FEH Web Service

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What does the FEH Web Service do?
The FEH Web Service provides the data and rainfall model outputs that are at the core of the flood frequency estimation procedures provided by the Flood Estimation Handbook (FEH) and subsequent updates. It provides catchment information (descriptors) for more than four million sites across the UK that drain an area of at least 0.5 km², as well as a subset of these descriptors for arbitrary points on the map. It also provides rainfall depth-duration-frequency (DDF) information for the catchments and for selected points derived from the new FEH 2013 and original FEH 1999 models.

The FEH Web Service updates and replaces the FEH CD-ROM application.
The key features in common are:

- The ability to define catchment boundaries across the UK, overlain on a map.
- A searchable gazetteer of UK place names.
- The ability to search for and view NRFA gauging stations.
- The ability to view and export catchment descriptors from these catchments.
- The ability to perform depth-duration-frequency (DDF) calculations for these catchments using the FEH 1999 rainfall method, both on a catchment average basis and at the nearest 1 kilometre grid location.

The principal new features of the FEH Web Service include:

- A modern web-based map interface with detailed Ordnance Survey mapping at a variety of scales ranging from 1:250,000 to 1:10,000. Users have the ability to adjust the transparency of contextual map layers, such as the urban extent or BGS hydrogeology.
- The ability to export detailed map images.
- The ability to export catchment boundaries as ESRI shape files.
- Rainfall DDF modelling using the latest FEH 2013 methods as well as the legacy FEH 1999 method.
- The ability to interrogate soil and climate descriptors, and perform rainfall DDF modelling, at arbitrary points on the map, not just at catchment outlets or points at 1km grid intersections. New for May 2016.
- More detailed graphs plotting DDF information which can be exported as an image.
- The web-based system does not require manual installation on users’ PCs. New features and updates can be added seamlessly without the need for manual updates.
- A pricing model that charges users according to their use of the system (“pay-per-view”), and which provides many features free of charge.

Accessing the service

The address for the FEH Web Service Beta is https://fehweb.ceh.ac.uk.

You can use any major modern web browser: Chrome, Safari, Firefox or Internet Explorer (v11+). Internet Explorer versions 9/10 also work with a minor limitation: see the online FAQs for more detail.

You can use any operating system these browsers will run on — Windows, Mac, or Linux.
Tablet devices and mobiles are not fully supported since some features of the service rely on a keyboard.

**Getting Started**

**Step 1 - sign up for your account**

Use the sign up button, top left to register for an account.

Once you have completed the form you will be emailed a link which must be clicked to confirm your email address and to activate your account. We need a valid current email address in case we need to send you password reminder. Your email address will become your username, although you will be able to update your email address later if you wish (see below).

**Step 2 - logging in**

Log in with your email address and password. If you lose your password, follow the link at the bottom of the login form.
Viewing the map
Once you have logged in, click on the Map button in the top menu, and choose between Great Britain and Northern Ireland. These appear in separate maps since they have different Ordnance Survey maps and map coordinate systems.

Tip: see more of the map by switching your browser to full-screen by pressing F11. Press it again to switch back.

Navigating around the map
Moving around the map should be familiar to users of web-based mapping systems such as Google Maps:

- Click and drag to move or pan the map window.
- Use your mouse wheel to zoom in and out (Alternatively you can click the + and – sign buttons at the top right corner of the map to adjust the magnification.)

- Hold down Shift and drag to “lasso” and area of the screen. Release the mouse to zoom in to the selected area
  Hold down Shift+Alt, then rotate the map using the mouse. To reset the map orientation to grid north, click the arrow above the magnification controls.

The current map scale is shown down at the bottom left of the map. You may need to scroll down in your browser window to see this.

The top right corner of the map also displays the grid reference of the location under your mouse pointer.

Searching for place names
Start typing a place name in the search bar above the map. Matching names will be suggested in a drop down list. You can select the entry at the top of the list by pressing Enter, or you choose one further down using the mouse or cursor keys.
The map will navigate to the location chosen and place a marker in the map.

Searching for grid locations
The same search bar can be used to enter grid references/coordinates.

It will accept the following formats:

- Numeric references using between digits for northing and easting, and with northing and easting separated by a space, a colon, a comma, or a forward slash '/'. For example:
  - 524500/136350
  - 524500 136350
  - 524500, 136350

- National Grid References using a two or one-letter prefix for Great Britain and Northern Ireland respectively, and between 4 and 10 digits, e.g.
  - SU 0325
  - SU 30 25
  - SU 03410 25100

Viewing gauging stations
Open the tools menu at the left side of the map.
Clicking on the checkbox adjacent to the **Gauging Stations** icon toggles the display of gauging stations, and displays a second set of checkboxes to filter the stations shown on the map.

Clicking on the magnifier icon next to the **Gauging Stations** entry brings up a search form for the National River Flow Archive (NRFA).

Click a blue station icon on the map to view more information:

Clicking on the station name will open up a new browser window with the relevant page from the NRFA website.

Note that if you zoom out of the map, clusters of nearby stations are collapsed into a single icon to reduce screen clutter. You can click on this icon to see the stations in the cluster.

**Other contextual layers**

Further down the **Tools** menu, you will see checkboxes to toggle the visibility of more contextual information. “Urban Extent 2000”, “Urban Extent 1990”, and “BGS Hydrogeology” reveal sliders that control the transparency/opacity of the layer. You may need to scroll down the tools menu to see these sliders. A fly-out legend is available for these options; hover over the blue icon:
The “50m” and “1km” grids provide a simple gridline overlay. These grids are automatically hidden at low magnification levels where they would otherwise obscure the map.

