Readme for Hydrological analysis of the 2019-2021 flooding:   
EA project 35752

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This document contains an outline of all example file formats needed to undertake the analysis in the code repo.

NOTE THAT: source raingauge, flow, level, groundwater and COSMOS-UK data has not been provided.

This is available from the EA directly, the NRFA Peak Flows dataset, the HadUK gridded dataset, the British Geological Society and the COSMOS-UK dataset.

# Catchment Rainfall Event Data

## /CatAvg\_rainfall\_totals.csv

Event total rainfall depths for 1-96 hours

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Area | EA Region | Character |
| Location | Location of river gauge | Character |
| Gauge.Name | Name of river gauge | Character |
| ID | EA WISKI ID | Character |
| NRFA | NRFA gauge identifier | Character |
| Depth.1h | 1-hour maximum depth during event | Number |
| StartDate.1h | start datetime of 1-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.6h | 6-hour maximum depth during event | Number |
| StartDate.6h | start datetime of 6-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.1d | 24-hour maximum depth during event | Number |
| StartDate.1d | start datetime of 24-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.4d | 96-hour maximum depth during event | Number |
| StartDate.4d | start datetime of 96-hour peak | Datetime YYYY-MM-DD hh:mm |
| GivenDate | Date as identified by area teams | Datetime YYYY-MM-DD hh:mm |

## /CatAvg\_rainfall\_RPs\_from\_XMLx.csv

Event rainfall AEP based on XML files

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Area | EA Region | Character |
| Location | Location of river gauge | Character |
| Gauge.Name | Name of river gauge | Character |
| ID | EA WISKI ID | Character |
| NRFA | NRFA gauge identifier | Character |
| Depth.1h | 1-hour maximum depth during event | Number |
| StartDate.1h | start datetime of 1-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.6h | 6-hour maximum depth during event | Number |
| StartDate.6h | start datetime of 6-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.1d | 24-hour maximum depth during event | Number |
| StartDate.1d | start datetime of 24-hour peak | Datetime YYYY-MM-DD hh:mm |
| Depth.4d | 96-hour maximum depth during event | Number |
| StartDate.4d | start datetime of 96-hour peak | Datetime YYYY-MM-DD hh:mm |
| GivenDate | Date as identified by area teams | Datetime YYYY-MM-DD hh:mm |
| RP\_AMAX\_1h | 1 in x AEP for 1-hour depth | Number |
| RP\_AMAX\_6h | 1 in x AEP for 6-hour depth | Number |
| RP\_AMAX\_1d | 1 in x AEP for 1-day depth | Number |
| RP\_AMAX\_4d | 1 in x AEP for 4-day depth | Number |
| RP\_POT\_1h | POT return period for 1-hour depth | Number |
| RP\_POT\_6h | POT return period for 6-hour depth | Number |
| RP\_POT\_1d | POT return period for 1-day depth | Number |
| RP\_POT\_4d | POT return period for 4-day depth | Number |

## /Rainfall\_CatAvg\_FEH22\_RP.csv

Event AEP for catchment rainfall depths

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Area | EA Region | Character |
| Location | Location of gauge | Character |
| Gauge | Gauge name | Character |
| ID | Gauge ID | Character |
| Event\_date | Date of peak rainfall | YYYY-MM-DD |
| Duration | Duration of rainfall accumulation for FEH Analysis (hrs) | 1h/ 6h/ 24h/ 96h |
| Accumd\_rainfall | Depth of rainfall accumulation for FEH22 analysis (mm) | Number |
| AEP | 1 in x AEP of rainfall event under FEH22 | Number or “>1.3” |

## /Raingauge\_table.csv

Raingauge information

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Area | EA region | Character |
| Location | Location of gauge | Character |
| Gauge Name | Gauge Name | Character |
| Gauge ID | Gauge ID | Character |
| Interval | Time between measurements (minutes) | Number |

## /Places\_and\_dates\_rainfall.csv

Metadata of events in rainfall analysis

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| OBJECTID | Processing id | Character |
| NRFA ID | Nearest NRFA gauge for analysis | Character |
| Gauge | Gauge Name | Character |
| River | River name | Character |
| EA Gauge ID | EA WISKI ID | Character |
| Type | Kind of gauging station (flow/level/…) | Character |
| Event 1 | Date of first key event | YYYY-MM-DD |
| Event 2 | Date of second key event (or empty) | YYYY-MM-DD |
| Event 3 | Date of third key event (or empty) | YYYY-MM-DD |
| Event 4 | Date of fourth key event (or empty) | YYYY-MM-DD |
| Event 5 | Date of fifth key event (or empty) | YYYY-MM-DD |
| Event 6 | Date of sixth key event (or empty) | YYYY-MM-DD |

## /Station\_FEH22\_depths\_1h.csv

## /Station\_FEH22\_depths\_6h.csv

## /Station\_FEH22\_depths\_1d.csv

## /Station\_FEH22\_depths\_4d.csv

Lookup tables for 1 in x AEP to derive event AEPs

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Gauge\_ID | EA WISKI ID number | Character |
| NRFA\_ID | NRFA station number | Character |
| Area | EA region | Character |
| Gauge | Gauge name | Character |
| River | River name | Character |
| X1.3 | 1.3-year return level | Number |
| X\*\*\*\* | 18 intermediate return levels | Number (x18) |
| X500000 | 500000-year return level | Number |

# COSMOS

## /COSMOS\_event\_VWC.csv

Event Volumetric Water Content according to COSMOS-UK stations

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| id | Station EA WISKI ID | Character |
| cosmos | Relevant COSMOS-UK station | Character |
| event\_date | Date of event as determined by local teams | YYYY-MM-DDThh:mm:ssZ |
| monthquarter | Monthquarter in which event lies | YYYY-MM-Qx (x = 1,2,3,4) |
| VWC | Volumetric Water Content (%), measure of soil moisture | Number |
| rank | Rank of event monthquarter relative to equivalent monthquarters in rest of record | Integer |
| reclen | Number of years in record | Integer |

## /SITE\_INFO.csv

Metadata of COSMOS-UK sites

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| SITE\_ID | Site code | Character |
| SITE\_NAME | Site name | Character |
| EASTING | Easting on GB National Grid (m) | Integer |
| NORTHING | Northing on GB National Grid (m) | Integer |
| LATITUDE | Latitude in degrees east | Number |
| LONGITUDE | Latitude in degrees north | Number |
| ALTITUDE | Height above mean sea level | Number |
| SOIL\_TYPE | Description of main soil composition | Character |
| SOIL\_TEXTURE | Description of main soil texture | Character |
| SAAR\_1961\_1990 | Average Annual Rainfall between 1961 and 1990 | Number |

## /Ranked\_Monthquarter/\*\*\*\*\_monthquarter.csv (\*\*\*\* station name)

data for each COSMOS-UK station ranked for each monthquarter

|  |  |  |
| --- | --- | --- |
| Col name | Description | Format |
| Month\_quarter | Quarter of month for corresponding VWC | YYYY-MM-Qx (x=1,2,3,4) |
| Mean\_VWC | Volumetric Water Content (%) | Number |
| Based\_on\_days | Number of daily datapoints | Integer |
| Rank | Rank compared to like month-quarters in other years | Integer |
| Of | Number of like month-quarters | Integer |

## /daily/COSMOS\_UK-1D-\*\*\*\*-YYYY-MM-DD-YYYY’-MM’-DD’.csv (\*\*\*\* station name)

daily COSMOS data from COSMOS-UK

Directly available from COSMOS-UK website

# Context

## /Aligned\_Events\_With\_Storm\_Names.csv

Details for all key flood characteristics aligned to key events

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Gauge ID | EA WISKI ID | Character |
| Easting | GB national grid coordinates | Integer |
| Northing |  | Integer |
| closest\_cosmos | Nearest COSMOS-UK Station name | Character |
| closest\_gw | Nearest groundwater station in WF1921 dataset | Character |
| Area | EA Region | Character |
| Event\_Number | Identifier for events at each location | Integer |
| Date | Date of event | YYYY-MM-DD hh:mm:ss |
| Peak\_flow | Value of peak flow at event (m3/s) | Number |
| Rank\_flow | Rank of peak flow relative to AMAX series | Integer |
| AEP\_flow | AEP (%) of peak flow according to FEH-ESS analysis | Number or “No AMAX” |
| Event\_Level | Value of peak level at event (m) | Number |
| Level\_in\_AMAX | Is the level in the AMAX series? | Yes/No |
| Rank\_level | Rank of peak level relative to level AMAX series | Integer |
| AEP\_level | AEP (%) of peak level using rank | Number |
| Volume\_2\_week | Total 2-week volume of flow proceeding key event (megalitres) | Number |
| Vol\_rank | Rank of 2-week volume within corresponding AMAX series | Integer |
| Rain\_Depth | 6 hour depth of rainfall from nearest raingauge using FEH22 analysis (mm) | Number |
| Rain\_RP | 1 in x AEP for 6 hour depth of rainfall from nearest raingauge using FEH22 analysis | Number |
| D30 | 30 day rainfall accumulation (mm) | Number |
| rank\_D30 | rank of 30-day rainfall accumulation within corresponding AMAX series | Integer |
| D60 | 60 day rainfall accumulation (mm) | Number |
| rank\_D60 | rank of 60-day rainfall accumulation within corresponding AMAX series | Integer |
| D90 | 90 day rainfall accumulation (mm) | Number |
| rank\_D90 | rank of 90-day rainfall accumulation within corresponding AMAX series | Integer |
| D180 | 180 day rainfall accumulation (mm) | Number |
| rank\_D180 | rank of 180-day rainfall accumulation within corresponding AMAX series | Integer |
| ror | maximum 1-hour rate of rise of level around key event (m/hr) | Number |
| ror\_rank | rank of 1-hour rate of rise of level within corresponding POT series | Integer |
| cosmos\_id | ID of nearest COSMOS-UK station | Character |
| cosmos\_rank | rank of quartermonth nearest to key event compared to respective month-quarters in the record | Integer |
| VWC | value of soil moisture, volumetric water content (%) over quartermonth | Number |
| GW | value of groundwater level peak during event (m) | Number |
| gw\_rank | rank of groundwater peak within corresponding AMAX series | Integer |
| GW\_and\_flow | Are both of these variables extreme (in top AMAX values) | Integer |
| cosmos\_and\_flow | Are both of these variables extreme (in top AMAX values) | Integer |
| acc\_and\_flow | Are both of these variables extreme (in top AMAX values) | Integer |
| GW\_and\_level | Are both of these variables extreme (in top AMAX values) | Integer |
| cosmos\_and\_level | Are both of these variables extreme (in top AMAX values) | Integer |
| acc\_and\_level | Are both of these variables extreme (in top AMAX values) | Integer |
| GW\_and\_ror | Are both of these variables extreme (in top AMAX values) | Integer |
| cosmos\_and\_ror | Are both of these variables extreme (in top AMAX values) | Integer |
| acc\_and\_ror | Are both of these variables extreme (in top AMAX values) | Integer |
| GW\_and\_rainfall | Are both of these variables extreme (in top AMAX values) | Integer |
| cosmos\_and\_rainfall | Are both of these variables extreme (in top AMAX values) | Integer |
| acc\_and\_rainfall | Are both of these variables extreme (in top AMAX values) | Integer |
| GW\_and\_vol | Are both of these variables extreme (in top AMAX values) | Integer |
| cosmos\_and\_vol | Are both of these variables extreme (in top AMAX values) | Integer |
| acc\_and\_vol | Are both of these variables extreme (in top AMAX values) | Integer |
| storm\_name | Name of key storm (if part of notable storm) | Character |
| storm\_group | Name of storm season (if part of storm season) | Character |
| storm\_group\_id | ID code for storm season | Character |
| storm\_start\_date | Start date of key storm | YYYY-MM-DD |

## /All\_Storms\_Antecedent.csv

Coincidence between flood hazards and antecedent conditions on national scale

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| storm\_start\_date | Start date of key storm | YYYY-MM-DD |
| storm\_name | Name of key storm | Character |
| GW\_and\_flow\_count | number of stations with high groundwater and flow (out of those observed) | “x of y” string |
| cosmos\_and\_flow\_count | number of stations with high VWC and flow (out of those observed) | “x of y” string |
| acc\_and\_flow\_count | number of stations with high 90d rainfall and flow (out of those observed) | “x of y” string |
| GW\_and\_level\_count | number of stations with high groundwater and level (out of those observed) | “x of y” string |
| cosmos\_and\_level\_count | number of stations with high VWC and level (out of those observed) | “x of y” string |
| acc\_and\_level\_count | number of stations with high 90d rainfall and flow (out of those observed) | “x of y” string |
| GW\_and\_ror\_count | number of stations with high groundwater and 1hr rate of rise (out of those observed) | “x of y” string |
| cosmos\_and\_ror\_count | number of stations with high VWC and 1hr rate of rise (out of those observed) | “x of y” string |
| acc\_and\_ror\_count | number of stations with high 90d rainfall and 1hr rate of rise (out of those observed) | “x of y” string |
| GW\_and\_rainfall\_count | number of stations with high groundwater and 6h point rainfall (out of those observed) | “x of y” string |
| cosmos\_and\_rainfall\_count | number of stations with high VWC and 6h point rainfall (out of those observed) | “x of y” string |
| acc\_and\_rainfall\_count | number of stations with high 90d catchment rainfall and 6h point rainfall (out of those observed) | “x of y” string |
| GW\_and\_vol\_count | number of stations with high groundwater and 2-week volume (out of those observed) | “x of y” string |
| cosmos\_and\_vol\_count | number of stations with high VWC and 2-week volume (out of those observed) | “x of y” string |
| acc\_and\_vol\_count | number of stations with high 90d rainfall and 2-week volume (out of those observed) | “x of y” string |

## /All\_Storms\_Antecedent\_Regional.csv

Coincidence between flood hazards and antecedent conditions on regional scale

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| storm\_start\_date | Start date of key storm | YYYY-MM-DD |
| storm\_name | Name of key storm | Character |
| Area | EA Region | Character |
| GW\_and\_flow\_count | number of stations with high groundwater and flow (out of those observed) | “x of y” string |
| cosmos\_and\_flow\_count | number of stations with high VWC and flow (out of those observed) | “x of y” string |
| acc\_and\_flow\_count | number of stations with high 90d rainfall and flow (out of those observed) | “x of y” string |
| GW\_and\_level\_count | number of stations with high groundwater and level (out of those observed) | “x of y” string |
| cosmos\_and\_level\_count | number of stations with high VWC and level (out of those observed) | “x of y” string |
| acc\_and\_level\_count | number of stations with high 90d rainfall and flow (out of those observed) | “x of y” string |
| GW\_and\_ror\_count | number of stations with high groundwater and 1hr rate of rise (out of those observed) | “x of y” string |
| cosmos\_and\_ror\_count | number of stations with high VWC and 1hr rate of rise (out of those observed) | “x of y” string |
| acc\_and\_ror\_count | number of stations with high 90d rainfall and 1hr rate of rise (out of those observed) | “x of y” string |
| GW\_and\_rainfall\_count | number of stations with high groundwater and 6h point rainfall (out of those observed) | “x of y” string |
| cosmos\_and\_rainfall\_count | number of stations with high VWC and 6h point rainfall (out of those observed) | “x of y” string |
| acc\_and\_rainfall\_count | number of stations with high 90d catchment rainfall and 6h point rainfall (out of those observed) | “x of y” string |
| GW\_and\_vol\_count | number of stations with high groundwater and 2-week volume (out of those observed) | “x of y” string |
| cosmos\_and\_vol\_count | number of stations with high VWC and 2-week volume (out of those observed) | “x of y” string |
| acc\_and\_vol\_count | number of stations with high 90d rainfall and 2-week volume (out of those observed) | “x of y” string |

## /counts\_of\_AMAX\_national.csv

Number of stations with AMAXn events during key storms

|  |  |  |
| --- | --- | --- |
| ID | Storm ID | Format |
| storm\_name | Name of key storm | Character |
| start\_date | Start date of key storm | YYYY-MM-DD |
| end\_date | End date of key storm | YYYY-MM-DD |
| group | Storm season ID | Character |
| AMAX1\_flow | Number of stations with AMAX1 flow during storm | Integer |
| AMAX2\_flow | Number of stations with AMAX2 flow during storm | Integer |
| AMAX3\_flow | Number of stations with AMAX3 flow during storm | Integer |
| AMAX10\_flow | Number of stations with AMAX10 flow during storm | Integer |
| flow | Number of flow stations identified with event during storm | Integer |
| AMAX1\_level | Number of stations with AMAX1 level during storm | Integer |
| AMAX2\_level | Number of stations with AMAX2 level during storm | Integer |
| AMAX3\_level | Number of stations with AMAX3 level during storm | Integer |
| AMAX10\_level | Number of stations with AMAX10 level during storm | Integer |
| level | Number of level stations identified with event during storm | Integer |
| AMAX1\_volume | Number of stations with AMAX1 2-week volume during storm | Integer |
| AMAX2\_volume | Number of stations with AMAX2 2-week volume during storm | Integer |
| AMAX3\_volume | Number of stations with AMAX3 2-week volume during storm | Integer |
| AMAX10\_volume | Number of stations with AMAX10 2-week volume during storm | Integer |
| volume | Number of stations identified with event during storm which asked for volume analysis | Integer |
| AMAX1\_rain | Number of stations with AMAX1 6-hr rainfall during storm | Integer |
| AMAX2\_rain | Number of stations with AMAX2 6-hr rainfall during storm | Integer |
| AMAX3\_rain | Number of stations with AMAX3 6hr-rainfall during storm | Integer |
| AMAX10\_rain | Number of stations with AMAX10 6hr rainfall during storm | Integer |
| rain | Number of rainfall stations identified with event during storm | Integer |
| AMAX1\_rate\_of\_rise | Number of stations with AMAX1 1hr rate of rise during storm | Integer |
| AMAX2\_rate\_of\_rise | Number of stations with AMAX2 1hr rate of rise during storm | Integer |
| AMAX3\_rate\_of\_rise | Number of stations with AMAX3 1hr rate of rise flow during storm | Integer |
| AMAX10\_rate\_of\_rise | Number of stations with AMAX10 1hr rate of rise flow during storm | Integer |
| rate\_of\_rise | Number of stations identified with event during storm which had rate of rise analysis | Integer |
| AMAX1\_gw | Number of stations with AMAX1 groundwater level during storm | Integer |
| AMAX2\_gw | Number of stations with AMAX2 groundwater level during storm | Integer |
| AMAX3\_gw | Number of stations with AMAX3 groundwater level during storm | Integer |
| AMAX10\_gw | Number of stations with AMAX10 groundwater level during storm | Integer |
| gw | Number of groundwater stations identified with event during storm | Integer |
| AMAX1\_cosmos | Number of stations with rank 1 VWC in nearest COSMOS\_UK station during storm | Integer |
| AMAX2\_cosmos | Number of stations with rank 2 VWC in nearest COSMOS\_UK station during storm | Integer |
| AMAX3\_cosmos | Number of stations with rank 3 VWC in nearest COSMOS\_UK station during storm | Integer |
| AMAX10\_cosmos | Number of stations with rank 10 VWC in nearest COSMOS\_UK station during storm | Integer |
| cosmos | Number of stations identified with event during storm which wanted soil moisture analysis | Integer |
| AMAX1\_D90\_rain | Number of stations with AMAX1 90-day rainfall preceding storm | Integer |
| AMAX2\_D90\_rain | Number of stations with AMAX2 90-day rainfall preceding storm | Integer |
| AMAX3\_D90\_rain | Number of stations with AMAX3 90-day rainfall preceding storm | Integer |
| AMAX10\_D90\_rain | Number of stations with AMAX10 90-day rainfall preceding storm | Integer |
| D90\_rain | Number of stations identified with event during storm with antecedent rainfall analysis | Integer |
| Area | EA Region | Character |

## /counts\_of\_AMAX\_regional.csv

Number of stations in each region with AMAXn events during key storms

As for 3.4

## /Extent\_of\_old\_storms\_regional.csv

Old storm metadata

|  |  |  |
| --- | --- | --- |
| ID | Description | Format |
| ID | Storm ID | Character |
| Storm\_name | Storm description | Character |
| Start\_Date | First day of storm period (notional) | YYYY-MM-DD |
| End\_Date | Last day of storm period (notional) | YYYY-MM-DD |
| Likely\_rain | Did it actually produce extreme rain? | Y/N |
| Notes | Misc comments | Character |
| Group | Storm grouping ID | Character |
| Print\_name | Human-friendly version of Storm\_name | Character |
| AMAX1\_flow | Number of stations with AMAX1 flow during storm | Integer |
| AMAX2\_flow | Number of stations with AMAX2 flow during storm | Integer |
| AMAX3\_flow | Number of stations with AMAX3 flow during storm | Integer |
| AMAX10\_flow | Number of stations with AMAX10 flow during storm | Integer |
| Flow | Number of stations with measured flow during storm | Integer |
| AMAX1\_level | Number of stations with AMAX1 level during storm | Integer |
| AMAX2\_level | Number of stations with AMAX2 level during storm | Integer |
| AMAX3\_level | Number of stations with AMAX3 level during storm | Integer |
| AMAX10\_level | Number of stations with AMAX10 level during storm | Integer |
| Level | Number of stations with measured level during storm | Integer |
| Area | EA Region | Character |

## /key\_storms\_out\_with\_ranks.csv

Tidy-format of number of stations with AMAXn events during key storms

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| group\_name | Storm season name | Character |
| Area | EA region | Character |
| measure | flood aspect being measured | Character |
| AMAX1 | Number of stations experiencing AMAX1 during season | Integer |
| AMAX2 | Number of stations experiencing AMAX2 during season | Integer |
| AMAX3 | Number of stations experiencing AMAX3 during season | Integer |
| AMAX10 | Number of stations experiencing AMAX10 during season | Integer |
| obs | Number of stations highlighted as having a key event during season | Integer |

## /ROR\_trends.csv

trend analysis on rate of rise of level

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| GaugeID | Station gauge NRFA identifier | Character |
| Period | Number of hours rate-of-rise calculated on | Number |
| Trend\_sig | p-value of Mann-Kendall test of trend | Number |
| Trend\_Z | Z-score of Mann-Kendall test of trend | Number |
| Sen\_slope | Estimate of slope from Theil-Sen method | Number |
| Type | Measurement (level/flow) | Character |
| file | Underlying file with rate-of-rise timeseries. | Character |

## /UrbanAndTrend.csv

Landcover and Trend analysis results from NRFA Winter Flood Stations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | NRFA Gauge number | Character |
| RecLen | length of record (years) | Integer |
| MK\_tau | Key statistic from Mann-Kendall trend test | Number |
| MK\_pval | p-value of significance from Mann-Kendall trend test | Number |
| MK\_S | Key statistic from Mann-Kendall trend test | Number |
| MK\_D | Key statistic from Mann-Kendall trend test | Number |
| MK\_varS | Key statistic from Mann-Kendall trend test | Number |
| MKZ | Key statistic from Mann-Kendall trend test | Number |
| TSE | Estimate of trend magnitude from Theil-Sen method | Number |
| Gauge\_ID | EA WIKSI ID | Character |
| to\_urb\_pc | Percent of gridcells in catchment that change from not-urban to urban between 1990-2015 | Number |
| from\_urb\_pc | Percent of gridcells in catchment that change from urban to not-urban between 1990-2015 | Number |
| urb\_2021\_pc | Percent of gridcells in catchment that are urban in LCM2015 | Number |
| MK\_sig | Is the Mann-Kendall Z value signficant at 95% level? | “No/Pos Trend” |

# Flow

## /All\_AM\_valid\_with\_dates.csv

AMAX flow values across all NRFA stations in Winter Floods dataset

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | NRFA Station identifier | Character |
| DateTime | Date of AMAX value | Character |
| WY | Water Year | Integer |
| AMAX | Peak flow AMAX value (m3/s) | Number |
| Stage | Stage corresponding to AMAX value (m) | Number |

## /All\_valid\_POT\_v12\_flow\_only.csv

POT flow values across all NRFA stations in Winter Floods dataset

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | NRFA station identifier | Character |
| DateTime | Date and time of POT flow | YYYY-MM-DD |
| POT | Magnitude of peak flow (m3/s) | Number |

## /AMAX\_from\_Q15\_grid.csv

AMAX values extracted from 15-minute flow data, one station per row, one year per column

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | Station identifier code | Character |
| 1963 |  |  |
| … | AMAX in that year (m3/s) (or NA if none) | Number |
| 2022 |  |  |

## /AMAX\_return\_periods.csv

1 in x AEP from compiled AMAX series (NRFA, EA 15-minute, EA supplied AMAX/POT)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | Station identifier code | Character |
| DateTime | Time of AMAX occurance | YYYY-MM-DD hh:mm |
| AMAX | Value of AMAX (m3/s) | Number |

## /AMAXs\_QWYearAMAX\_vs\_Q15\_summary.csv

Summary of the difference between supplied AMAX series and series derived from 15-minute flow data.

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | EA WISKI ID | Character |
| N\_AMAX\_FlowQ15 | Number of AMAX extracted from 15-minute data | Integer |
| N\_AMAX\_QWYearAMAX | Number of AMAX in supplied AMAX | Integer |
| N\_missing\_from\_ QWYearAMAX | Number of AMAX expected but missing from supplied AMAX series | Integer |
| N\_different\_AMAX | Number of AMAX values/dates which differ between the two series | Integer |

## /AMAXs\_QWYearAMAX\_vs\_Q15.csv

difference between supplied AMAX series and series derived from 15-minute flow data.

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | Station identifier code | Character |
| AMAXdate | Date of AMAX | YYYY-MM-DD hh:mm |
| FlowQ15 | AMAX (m3/s) as derived from 15-minute data | Number |
| QWYAMAX | AMAX from pre-created AMAX files | Number |

## /amax\_PF12.csv

wide format of Peak flow dataset, as downloaded from Peak Flow website.

## /ESS-on-NRFA-12.csv

WINFAP data on NRFA stations based on ESS

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | NRFA Station ID | Character |
| QMED | Gauged value of QMED from AMAX series | Number |
| GrowthFactor2yr | Enhanced Single Site Analysis estimate of 2-year growth factor | Number |
| GrowthFactor5yr | Enhanced Single Site Analysis estimate of 5-year growth factor (Q5/QMED) | Number |
| GrowthFactor10yr | Enhanced Single Site Analysis estimate of 10-year growth factor (Q10/QMED) | Number |
| GrowthFactor30yr | Enhanced Single Site Analysis estimate of 30-year growth factor (Q30/QMED) | Number |
| GrowthFactor50yr | Enhanced Single Site Analysis estimate of 50-year growth factor (Q50/QMED) | Number |
| GrowthFactor75yr | Enhanced Single Site Analysis estimate of 75-year growth factor (Q75/QMED) | Number |
| GrowthFactor100yr | Enhanced Single Site Analysis estimate of 100-year growth factor (Q100/QMED) | Number |
| GrowthFactor150yr | Enhanced Single Site Analysis estimate of 150-year growth factor (Q150/QMED) | Number |
| GrowthFactor200yr | Enhanced Single Site Analysis estimate of 200-year growth factor (Q200/QMED) | Number |
| GrowthFactor500yr | Enhanced Single Site Analysis estimate of 500-year growth factor (Q500/QMED) | Number |
| GrowthFactor1000yr | Enhanced Single Site Analysis estimate of 1000-year growth factor (Q1000/QMED) | Number |
| GLObeta | ESS estimate of GLO scale parameter | Number |
| GLOkappa | ESS estimate of GLO shape parameter | Number |
| t2pooled | Pooled ESS estimate of L-CV | Number |
| t3pooled | Pooled ESS estimate of L-Skew | Number |

## /FEH\_AMAX\_flood\_frequency\_analysis.csv

Results of peak flow analysis for reporting

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA region name | Character |
| Site | EA WISKI ID for station | Character |
| Event given date | Date provided by local teams for event | YYYY-MM-DD |
| Event peak | Value of peak flow (m3/s) - based on preferred data source | Number |
| In AMAX series | YES if already known to be in the stations flow AMAX series | Yes/No |
| In POT series | YES if already known to be in the stations flow POT series (if such series exists) | Yes/No |
| Rank as AMAX | Rank compared to AMAX series | Integer |
| Rank as POT | Rank compared to POT series | Integer |
| Method | Preferred method: FEH-ESS is enhanced single site analysis. | AMAX-ESS or AMAX-Site |
| Confidence Interval | Confidence interval for preferred AEP | “xx (yy – zz)” or “NO AMAX” |
| AEP Alt % | % AEP for alternative approach (POT adjustment) | Number |
| AEP Alt 1 in x | 1 in x representation of AEP Alternative | Number |

## /POT\_return\_periods\_from\_files.csv

1 in x AEP from compiled POT series (NRFA, EA 15-minute, EA supplied POT)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| STATION | EA WISKI ID for station | Character |
| DATE | Datetime of POT value | YYYY-MM-DD |
| FLOW | measurement of flow at peak (m3/s) | Number |
| BATCH\_ID | processing batch. Order of preference: WINTER\_FLOODS\_3 > WINTER\_FLOODS\_2 > FromFile | Character |
| FLAG | Flag of data quality | Character |
| COMMENT | Reason for value if needed | Character |
| RETURN\_PERIOD\_AM | GPA distribution estimate of 1 in x AEP | Number |
| RETURN\_PERIOD\_POT | Scaled using Langbein's approximation (FEH Vol 3, pg 86) | Number |

## /POTs\_Q15.csv

Peaks over threshold extracted from 15-minute data

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | EA WIKSI ID | Character |
| DateQ15 | Datetime of peak flow as derived from 15-minute data | YYYY-MM-DD hh:mm |
| FlowQ15 | Magnitude of peak flow as derived from 15-minute data | Number |

## /POTs\_QPOT\_vs\_Q15\_summary\_table.csv

Summary of the difference between supplied POT series and series derived from 15-minute flow data.

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | EA WISKI ID | Character |
| N\_POT\_FlowQ15 | POT values from 15-minute flow data | Integer |
| N\_POT\_QPOT | POT values from supplied POT series | Integer |
| N\_missing\_from\_FlowQ15 | Number of values missing but expected in POT series | Integer |
| N\_different\_POT | Number of dates/values differing between the two series | Integer |

## /Stations\_not\_on\_batch\_AMAX.csv

List of station ID of data from alternative sources, or needing manual adjustment

# Groundwater

## /Event\_Antecedent\_max\_level\_or\_min\_dip.csv

Summary of event groundwater extremes at linked flow/groundwater stations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| River | River on which gauge is based | Character |
| Gauge.Name | Name of gauge | Character |
| ID | EA WISKI ID | Character |
| NRFA | NRFA station identifier | Character |
| GW.Gauge | Name of groundwater gauge linked to above river gauge | Character |
| EventDate | Key event date as determined by area teams | YYYY-MM-DD |
| Level\_AP\_max | maximum groundwater level | Number |
| Dip\_AP\_min | minumum groundwater dipped depth | Number |

## /FullRecord\_Dip\_AMIN.csv

Full annual extremes for minimum depth across all Winter Flood Groundwater sites

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| GW.Gauge | Groundwater gauge | Character |
| WY | Water year | Integer |
| Dip\_AMIN | Annual minimum dipped depth (m) | Number |

## /FullRecord\_Level\_AMAX.csv

Full annual extremes for maximum groundwater level across all Winter Flood Groundwater sites

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| GW.Gauge | Groundwater gauge name | Character |
| WY | Water Year | Integer |
| Level\_AMAX | annual maxima of groundwater level (mAOD) | Number |

## /Groundwater Event Values.csv

most extreme groundwater values during key events as identified by area teams

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| River | River name on which gauge is based | Character |
| Gauge.Name | River Gauge name | Character |
| ID | EA WISKI ID | Character |
| NRFA | NRFA gauge ID | Character |
| GW.Gauge | Groundwater gauge name | Character |
| EventDate | Event date as identified by area teams | YYYY-MM-DD |
| Level\_AP\_max | If level data captured, value of peak groundwater level during event (m) | Number |
| Dip\_AP\_min | If dipped depth data captured, value of peak groundwater depth during event (m) | Number |

## /gw\_for\_closest\_station.csv

groundwater level for nearest groundwater gauge to each flow/level station. Only used for Contextual Analysis

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Date | Dates of key events | YYYY-MM-DD |
| ID | EA WISKI ID | Character |
| NRFA\_ID | NRFA station identifier | Character |
| Gw\_name | Name of groundwater station | Character |
| GW | Value of groundwater level/dip | Number |
| rank | Rank of groundwater within AMAX/AMIN series | Integer |

## /Results\_Groundwater\_Dipped.csv

reporting table for groundwater event AEPs (based on dipped depth)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| GW.Gauge | Groundwater Gauge Name | Character |
| EventDate | Date of event according to local teams | YYYY-MM-DD |
| Level\_AP\_max | Maximum groundwater level during event (m) | Number |
| InAMAX | Is level in the groundwater level AMAX series? | Yes/No |
| rank\_AMAX | What rank would the event have in the groundwater AMAX series? | Integer |
| empirical\_AMAX | Estimate of 1 in x AEP based on rank only | Number |
| GEV\_AMAX | Estimate of 1 in x AEP based on GEV distribution fitted to AMAX series | Number |
| ci | 95% confidence interval of AEP for key event based on parametric bootstrapping | “xx (yy – zz)” formatted string |

## /Results\_Groundwater\_Level.csv

reporting table for groundwater event AEPs (based on level measurement)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA region | Character |
| GW.Gauge | Groundwater gauge name | Character |
| EventDate | Date of key event according to local teams | YYYY-MM-DD |
| Dip\_AP\_min | Value of minimum dipped groundwater depth | Number |
| InAMIN | Is this value in the AMIN series for this station (AMIN equivalent to AMAX for level) | Yes/No |
| rank\_AMIN | What rank does this value have in the AMIN series | Integer |
| empirical\_AMIN | Estimate of 1 in x AEP according to rank only. | Number |
| GEV\_AMIN | Estimate of 1 in x AEP according to fitted GEV distribution | Number |
| ci | 95% confidence interval of AEP based on parametric bootstrapping | “xx (yy – zz)” formatted string |

# Metadata

## /Groundwater\_Metadata.csv

key station information on groundwater level gauges

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| GW.Gauge | Name of groundwater gauge | Character |
| por | Period of record | “yyyy-zzzz” string |
| reclen | Length of record (years) | Integer |
| WY | Water Year of AMAX1 in groundwater series | Integer |
| Level\_AMAX | Greatest groundwater level in AMAX series (AMAX1) | Number |

## /Master Station Listings.xlsx

initial outline of station names, required analysis, locations and notes

Sheets: Matrices, Pluvial Analysis, Fluvial Ungauged Analysis, Lookup, PostQueries\_FluvialGauged

### Columns for PostQueries\_FluvialGauged

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| NRFA | NRFA station identifier | Character |
| Area | EA Region | Character |
| Gauge | Gauging station name | Character |
| River | River name | Character |
| Gauge ID | EA WISKI ID | Character |
| NRFA Public | Is the station in the NRFA dataset? | Y/N |
| Type | Type of station: flow/level | Character |
| Gauging station start year | Start of record according to metadata | Integer |
| Length of data record | Length of data according to metadata | Integer |
| Catchment area (km2) | Catchment area according to metadata | Number |
| Event 1 |  |  |
| … | Date of key events | YYYY-MM-DD |
| Event 6 |  |  |
| [ANALYSIS TYPE] | Types of analysis to be undertaken on this dataset | Y/N |
| [EXTRA METADATA] | Other information about a station | Mixed |

## /Metadata\_GroundwaterDipped.csv

key station information on groundwater dipped gauges

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Gauge ID | Groundwater EA Gauge ID | Character |
| GWGauge | Name of groundwater gauge | Character |
| POR | Period of record | “yyyy-zzzz” string |
| reclen | Length of record (years) | Integer |
| MaxDay | Date of maximum groundwater depth | YYYY-MM-DD |
| MaxDepth | Maximum depth in groundwater depth record |  |

## /Table\_COSMOS\_Metadata.csv

key COSMOS\_UK station information

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Site | Name of COSMOS-UK Site | Character |
| POR | Period of record | “yyyy-zzzz” string |
| nyears | Length of record (years) | Integer |
| Date | Date of peak soil moisture | YYYY-MM-DD |
| VWC | Peak soil moisture in volumetric water content (%) | Number |
| Area | EA Region of closest gauging station in study | Character |

## /Table\_FEH\_stations\_flow.csv

key flow station metadata

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA region | Character |
| Station | EA Station name | Character |
| River | River on which station lies | Character |
| Type | Type of station | Character |
| ID | WISKI ID | Character |
| POR | Period of record | “yyyy-zzzz” |
| Length | Length of record (years) | Number |
| DateTime\_Q15 | Date and time of highest value in 15-minute flow record | YYYY-MM-DD hh:mm |
| StartDate | Start date of record | YYYY-MM-DD hh:mm |
| EndDate | End date of record | YYYY-MM-DD hh:mm |
| AMAX1\_Q15 | Highest value in 15-minute flow record | Number |

## /Table\_FEH\_stations\_level.csv

key level station metadata

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Station | Station name | Character |
| River | River on which station resides | Character |
| Type | Type of data | Character |
| ID | EA WISKI ID | Character |
| POR | Period of record | “yyyy-zzzz” |
| Length | Length of record (years) | Number |
| DateTime\_SG15 | Date and time of highest 15-minute level data | YYYY-MM-DD hh:mm |
| StartDate | Start of record | YYYY-MM-DD hh:mm |
| EndDate | End of record | YYYY-MM-DD hh:mm |
| AMAX1\_SG15 | Value of highest 15-minute level data (m) | Number |

## /Table\_Volume\_Metadata.csv

reporting table of volume-related metadata at selected flow stations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Gauge | EA Gauge name | Character |
| River | River on which gauge resides | Character |
| GaugeID | EA WISKI ID | Character |
| POR | Period of flow record | “yyyy-zzzz” |
| Length | length of flow record (years) | Number |
| Date | date of largest 1-week volume | YYYY-MM-DD hh:mm |
| Volume | magnitude of largest 1-week volume (megalitres) | Number |

# Nonstationary

## /Inputs

NRFA Peak Flows dataset as available from NRFA website

## /Outputs

Direct outputs from nonstat R package

## /Joint\_Probability\_Analysis.csv

Table for reporting joint probability analysis as obtained from JBA MEM tool

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Region | EA Region | Character |
| Gauge A | Gauge Name for location 1 | Character |
| Gauge B | Gauge Name for location 2 | Character |
| GaugeC | Gauge Name for location 3 | Character |
| Date | Event date | YYYY-MM-DD |
| Value A | Peak value of flow at location 1 during the event | Number |
| Value B | Peak value of flow at location 2 during the event | Number |
| Value C | Peak value of flow at location 3 during the event | Number |
| Marginal AEP A | Peak AEP (%) of flow at location 1 during the event | Number |
| Marginal AEP B | Peak AEP (%) flow at location 2 during the event | Number |
| Marginal AEP C | Peak AEP (%) flow at location 3 during the event | Number |
| Joint AEP | Joint AEP (%) of flow | Number |

## /Nonstationary\_Return\_Periods\_Time\_As\_Covariate.csv

Results of nonstationary analysis using time as a covariate (summary from nonstat package)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Gauge ID | EA WISKI ID of station | Character |
| Length of data record | Length of NRFA flow data record (years) | Integer |
| EventDate | Date of key event as identified by local experts | YYYY-MM-DD |
| EventQ | Peak flow of key event from 15-minute data (m3/s) | Number |
| fit.stat | Performance statistic for stationary model | Number |
| fit.var.loc | Performance statistic for nonstationary model with only location varying | Number |
| fit.var.scale | Performance statistic for nonstationary model with only scale varying | Number |
| fit.var.loc.scale | Performance statistic for nonstationary model with location and scale varying | Number |
| Stationary | 1 in x AEP for stationary model | Number |
| Varying Location | 1 in x AEP for nonstationary model with only location varying | Number |
| Varying Scale | 1 in x AEP for nonstationary model with only scale varying | Number |
| Vaying loc and scale | 1 in x AEP for nonstationary model with location and scale varying | Number |

## /Poisson\_Clustering.csv

Results of Poisson clustering analysis

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| NRFA ID | NRFA station identifier | Character |
| Area | EA Region | Character |
| Gauge | Gauge Name | Character |
| River | River on which gauge resides | Character |
| Gauge ID | EA WISKI ID | Character |
| EventDate | Date of key event | YYYY-MM-DD |
| PoissonRate\_1yr | Poisson event occurrence rate at event date (based on 1-year bandwidth) | Number |
| Signif\_1yr | Was this occurrence rate significant at 95% level (based on 1-year bandwidth) | T/F |
| PoissonRate\_2yr | Poisson event occurrence rate at event date (based on 2-year bandwidth) | Number |
| Signif\_2yr | Was this occurrence rate significant at 95% level (based on 2-year bandwidth) | T/F |

## /Table\_MK.csv

Reporting table for Mann-Kendall tests in nonstat package

## /Table\_PELT.csv

Reporting table for PELT tests in nonstat R package

## /Table\_Pettitt.csv

Reporting table for Pettitt tests in nonstat R package

## /Inputsxxxx\_covariates.csv

Data relating to seasonal rainfall for specified stations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Year | Year of record | Integer |
| Annual | Total rainfall (mm) | Number |
| DJF | Winter rainfall (mm) | Number |
| MAM | Spring rainfall (mm) | Number |
| JJA | Summer rainfall (mm) | Number |
| SON | Autumn rainfall (mm) | Number |

