![riverobstacles logo]

User Guide

September 2021

Contents

The River Obstacles Initiative

The **River Obstacles Initiative** is a partnership project between the Environment Agency, Rivers Trust, Zoological Society of London, Thames Estuary Partnership and the River Restoration Centre which aims to help restore and reconnect our rivers by identifying barriers to fish migration.

Records submitted using the River Obstacles App are used to update, expand and improve the River Obstacles dataset. This dataset is currently an inventory of over 36,000 weirs, sluices, dams, culverts, fords and flap gates in England and Wales. Users submit records which are manually verified, then added to the dataset, which is available as open data and updated regularly, so the data can be used to plan and deliver improvements to the river environment. The information received from this app will be used by public bodies, environmental organisations, trusts and local authorities to identify redundant man-made obstacles that can be removed from rivers, and to prioritise improvements to other obstacles that will yield the biggest environmental benefits.

Link to recorded data: https://river-obstacles-theriverstrust.hub.arcgis.com/pages/results-map

Setting up the River Obstacles App

Download the 'River Obstacles' Application to your chosen device from the App store (iPhone) or The Google Play Store (Android).


Once the app is downloaded, you will be taken to a home screen where you can now Sign up. Click account, (Sign in - if you have already registered) and click the Sign-up option at the bottom of the screen. Fill in your details and create a River Obstacles username and password.
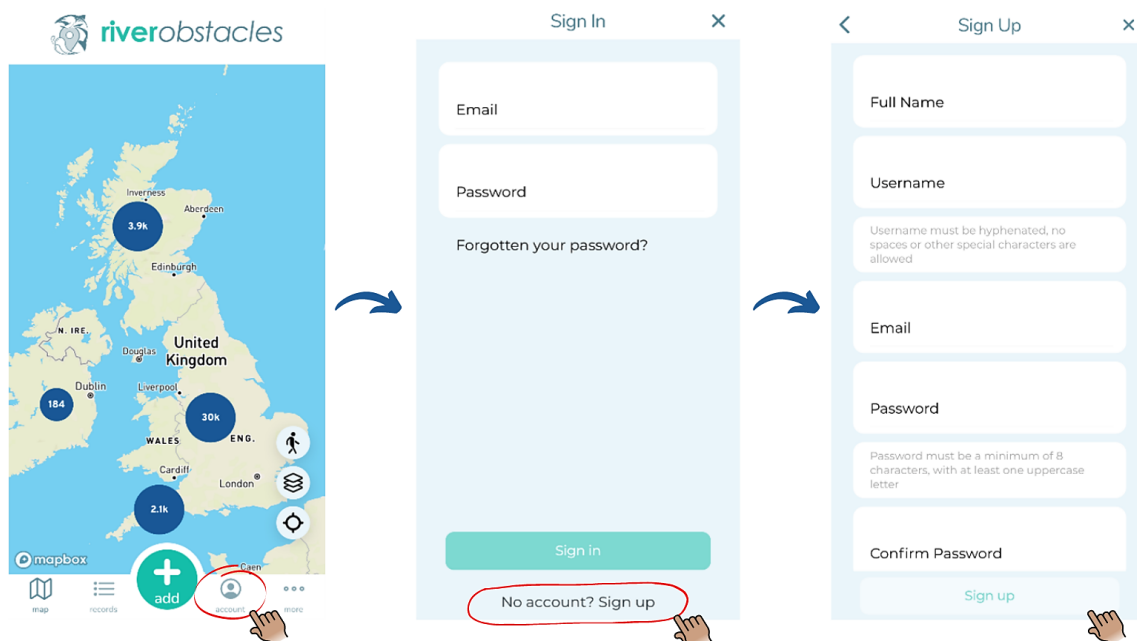
You will now be sent an activation email to the email address you used to Sign-up. This might take a couple of minutes to come through and be sure to check your junk inbox just in case! Once you receive the email, please click the link provided to complete a verification of your account. You are now ready to **Sign in** and start using the River Obstacles App!
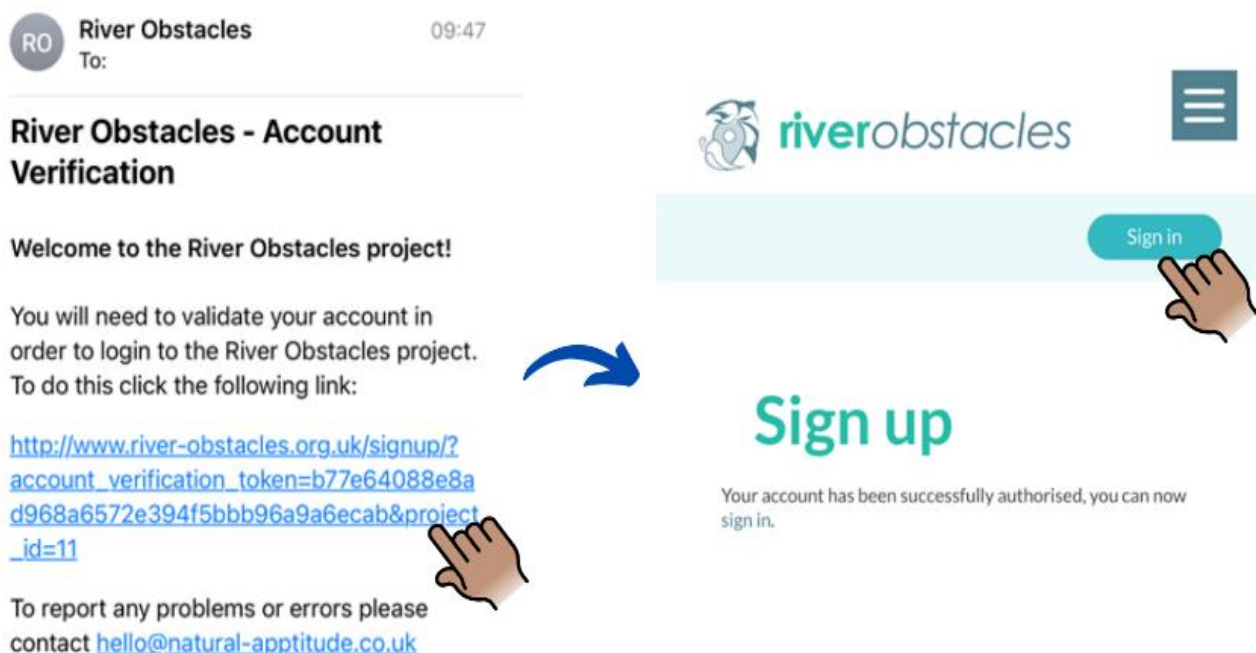
Using the River Obstacles App