The three remaining two layers – “Drainage Network”, “My Catchments”, and “My Points” are discussed in the next section.

**Exploring catchments**

Retrieving catchment information is done in two stages: first you choose the catchment outlet and define the boundary, then, when you are satisfied with your selection you may opt to purchase the catchment descriptors and rain data.

**Defining catchment boundaries: preview mode.**

1. Choose a location on the map and zoom in a little
2. Turn on the “Drainage Network” layer. You will now see a network of blue lines.
3. At the top left of the screen, click the button to indicate that you want to climb a catchment boundary
4. Hold down the Alt key (to the left of your space bar)
5. Click on or near a point on the drainage network of interest. The point you click will snap to the nearest section of the drainage network so don’t worry if you miss the line slightly.
6. Release the Alt key. The calculation will begin

Larger catchments will take longer to calculate. Please be patient.

Following a brief pause, the catchment boundary will appear. To see the catchment at the optimal magnification, click the “Fit” button in the Tool menu
The green marker identifies the exact catchment outlet. The red cross (visible just under the green marker in the image above) shows the nearest 1 kilometre grid post. Finally, the roundel in the centre of the catchment marks its centroid. Need a reminder? Let the mouse hover over one of these markers and a label will pop up.

We refer to the catchment at this stage as a “preview”, hence the entry under the tools menu:

You can generate as many catchment previews as you like at no cost. These give you the catchment area as well as the ability to produce a screenshot of the map, using the entry Tools->Save map as image
Examining purchased catchments in more detail

To retrieve more detailed information, you must purchase the catchment details by spending one of your account credits. (We’ll explain about buying credits below). Click ‘Buy now’ under the Tools->Catchments once you are happy with your catchment area. Rename catchments to distinguish them by altering the text circled below.

Once catchments have been purchased they are permanently associated with your account and will be available whenever you access the system. Your most recent catchment purchases are listed at the bottom of the Tools->Catchments menu. A search bar is also available to search for previously purchased catchments.
Exporting catchment descriptors and boundary polygons

Once you have selected a purchased catchment, the side menu will expand to show the full set of catchment descriptors. These can then be exported in the familiar XML, .CSV and .CD3 formats used by the CD-ROM. The XML format also includes a full set of FEH 2013 rainfall for use in tools such as ReFH2.

You can also export an ESRI shape file of the catchment boundary.

DDF rainfall

Click on the little cloud to view the DDF rainfall screen.
This screen is modelled on the corresponding screen of the legacy FEH CD-ROM, the notable differences being

- The ability to perform DDF calculations using CEH’s newer FEH 2013 rainfall model as well as the CD-ROM’s FEH 1999 model
- A more detailed, interactive graph plotting up common return periods
- The ability to save an image of the graph
- Automatic choices for advanced parameters to simplify use, namely the choice between the annual maximum (AM) and peaks-over-threshold (POT) return period scales, and fixed and sliding event durations.

Certain combinations of depth, duration, or return period will automatically switch these options. For example, setting a return period of 6 months will disable the AM return period scale option and switch to POT.

**Exploring points**

In addition to river catchments, the service also allows you to interrogate specific points on the map for their soil and climate descriptors, and rainfall characteristics. Specifically, the following catchment descriptors are available:

- PROPWET
- BFIHOST
- SAAR6190

Please note that unlike catchments, rainfall DDF estimates for points are only possible using the FEH 2013 method, not FEH 1999.

Both of the above are reflected in the lower cost of purchase for points when compared with catchments.

The process for selecting and purchasing point data is similar to that of catchment definition:

1. Choose a location on the map and zoom in a little
2. At the top left of the screen, click the button to indicate that you want to select a point
3. Hold down the Alt key (to the left of your space bar)
4. Click a point of interest.
5. Release the Alt key. The calculation will begin

If you are happy with your selection (noting the coordinates of your selected point), you may opt to purchase it in order to retrieve the descriptors and access the rainfall modelling screens.

Click **Buy now** from the Tools menu:

You will then be able to rename the point and purchase it. Once points have been purchased they are permanently associated with your account and will be available whenever you access the system. To locate your purchased points, you can either toggle the “My Points” layer in the side menu, or use the search facility by clicking the magnifier glass alongside:
Exporting point descriptors
Once you have purchased a point, the side menu will change to show the relevant descriptors. These can be exported as an XML file for processing in tools such as ReFH (version 2.2 and above). The export also includes a full set of FEH13 rainfall depth/rarity values.

Examining rainfall depth and rarity.
Click the little cloud icon to launch the rainfall modelling screen.

The point rainfall screen functions identically to the equivalent catchment version, with the caveat that only the newer FEH13 model is available for DDF estimates. See DDF rainfall, above, for more details on using the rainfall screen.

Purchasing credits
We explained above that to access the catchment/point descriptors and rainfall screens, you must purchase the catchment/point. This is done by spending your account credits. You can buy credits from the main menu:
This will take you into a series of shop pages where you can buy credits, enter your payment details, and complete the transaction. Online payment is by credit card only. Please contact us if you are unable to pay by credit card; we can arrange for purchase order payments via cheque or BACS — minimum credit purchases apply.

Viewing your account details and payment history, and changing your password
Once you have completed an order for credits, it will show up under your account pages. Here you can examine your order history, view and print detailed invoices, and perform other account management tasks such as changing your contact details and password.

Feedback
We would greatly appreciate all your suggestions and comments to help us improve our product.

Reporting issues to us
Please address your feedback to fehweb@ceh.ac.uk.

If there is anything else you’d like to know about the web service please don’t hesitate to let us know. If we start to accrue frequently asked questions about using the system these may be added to the FAQ section, accessible here: