cemetery on the 1st in Hertfordshire and North London area (HNL) and of this, 39.8mm fell in only 2 hours due to a very slow moving isolated cell of heavy, intense rainfall. HNL was the wettest Area for the first 5 days, THM area was wetter on the 12th, and both Solent and South Downs (SSD) and Kent and South London (KSL) were the wettest on the 17th, 18th and 20th. The total rainfall recorded on these 5 days accounted for around one third of the month’s rainfall total. Subsequently, Cotswolds East, Upper Thames (THM), South London (KSL) and Test Chalk (SSD) areal units all recorded the wettest October since 2004. Dover Chalk (KSL) had the wettest October since 2000.

Soil Moisture Deficit/Recharge
As a result of the high rainfall, recharge was almost double the October LTA for the South-east of England. Subsequently, soil moisture deficits (SMDs) fell during the month and ended below the end of October average. However, there was a very wide spatial variation in both recharge and SMDs across the south east. Most areal units in THM and SSD areas ended the month with more than double the recharge and consequently, no deficits whilst other units in KSL and HNL had significantly less recharge and as such, SMDs remained although they were below the end of October LTA.

River Flows
Flows at all of the indicator sites responded to the rainfall during the month. There were substantial increases in flows at most sites, but more muted at Chalk indicator sites fed by groundwater, such as the Ver at Hansteads and Mimram at Panshanger, both HNL. The October flows at both these sites were below normal. All the other sites were at normal flows or higher. Flows at both Farmoor on the River Thames and at Bibury on the River Coln were exceptionally high for October and were the highest on record and 2nd highest on record respectively. Response to the rainfall across SSD and KSL led to a number of sites where flows were at their highest for October since 2012, including Broadlands, Allbrook and Highbridge, Brockenhurst, Iping Mill (all SSD) and Stonebridge and Udiom (both KSL). There were 66 fluvial flood alerts and 1 fluvial flood warning issued. 

<table>
<thead>
<tr>
<th></th>
<th>HNL</th>
<th>THM</th>
<th>SSD</th>
<th>KSL</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluvial Flood Alerts</td>
<td>12</td>
<td>32</td>
<td>6</td>
<td>16</td>
<td>66</td>
</tr>
<tr>
<td>Fluvial Flood Warnings</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

Groundwater Levels
Groundwater levels at most of the indicator sites rose over the month due to the wet weather, subsequent increased recharge and reductions in the SMDs. Levels continued to fall at Stonor Park (THM) and Ashley Green (HNL), both in the Chilterns Chalk. Along with Lilley Bottom (Lee Chalk, HNL), these 3 indicator sites ended the month at notably low or exceptionally low levels for October. As such, groundwater levels at Lilley Bottom ended the month as the 2nd lowest level on record, with Ashley Green and Stonor both being 3rd lowest October levels on their respective records. At the other end of the scale, levels at Jackaments and Rockley (both THM) both rose rapidly and ended October at exceptionally high levels, where Jackaments recorded the highest level for October on record.

Reservoir Storage/Water Resource Zone Stocks
Storage in all of the reservoirs across the South-east of England ended the month above the LTA for October. Author: Groundwater and Hydrology team, HNL.
Rainfall Map

Total rainfall for hydrological areas across South East England for the current month, the last 3 months, the last 6 months and the last 12 months classed relative to an analysis of respective historic totals. Data source: HadUK data based on the Met Office 1Km gridded rainfall dataset derived from raingauges. (Source: Met Office © Crown Copyright, 2019). Provisional data based on Environment Agency 1Km gridded rainfall dataset derived from Environment Agency intensity raingauges.

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River Flow and Groundwater Status Map

Groundwater site status based on end of month level. Surface water site status based on mean monthly flow.

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Thames – Page 2

Monthly total rainfall (mm) - North Downs - Hampshire (P) - Rainfall

Long term average rainfall (mm) - Wey - Greensand (S) - Rainfall

Effective Rainfall (mm) - North Downs - Hampshire (P) - Effective Rainfall

Effective Rainfall (mm) - Wey - Greensand (S) - Effective Rainfall

Daily Mean Flow (cumecs) - River Wey at Tilford

Daily Mean Flow (cumecs) - River Loddon at Sheepbridge

Daily Mean Flow (cumecs) - River Thames at Kingston (Naturalised)
Hertfordshire and North London

- Monthly total rainfall (mm)
- Long term average rainfall (mm)