Step 1 - Familiarising yourself with the main functions: Access to **Records**, **Account** and **More** (*Safety First, About the Partners, Data & Privacy and App Information*), as well as options to toggle the survey tracks *on/off*, change the base map layers (*see instructions below*) and a location indicator button can all be found on this App landing page/home screen. You can return 🗺 to this home screen view at any time by clicking the button.
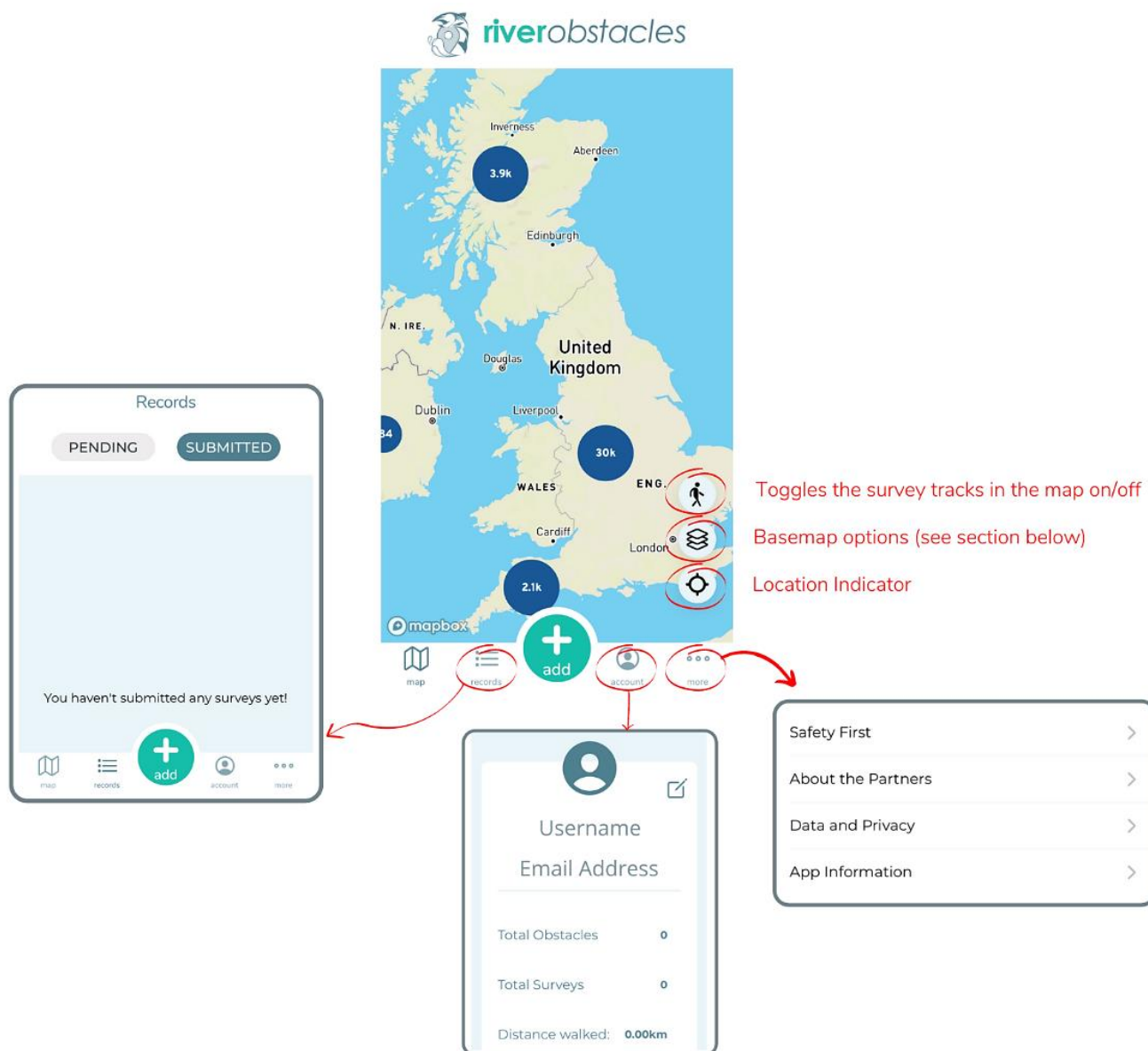
Changing the Base Map: Click the Base map button 🗇 to switch between **Outdoor**, **Satellite** and **Street** maps to suit your preference.
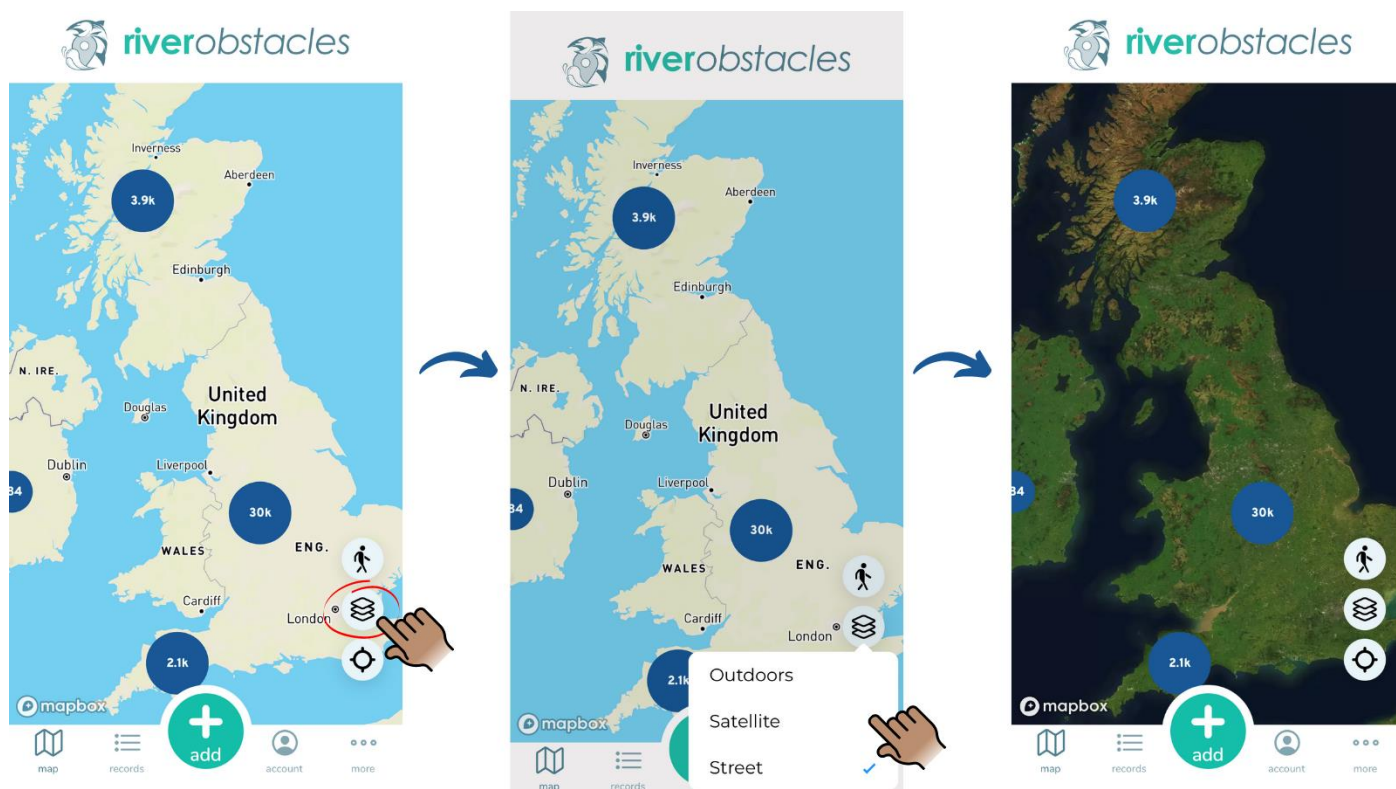
Step 2 - Entering your data:

To start entering data into the app, click **+ add** at the bottom of the Home screen. This will take you to a page with the option to **Start a survey** or **Add a single sighting**. **Obstacles should be assessed from downstream, looking upstream.**
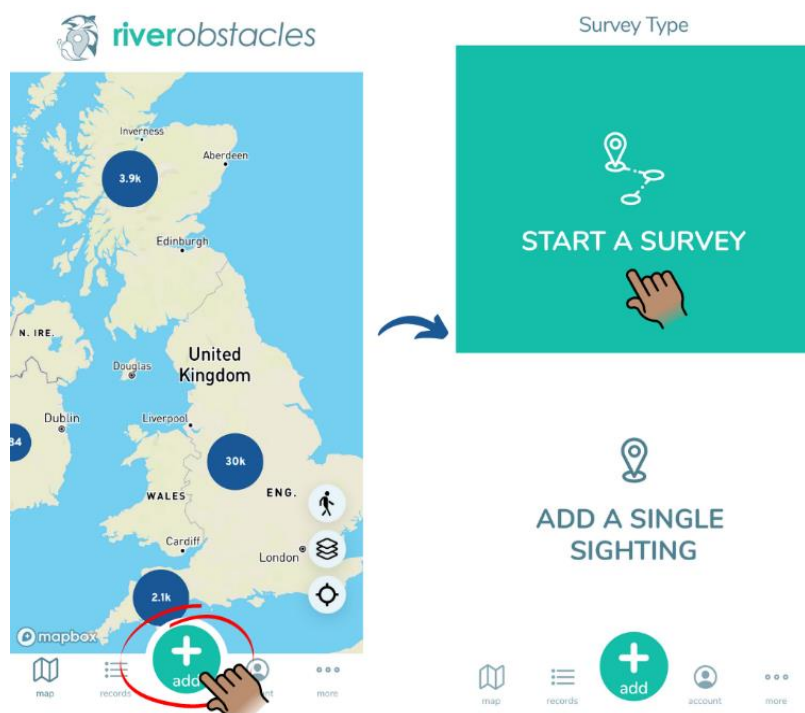
Important Information!