# Rainfall\_long\_duration

## /WF\_AMAX1\_table\_30\_day.csv

## /WF\_AMAX1\_table\_60\_day.csv

## /WF\_AMAX1\_table\_90\_day.csv

## /WF\_AMAX1\_table\_180\_day.csv

Summary of largest N-day rainfall accumulations in catchments in the WF dataset

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| NRFA\_ID | NRFA station identifier | Character |
| Gauge | Gauging station name | Character |
| River | River name | Character |
| ID | EA WISKI ID | Character |
| Total30 | AMAX1 of Total X accumulation from AMAX series | Number |
| W | Is this during Winter? | 1/0 for T/F |
| S | Is this during Summer? | 1/0 for T/F |

## /Maxima\_rank\_RP\_table\_30\_day.csv

## /Maxima\_rank\_RP\_table\_60\_day.csv

## /Maxima\_rank\_RP\_table\_90\_day.csv

## /Maxima\_rank\_RP\_table\_180\_day.csv

Ranks and 1 in x AEP of annual maxima of N-day rainfall accumulations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| NRFA\_ID | NRFA station identifier | Character |
| Gauge | Gauging station name | Character |
| River | River name | Character |
| ID | EA WISKI identifier | Character |
| WaterYear | Water year for accumulation | Integer |
| Date | Datetime of start of period | YYYY-MM-DD hh:mm |
| Total\*X\* | \*X\* day total rainfall depth (mm) | Number |
| T\*X\*Season | Indicator of half-year (W=Sep-Mar, S=Apr-Aug) | Character |
| Rank | Rank within AMAX series | Integer |
| RP | 1 in x AEP of X-day accumulation | Number |

## /Rainfall\_accumulation.csv

N-day rainfall accumulations preceding key events, with ranks and 1-in-x AEP

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Gauge | Gauge name | Character |
| River | River on which gauge resides | Character |
| ID | EA WISKI ID | Character |
| NRFA\_ID | NRFA station ID | Character |
| Total30 | total catchment rainfall over 30 days (based on daily data) | Number |
| Total60 | total catchment rainfall over 60 days (based on daily data) | Number |
| Total90 | total catchment rainfall over 90 days (based on daily data) | Number |
| Total180 | total catchment rainfall over 180 days (based on daily data) | Number |
| W | Was the period during Winter (Sept-Feb) | Y/N |
| S | Was the period during Summer? (Mar-Aug) | Y/N |
| Rank30 | Rank of 30-day rainfall in corresponding rainfall total AMAX series | Integer |
| Rank60 | Rank of 60-day rainfall in corresponding rainfall total AMAX series | Integer |
| Rank90 | Rank of 90-day rainfall in corresponding rainfall total AMAX series | Integer |
| Rank180 | Rank of 180-day rainfall in corresponding rainfall total AMAX series | Integer |
| RP30 | 1 in x AEP of 30-day rainfall in corresponding rainfall total AMAX series | Number |
| RP60 | 1 in x AEP of 60-day rainfall in corresponding rainfall total AMAX series | Number |
| RP90 | 1 in x AEP of 90-day rainfall in corresponding rainfall total AMAX series | Number |
| RP180 | 1 in x AEP of 180-day rainfall in corresponding rainfall total AMAX series | Number |

# Ranks of flow and level data

## /all\_amax\_with\_ranks.csv

All NRFA stations AMAX series, with ranks. EA WISKI ID added for WF stations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| ID | EA WISKI ID | Character |
| NRFA | NRFA station identifier | Character |
| WY | Water Year | Integer |
| DateTime | Datetime of AMAX peak in the above water year | YYYY-MM-DD hh:mm |
| AMAX | Peak flow of AMAX (m3/s) | Number |
| Area | EA Region | Character |

## /all\_amax\_with\_ranks\_WF.csv

Just WF stations with full AMAX series and ranks.

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| ID | EA WISKI ID | Character |
| NRFA | NRFA station identifier | Character |
| WY | Water Year | Integer |
| DateTime | Datetime of AMAX peak in the above water year | YYYY-MM-DD hh:mm |
| AMAX | Peak flow of AMAX (m3/s) | Number |
| Area | EA Region | Character |
| rank | Rank within AMAX series at station | Integer |

## /all\_level\_amax.csv

Level AMAX series at all WF stations, full period of record

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| NRFA ID | NRFA station identifier | Character |
| Year | Water Year | Integer |
| date | Date of key event | YYYY-MM-DD hh:mm |
| stage | Level of river (m) | Number |
| rank | rank within level AMAX series | Integer |
| Area | EA Region | Character |
| Gauge | Gauge name | Character |
| River | River on which gauge is based | Character |
| Gauge ID | EA WISKI ID | Character |
| source | Origin of level data: NRFA (NRFA PF and WINTERFLOODS2), EA-Supplied peak level (sgAMAX), EA-supplied 15-minute level data (sg15) | Character |

## /POT\_ranks.csv

Ranks of POT flow at all WF stations, full period of record

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| BATCH\_ID | Source of Data. Order of preference: WINTER\_FLOODS\_3 > WINTER\_FLOODS\_2 > FromFile | Character |
| STATION | WISKI ID for station | Character |
| DATE\_TIME | Time of POT event | YYYY-MM-DD |
| FLOW | Value of flow (m3/s) | Number |
| RANK | position within AMAX flow series (as derived from the same source) | Integer |
| MIN\_DATE | start of record | YYYY-MM-DD |
| MAX\_DATE | end of record | YYYY-MM-DD |

## /Table\_Level\_ranking.csv

Reporting table for ranks of event levels (mAOD)

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Gauge ID | EA WISKI ID | Character |
| EventDate | Date of key event as identified by area teams | YYYY-MM-DD |
| EventS | Peak level during key event (m) | Number |
| IN\_AMAX | Is the event peak level in the level AMAX series? | Y/N |
| rank | What rank would the level have in the level AMAX series? | Integer |
| empirical 1 in x | Estimate of 1 in x AEP based on rank only | Number |

# Rate of Rise

## /Table\_xx\_ror\_yyyyy.csv

xx: 025h, 05h, 1h, 2h, 4h, 6h

yyyy: flow, level

rate of rise of top 5 rate of rise POT plus event rate of rise rankings

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | EA WISKI ID | Character |
| DateTime | Date of key event | YYYY-MM-DD |
| ror | Peak rate of rise in period around peak flow (m3/s/hr) | Number |
| ror\_rank | Rank of rate of rise in ROR AMAX series | Integer |
| period | Duration of rate of rise calculation period | Integer |
| Area | EA Region | Character |
| KeyEvent | Was this a key event, or a top ranking AMAX event? | Y/N |

## /Sg\_combined/\*\*\*\*\*\_events\_ror.csv

POT series of rate-of-rise of level

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| DateTime | Date of greatest rate of rise around key event | YYYY-MM-DD |
| Period | Period over which ROR is calculated | Number |
| Ror | Calculated rate of rise (m/hr or m3/s/hr) | Number |
| Ror\_rank | Rank within ROR AMAX series | Integer |

## /Q\_combined/\*\*\*\*\*\_events\_ror.csv

POT series of rate-of-rise of flow

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| DateTime | Date of greatest rate of rise around key event | YYYY-MM-DD |
| Period | Period over which ROR is calculated | Number |
| Ror | Calculated rate of rise (m/hr or m3/s/hr) | Number |
| Ror\_rank | Rank within ROR AMAX series | Integer |

# Shapefiles

## /ALLSHAPES.shp

combination of all catchments pouring into identified flow/level stations (as supplied by EA/NRFA)

## /eng\_rivers\_simple.shp

simplified major river network for plotting

## /hyd\_areas.shp

Hydrological Areas for plotting

## /AllShapes\_Grid References.csv

Names and locations (easting/northing on GB National Grid) for flow/level stations, groundwater and raingauge locations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Layer | Originating shapefile | Character |
| Gauge | If a gauge, name of gauge | Character |
| Location | If not a gauge, name of nearby location | Character |
| X | Easting (m) | Number |
| Y | Northing (m) | Number |

## /uk\_outline\_1000m.shp

outline of UK for plotting

## /all\_locations\_rain.shp

locations of key raingauges

# Volumes

## /X\_week\_max\_Q\_combined.csv

## /X\_week\_max\_Q\_combined\_with\_rank.csv

X: 1,2,4,6,8

total flow volume over X weeks AMAX series with and without associated ranks

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Station | EA WISKI ID | String |
| WY | Water Year of date | Integer |
| DateTime | Date time of peak of flow volume series | YYYY-MM-DD |
| WeekX | Value of flow volume (megalitres) | Number |
| CompX | Completeness of the period | Number |
| rank | Rank of volume within AMAX series | Integer |

## /event\_volumes\_with\_ranks.csv

total flow volume for key events with associated ranks

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Site | EA WISKI ID | Character |
| Gauge | Gauge name | Character |
| River | River name | Character |
| Event.date | Event date as identified by area teams | YYYY-MM-DD |
| Vol1 | 1-week total volume (Ml) | Number |
| Vol2 | 2-week total volume (Ml) | Number |
| Vol4 | 4-week total volume (Ml) | Number |
| Vol6 | 6-week total volume (Ml) | Number |
| Vol8 | 8-week total volume (Ml) | Number |
| Comp1 | 1-week volume series completeness | Number |
| Comp2 | 2-week volume series completeness | Number |
| Comp4 | 4-week volume series completeness | Number |
| Comp6 | 6-week volume series completeness | Number |
| Comp8 | 8-week volume series completeness | Number |
| Area | EA region | Character |

## /Volume\_Analysis.csv

Reporting table of volumes associated with key events

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Site | Site EA WISKI ID | Character |
| Gauge | Gauge name | Character |
| River | River on which gauge resides | Character |
| Volume.start.date | Start date of event volumes corresponding to key events as identified by local teams | YYYY-MM-DD |
| Vol.1.week | volume in megalitres over 1 week following start of event | Number |
| Vol.2.week | volume in megalitres over 2 week following start of event | Number |
| Vol.4.week | volume in megalitres over 4 week following start of event | Number |
| Vol.6.week | volume in megalitres over 6 week following start of event | Number |
| Vol.8.week | volume in megalitres over 8 week following start of event | Number |
| Rank.1.week | rank of event volume compared to volume AMAX series (based on 1-week accumulations) | Integer |
| Rank.2.week | rank of event volume compared to volume AMAX series (based on 2-week accumulations) | Integer |
| Rank.4.week | rank of event volume compared to volume AMAX series (based on 4-week accumulations) | Integer |
| Rank.6.week | rank of event volume compared to volume AMAX series (based on 6-week accumulations) | Integer |
| Rank.8.week | rank of event volume compared to volume AMAX series (based on 8-week accumulations) | Integer |
| AMAX.RP.1.week | 1 in x AEP based on GEV distribution fitted to volume AMAX series (1-week) | Number |
| AMAX.RP.2.week | 1 in x AEP based on GEV distribution fitted to volume AMAX series (2-week) | Number |
| AMAX.RP.4.week | 1 in x AEP based on GEV distribution fitted to volume AMAX series (4-week) | Number |
| AMAX.RP.6.week | 1 in x AEP based on GEV distribution fitted to volume AMAX series (6-week) | Number |
| AMAX.RP.8.week | 1 in x AEP based on GEV distribution fitted to volume AMAX series (8-week) | Number |
| POT.RP.1.week | 1 in x AEP based on GEV distribution, adjusted using Langbein's approximation (1-week) | Number |
| POT.RP.2.week | 1 in x AEP based on GEV distribution, adjusted using Langbein's approximation (2-week) | Number |
| POT.RP.4.week | 1 in x AEP based on GEV distribution, adjusted using Langbein's approximation (4-week) | Number |
| POT.RP.6.week | 1 in x AEP based on GEV distribution, adjusted using Langbein's approximation (6-week) | Number |
| POT.RP.8.week | 1 in x AEP based on GEV distribution, adjusted using Langbein's approximation (8-week) | Number |

## /Specified\_event\_volumes.csv

Dates of event volumes. Z=1,2,4,6,8 weeks

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Site | EA WISKI ID | Character |
| Gauge | Name of gauging station | Character |
| River | Name of river | Character |
| Event.date | Date of key event as identified by area teams | YYYY-MM-DD |
| Vol1 |  |  |
| … | Total flow volume in Z weeks | Number |
| Vol8 |  |  |
| Comp1 |  |  |
| … | Data completeness of the specific period | Number |
| Comp8 |  |  |

# Other files

## /Point\_Rainfall\_FEH22.csv

FEH22 outputs of raingauge rainfall depth for key events

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Area | EA Region | Character |
| Location | Gauge area location | Character |
| Gauge.Name | Gauge name | Character |
| ID | Gauge ID | Character |
| GivenDate | Date of event according to local teams | YYYY-MM-DD |
| Duration | Duration of accumulation for FEH22 Analysis (hrs) | 1h/6h/24h/96h |
| Depth | Depth of rainfall for FEH22 Analysis (mm) | Number |
| RP\_AMAX | 1 in x AEP from FEH22 Analysis (mm) | Number |
| RP\_POT | 1 in x AEP from FEH22 Analysis (mm), adjusted using Langbein's approximation (8-week) |  |

## /Ungauged ReFH2\_Analysis.csv

ReFH2 output summary of ungauged analysis at key locations

|  |  |  |
| --- | --- | --- |
| Name | Description | Format |
| Location | Site of ungauged analysis | Character |
| Easting | GB National Grid coordinates | Integer |
| Northing |  | Integer |
| Event Date | Date of event as identified by local teams | YYYY-MM-DD |
| Area (km²) | esitmated area of catchment leading to identified site | Number |
| Tp | Time to peak as used in ReFH2.3 | Number |
| QMED Cini (mm) | Initial parameter for ReFH2.3 | Number |
| Event Cini (mm) | Initial parameter for ReFH2.4 | Number |
| 1% AEP Rainfall (R100) (mm) | Modelled value of 1 in 100 AEP rainfall (mm) | Number |
| Event Rainfall (mm) | peak rainfall of event (mm) | Number |
| Rainfall Ratio | ration between both rainfall depths | Number |
| Event duration (hrs) | duration of rainfall event (hrs) | Number |
| Max intensity (mm/15min) | maximum intensity (flow per unit time) | Number |
| Peak flow (m³/s) | peak river flow modelled from rainfall data | Number |
| 1 in x AEP | Annual exceedance probability of event | Number |