Rainfall Levels:
- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low

Effective Rainfall (mm)

Daily Mean Flow (cumecs)

River Ver at Colney Street (Hansteads)
Ranking used data from 01/10/1956 to 31/12/2017

River Ver at Colney Street (Hansteads)
Ranking used data from 01/10/1956 to 31/12/2017

River Mimram at Panshanger
Ranking used data from 01/12/1952 to 31/12/2017

River Lee at Feildes Weir (Naturalised)
Ranking used data from 01/10/1883 to 31/12/2017

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Incident hotline: 0800 80 70 60
Floodline: 0345 988 1188

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Solent & South Downs – Page 1

Monthly total rainfall (mm)

Test Chalk - Rainfall

Lymington - Rainfall

Long term average rainfall (mm)

Test Chalk - Effective Rainfall

Lymington - Effective Rainfall

LYMINGTON RIVER AT BROCKENHURST
Ranking used data from 01/01/1997 to 31/12/2017

RIVER TEST AT BROADLANDS
Ranking used data from 01/10/1957 to 31/12/2017

RIVER ITCHEN AT ALLBROOK AND HIGHBRIDGE
Ranking used data from 01/10/1958 to 31/12/2017

Daily Mean Flow (cumecs)

Exceptionally high

Notably high

Above normal

Normal

Below normal

Notably low

Exceptionally low

Latest data
Solent & South Downs – Page 2

Monthly total rainfall (mm) vs. Long term average rainfall (mm)

### Arun - Rainfall

- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low

### Ouse - Rainfall

- Exceptionally high
- Notably high
- Above normal
- Normal
- Below normal
- Notably low
- Exceptionally low

---

Daily Mean Flow (cumecs)

**River Rother at Iping Mill**
- Ranking used data from 01/11/1966 to 31/12/2017

**River Arun at Alfoldean**
- Ranking used data from 01/05/1970 to 31/12/2017

**River Ouse at Goldbridge**
- Ranking used data from 01/03/1960 to 31/12/2017

---

Customer service line 03708 506 506
Incident hotline 0800 80 70 60
Flooding line 0345 988 1188

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Kent & South London – Page 1

Monthly total rainfall (mm)

Long term average rainfall (mm)

Exceptionally high

Notably high

Above normal

Normal

Below normal

Notably low

Exceptionally low

───

Latest data

Rainfall (mm)

Medway

Eastern Rother

Effective Rainfall

Daily Mean Flow (cumecs)

RIVER MEDWAY AT TESTON & EAST FARLEIGH COMBINED

Ranking used data from 01/10/1956 to 31/12/2017

Daily Mean Flow (cumecs)

RIVER TEISE AT STONEBRIDGE

Ranking used data from 01/10/1961 to 31/12/2017

Daily Mean Flow (cumecs)

RIVER ROTHER AT UDIAM

Ranking used data from 01/10/1962 to 31/12/2017

Daily Mean Flow (cumecs)
**Groundwater Levels**

- **COTSWOLDS – JACKAMENTS BOTTOM – INFERIOR OOLITE**
  - Ranking derived from data for the period Jan-1974 to Dec-2017

- **STONOR PARK**
  - Ranking derived from data for the period May-1961 to Dec-2017

- **ROCKLEY OBH**
  - Ranking derived from data for the period Mar-1933 to Dec-2017

- **TILE BARN FARM**
  - Ranking derived from data for the period Oct-1971 to Dec-2017

- **ASHLEY GREEN STW OBH**
  - Ranking derived from data for the period Sep-1987 to Dec-2017

- **LILLEY BOTTOM OBH**
  - Ranking derived from data for the period Jul-1979 to Dec-2017

- **CLANVILLE GATE GWL**
  - Ranking derived from data for the period Mar-1963 to Dec-2017

- **LOPCOMBE CORNER GWL**
  - Ranking derived from data for the period Apr-1963 to Dec-2017
Reservoir Stocks

---

**Thames Water - Lower Thames Reservoirs - Lower Thames**

---

**Thames Water - Lee Valley Reservoirs - Lower Lee**

---

**Thames Water - Farmoor Reservoir - Upper Thames**

---

**SES Water - Bough Beech Reservoir - Medway**

---

**South East Water - Ardingly Reservoir - Ouse**

---

**South East Water - Arlington Reservoir - Cuckmere**

---

**Southern Water - Bewl Reservoir - Teise (Medway)**

---

**Southern Water - Darwell Reservoir - Rother (Eastern)**
Reservoir Stocks

Cumulative Rainfall Plots

CUMULATIVE RAINFALL FOR THAMES AREA COMPARED WITH LONG TERM AVERAGE

CUMULATIVE RAINFALL FOR HERTS AND NORTH LONDON AREA COMPARED WITH LONG TERM AVERAGE

CUMULATIVE RAINFALL FOR SOLENT AND SOUTH DOWNS AREA COMPARED WITH LONG TERM AVERAGE

CUMULATIVE RAINFALL FOR KENT AND SOUTH LONDON AREA COMPARED WITH LONG TERM AVERAGE
## Summary of October-2019 Rainfall, Effective Rainfall and Soil Moisture Deficit calculated up to the 31st of the month

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Rainfall (mm)</th>
<th>Effective Rainfall (mm)</th>
<th>SMD (mm)</th>
<th>Winter period: 01/10/2019 to 31/10/2019</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>31 day October</td>
<td>01 day October</td>
<td>Day 31</td>
<td>Total Rainfall (mm)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 day</td>
<td>14 day</td>
<td>21 day</td>
<td>Total LTA</td>
</tr>
<tr>
<td>640TH</td>
<td>Cotswolds - West (A)</td>
<td>120</td>
<td>10</td>
<td>19.1%</td>
<td>116</td>
</tr>
<tr>
<td>650TH</td>
<td>Berkshire Downs - G</td>
<td>124</td>
<td>70</td>
<td>10.3%</td>
<td>47</td>
</tr>
<tr>
<td>630TH</td>
<td>Chiltern - West (M)</td>
<td>100</td>
<td>65</td>
<td>15.3%</td>
<td>13</td>
</tr>
<tr>
<td>662TH</td>
<td>North Downs - Hampshire (P)</td>
<td>121</td>
<td>80</td>
<td>15.8%</td>
<td>63</td>
</tr>
<tr>
<td>654TH</td>
<td>Wey - Greenhead (S)</td>
<td>126</td>
<td>80</td>
<td>15.8%</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Thames Catchment Average</td>
<td>113</td>
<td>65</td>
<td>11.5%</td>
<td>38</td>
</tr>
<tr>
<td>640TH</td>
<td>Chiltern - East - Colne (N)</td>
<td>102</td>
<td>67</td>
<td>15.3%</td>
<td>13</td>
</tr>
<tr>
<td>600TH</td>
<td>Loe Chalk</td>
<td>83</td>
<td>51</td>
<td>14.3%</td>
<td>10</td>
</tr>
<tr>
<td>660TH</td>
<td>North London</td>
<td>95</td>
<td>60</td>
<td>15.7%</td>
<td>0</td>
</tr>
<tr>
<td>650TH</td>
<td>Poinding</td>
<td>0</td>
<td>55</td>
<td>16.2%</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Herts and North London Average</td>
<td>92</td>
<td>60</td>
<td>15.5%</td>
<td>5</td>
</tr>
<tr>
<td>630TH</td>
<td>North Downs - South London (W)</td>
<td>120</td>
<td>74</td>
<td>16.7%</td>
<td>39</td>
</tr>
<tr>
<td>650TH</td>
<td>Dover</td>
<td>100</td>
<td>60</td>
<td>16.0%</td>
<td>10</td>
</tr>
<tr>
<td>610TH</td>
<td>North Kent Chalk</td>
<td>105</td>
<td>69</td>
<td>15.2%</td>
<td>13</td>
</tr>
<tr>
<td>610TH</td>
<td>Stow</td>
<td>117</td>
<td>77</td>
<td>11.0%</td>
<td>13</td>
</tr>
<tr>
<td>640TH</td>
<td>Medway</td>
<td>124</td>
<td>76</td>
<td>16.3%</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Kent &amp; South London Average</td>
<td>112</td>
<td>71</td>
<td>15.9%</td>
<td>19</td>
</tr>
<tr>
<td>610TH</td>
<td>Tenterden</td>
<td>125</td>
<td>75</td>
<td>16.4%</td>
<td>60</td>
</tr>
<tr>
<td>610TH</td>
<td>East Hampshire Chalk</td>
<td>136</td>
<td>86</td>
<td>15.7%</td>
<td>70</td>
</tr>
<tr>
<td>610TH</td>
<td>W. Kent Success Chalk</td>
<td>143</td>
<td>82</td>
<td>15.5%</td>
<td>70</td>
</tr>
<tr>
<td>610TH</td>
<td>Arun</td>
<td>121</td>
<td>81</td>
<td>15.8%</td>
<td>62</td>
</tr>
<tr>
<td>610TH</td>
<td>Adur</td>
<td>140</td>
<td>86</td>
<td>16.3%</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>Kent &amp; South Downs Average</td>
<td>136</td>
<td>85</td>
<td>15.3%</td>
<td>59</td>
</tr>
<tr>
<td></td>
<td>South East Average</td>
<td>118</td>
<td>72</td>
<td>16.3%</td>
<td>36</td>
</tr>
</tbody>
</table>