⚠️ *Please do not enter the river to obtain any measurements. Instead, these measurements should be taken from the river/stream bank and realistic estimations for dimensions should be made.*

You will now be able to see the **Start a Survey** screen. At this stage you can edit the **Survey Name** before clicking the **Start** button at the bottom of the screen. For the **Site Name**, please fill this in based on nearby signage or local knowledge. If you are unsure, you c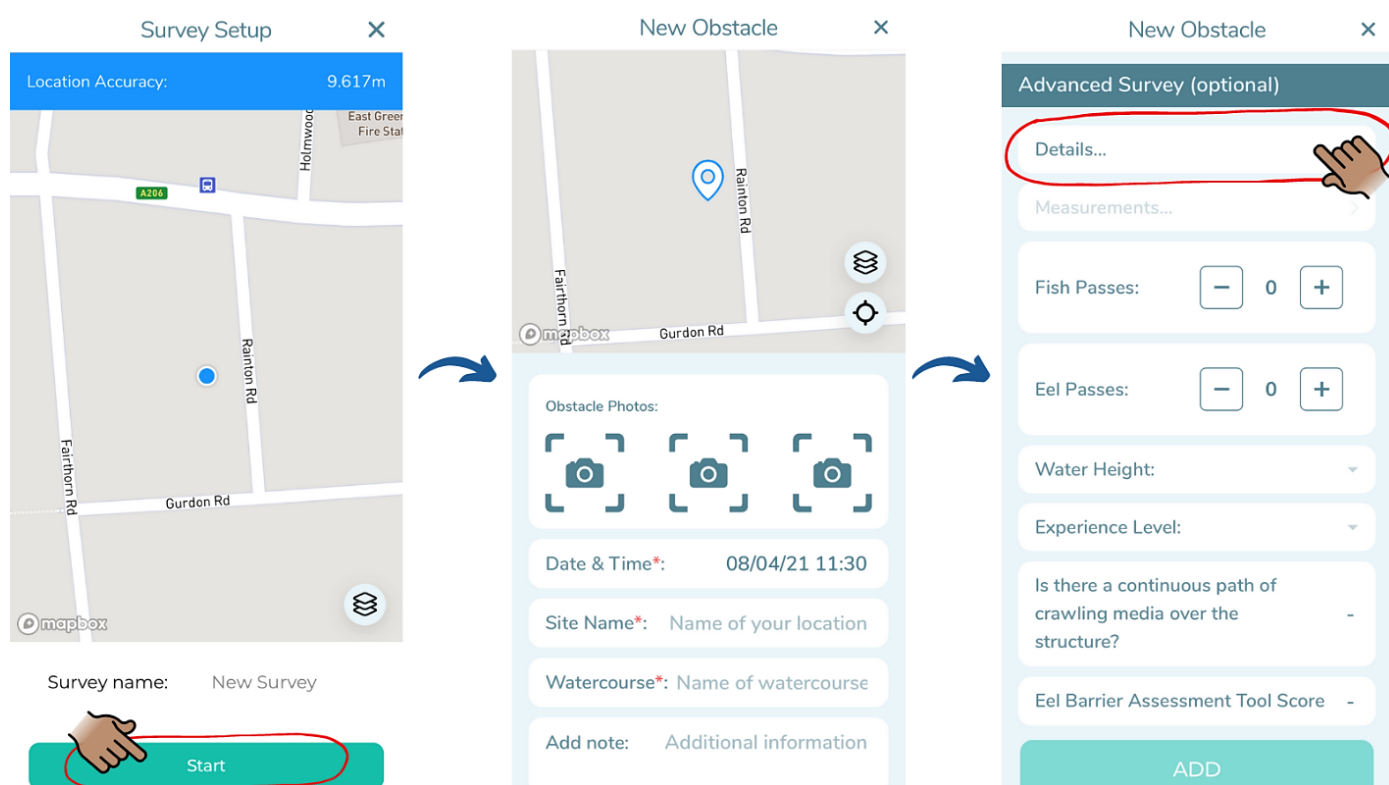an either create a name to best describe your current location (avoiding using any personal names) or simply write '**unknown**' in this box. You have the choice to continue in **Map View** or in **List View**. After proceeding by clicking the **+ Add Barrier** button you will be taken to the **New Obstacle** screen. Here you will find several data entry boxes (boxes with a red ***** are compulsory boxes which will need to be filled in before you can proceed further or add a survey to the database). **Obstacle Photos** can be added at this stage with the option to upload a file that you already have saved to your device or to take a new photo.