This is a second estimate of areal rainfall, effective rainfall (i.e. percolation/runoff) and soil moisture deficit. There may be significant variation within each area which must be considered when interpreting these data. When additional meteorological data is available estimates are revised, this will affect period totals.
South East Areal Rainfall units for reference

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## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquifer</td>
<td>A geological formation able to store and transmit water.</td>
</tr>
<tr>
<td>Areal average rainfall</td>
<td>The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Artesian</td>
<td>The condition where the groundwater level is above ground surface but is prevented from rising to this level by an overlying continuous low permeability layer, such as clay.</td>
</tr>
<tr>
<td>Artesian borehole</td>
<td>Borehole where the level of groundwater is above the top of the borehole and groundwater flows out of the borehole when unsealed.</td>
</tr>
<tr>
<td>Cumecs</td>
<td>Cubic metres per second (m³s⁻¹)</td>
</tr>
<tr>
<td>Effective rainfall</td>
<td>The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Flood Alert/Flood Warning</td>
<td>Three levels of warnings may be issued by the Environment Agency. Flood Alerts indicate flooding is possible. Flood Warnings indicate flooding is expected. Severe Flood Warnings indicate severe flooding.</td>
</tr>
<tr>
<td>Groundwater</td>
<td>The water found in an aquifer.</td>
</tr>
<tr>
<td>Long term average (LTA)</td>
<td>The arithmetic mean calculated from the historic record, usually based on the period 1961-1990. However, the period used may vary by parameter being reported on (see figure captions for details).</td>
</tr>
<tr>
<td>mAOD</td>
<td>Metres Above Ordnance Datum (mean sea level at Newlyn Cornwall).</td>
</tr>
<tr>
<td>MORECS</td>
<td>Met Office Rainfall and Evaporation Calculation System. Met Office service providing real time calculation of evapotranspiration, soil moisture deficit and effective rainfall on a 40 x 40 km grid.</td>
</tr>
<tr>
<td>Naturalised flow</td>
<td>River flow with the impacts of artificial influences removed. Artificial influences may include abstractions, discharges, transfers, augmentation and impoundments.</td>
</tr>
<tr>
<td>NCIC</td>
<td>National Climate Information Centre. NCIC area monthly rainfall totals are derived using the Met Office 5 km gridded dataset, which uses rain gauge observations.</td>
</tr>
<tr>
<td>Recharge</td>
<td>The process of increasing the water stored in the saturated zone of an aquifer. Expressed in depth of water (mm).</td>
</tr>
<tr>
<td>Reservoir gross capacity</td>
<td>The total capacity of a reservoir.</td>
</tr>
<tr>
<td>Reservoir live capacity</td>
<td>The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (e.g. storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as ‘net’ or ‘deployable’ capacity.</td>
</tr>
<tr>
<td>Soil moisture deficit (SMD)</td>
<td>The difference between the amount of water actually in the soil and the amount of water the soil can hold. Expressed in depth of water (mm).</td>
</tr>
</tbody>
</table>

### Categories

- **Exceptionally high**: Value likely to fall within this band 5% of the time
- **Notably high**: Value likely to fall within this band 8% of the time
- **Above normal**: Value likely to fall within this band 15% of the time
- **Normal**: Value likely to fall within this band 44% of the time
- **Below normal**: Value likely to fall within this band 15% of the time
- **Notably low**: Value likely to fall within this band 8% of the time
- **Exceptionally low**: Value likely to fall within this band 5% of the time

---

**Cat code LIT 9025**

**customer service line**
03708 506 506

**incident hotline**
0800 80 70 60

**floodline**
0345 988 1188

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