> **Important Information!**
>
> *Please check your location and the accuracy of this before logging a New Obstacle! Your location will be represented by a blue dot on the live map and the accuracy can be seen in the top right corner of the screen. Please ensure that your location accuracy is <u>at least 10m</u>. If your location does not look right and the accuracy is greater than 10m then refresh your location by pressing the ⬦ button.*

> **Important Information!**
>
> *If you identify a structure that is not currently acting as an obstacle but can be opened and closed (e.g. a sluice gate at low flow) then please be sure to record this as an obstacle and add in to the additional information section that this was 'open' and not acting as a barrier at the time of the survey, but that it could be in the future.*

When adding a saved photo or uploading a new photo you will have to select your desired privacy settings on your device. If you choose the **Use File** option, you will have the choice to **Select Photos** (choose specific photos that the app can access) or **Allow Access to All Photos**. If you choose the **Take Photo** option, you will need to select the **OK** button to be able to proceed. If at any point you wish to change these settings – this can be done in the privacy settings on your device.
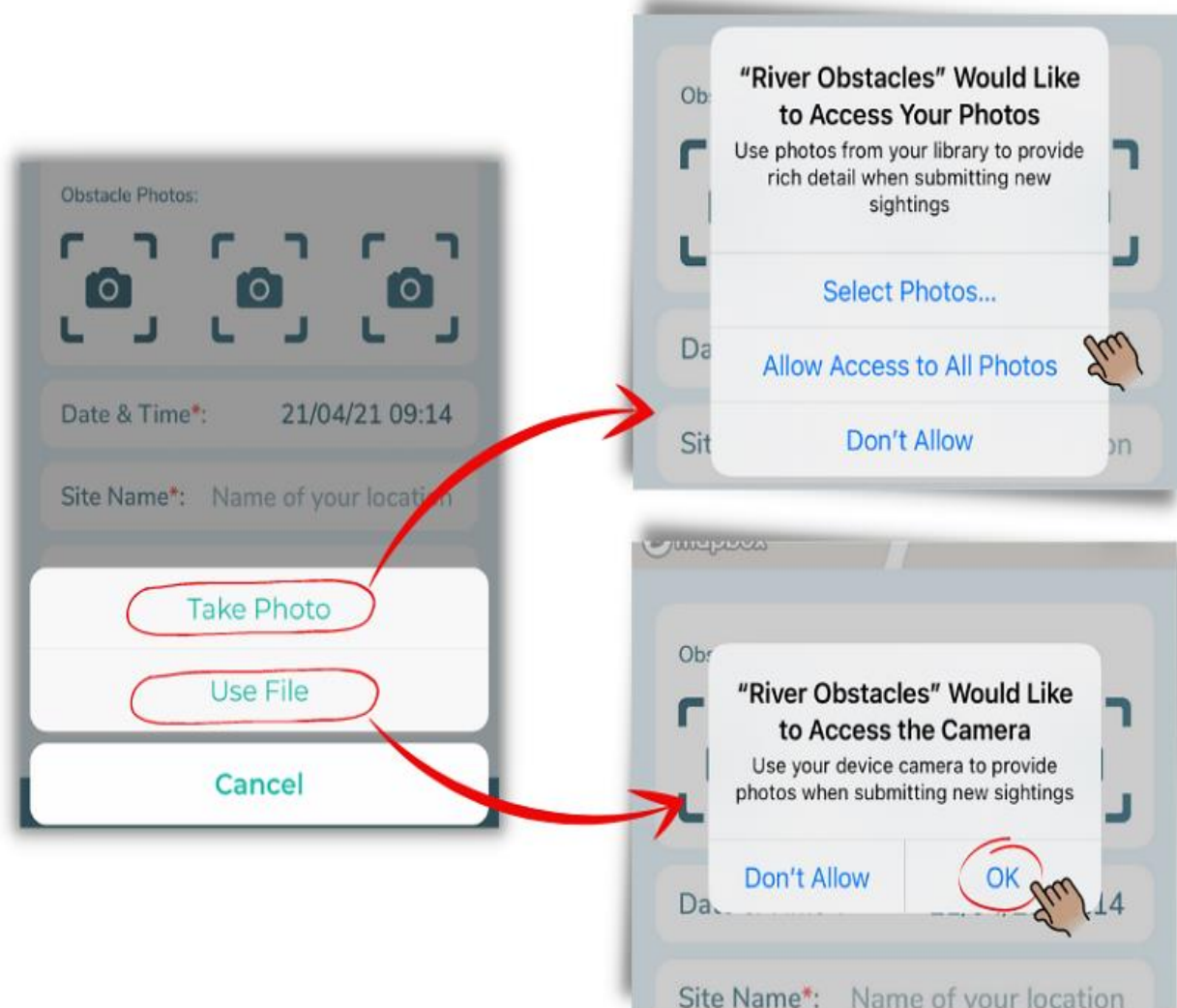
Important Information!

⚠️ *Please avoid photographing the following:*

- *Images that show identifiable people,*
- *An address or part of an address,*
- *Vehicle number plates or branding.*

✅ *Please try to capture the following where possible:*

- *Bank to bank view of the obstacle*
- *A clear unobstructed view of any distinctive features*

Please note that photos taken within the app will not automatically save to your mobile device, so if you wish to keep a copy for yourself you will need to take a separate photo.

As you scroll down the page you will reach the **Advanced Survey (optional)** section. Click on the **Details** panel and select either a **Man Made** or **Natural** obstacle depending on the obstacle you wish to record.

- If you choose **Natural**, the following obstacle options will appear: **Permanent** (e.g. waterfall), **Temporary** (e.g. log jams and fallen trees)

- If you click on **Man Made** the following options will appear:

Weirs (with a choice of *Vertical, Sloping or Stepped* with another '*yes/no*' option to select whether the weir forms part of the footing structure of a bridge) - A weir is a small, low head dam built across a river or a stream to control the upstream water level.
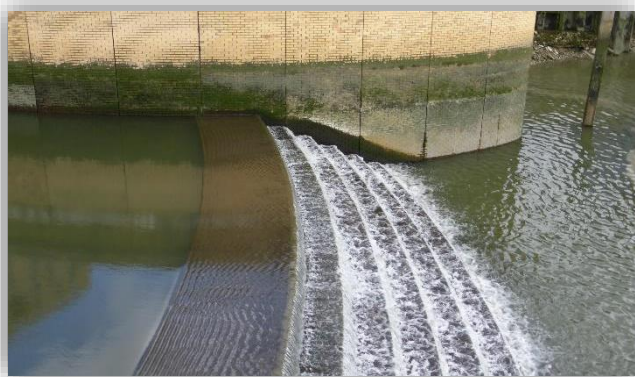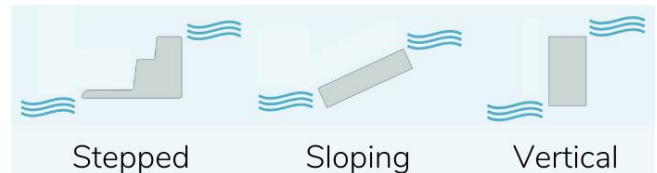
Photo: (Left) ZSL, (Right) Marathon, River Medway, WikiCommons.

Culverts (with a choice *of Perched, Not perched*): a structure built to allows a stream or river to flow through/under an obstruction. Culverts can be embedded into the ground (not perched) or raised (perched) with the outlet being higher than the elevation of the downstream water. Perched culverts can be constructed intentionally or can be caused by erosion at the outlet from high flows, scouring the channel bed.

Perched   **Not Perched**

Photo: (Left) Brendanboshea, WikiCommons, (Right) Dave Spicer, Arun canal twin culverts, WikiCommons.

Please note: *These can often be confused with Combined Sewer Overflows (CSOs), surface water outfalls and land drains!*

Flap gates (with a choice of: *Side Hung* and *Top Hung*, *Non-Tidal* and *Tidal*): A flap gate is a flow control device that allows water to flow through it in only one direction.

Tidal flap gates close during incoming (flood) tides to prevent tidal waters from moving upland and open during outgoing (ebb) tides to allow upland water to flow into the receiving body of water.

Two factors influence the degree to which a flap gate represents a physical barrier for fish. Firstly, the length of time the gate is closed for and the secondly, the size of the opening. All flap gates act as a total barrier to fish passage during the time they remain completely closed.

Top hung flap gates, sometimes referred to as 'tidal flaps' range greatly in size from tens of centimetres to several metres in width and depth. They are generally rectangular or circular in shape.

Side Hung Flap Gates, also commonly known as 'tidal doors', are generally larger than top hung flap gates and have an appearance similar to lock gates.
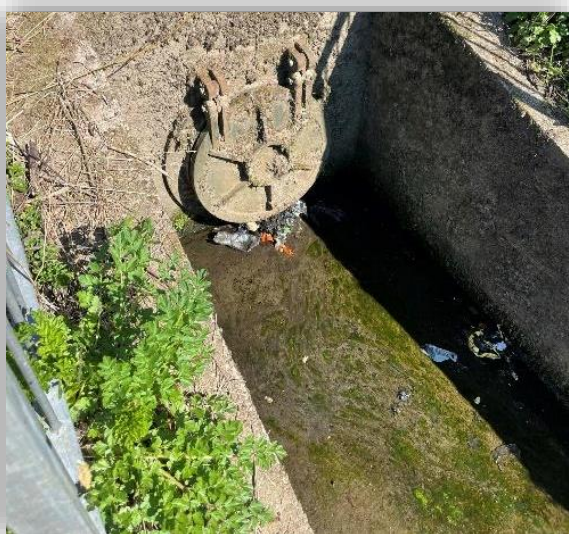

Photo: (Top Left) Heather Bell, The Rivers Trust, (Top Right) Adrian Fewings, The Environment Agency, (Bottom Left) The Environment Agency, (Bottom Right) Adrian Fewings, The Environment Agency.

Dams– A dam is a barrier built to block or limit the flow of water that can come in a variety of shapes and sizes running the width of a river system Some fish species are unable to move upstream of even low height dams.

Photo: SERT, Weirwood Reservoir on the Medway.

Sluices are movable barriers that are opened and closed to control water levels and flow rates. Sluices are traditionally a wood or metal barrier sliding in grooves that are set in the sides of the waterway and come in many shapes and sizes. Sluices can often be built into/around other structures such as weirs.

Photos: Heather Bell (The Rivers Trust), North Somerset.

Fords – A ford is a structure in a river or stream which creates a shallow area to be crossed by vehicles or on foot. Fords can create several barriers to fish passage including a vertical drop (or step up for fish migrating upstream), shallow water especially during summer migration, when water flows are lowest and high water compared to the natural stream with no resting areas available.

Photo: (Left) Roger Kidd / Trescott Ford, Staffordshire / CC BY-SA 2.0, WikiCommons, (Right) John Walton / *Rawney Ford* / WikiCommons CC BY-SA 2.0.

Locks– A lock is a device used to improve crossing and navigation in rivers and canals, raising and lowering boats and other vessels between stretches of water of different levels. **Please Note:** *if selecting this obstacle option, you will not be required to enter any measurements.*

Photos: Wanda Bodnar, Thames Estuary Partnership.

Multiple and Complex Structures – *For where the user is recording a complex obstruction that is made up of several 'obstacle types'. (This will commonly apply to multiple obstacles such as lock and weir barriers)

There is not an option for recording these multiple barriers within the app, instead please ensure that clear descriptions are added to the 'Add Notes' section. If the obstacle elements are joined then this should be recorded as **one obstacle** with **Multiple** components (acknowledged within the notes). If they are near one another but separated then they are to be recorded as **separate obstacles** within the app.

The man-made barriers encountered in rivers can often be complex non-uniform structures. These can vary across their width (bank to bank or 'transversally') and across their length (downstream to upstream or 'longitudinally'). Complex structures can contain multiple structure types across their width e.g. a sluice gate with two weirs on either side (see image below). Structures may also include a vertical lip at the crest or a step at the toe of the weir. These can present an additional challenge to migrating fish and, in some cases, make an otherwise passable structure a barrier.

Photo: Small scale example) David P. Howard, Alveston Sluice and Weir on River Avon (Sluice in centre), WikiCommons.
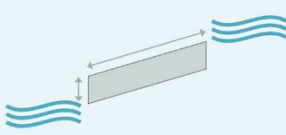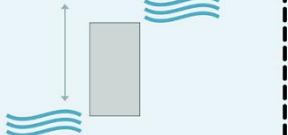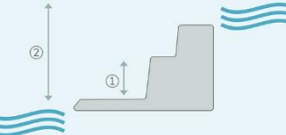

Photo: Large scale example) Maxwell Hamilton, The Weir at Teddington Lock (2011), WikiCommons.

Step 3 - Entering your measurements:

> **Important Information!**
>
> *Remember, do not enter the river. Measurements should be taken from the river/stream bank and realistic estimations for dimensions should be made.*

After selecting the type of obstruction and specifying the obstacle details where necessary, the measurements of the obstruction can be added. Depending on the obstacle type selected, the measurement data entry boxes will differ. **Ensure that all data are entered in the specified unit of measurement**. Diagrams of how to measure each obstacle can be seen along with important specifications and guidance for measuring given where necessary. Once measurement submission is completed, double check your data and click **Save**. **Please note:** *You can edit these data by going back into the **Measurements** tab.*

You now have the option of adding in any **fish passes**/**eel passes** present, the number of these can be adjusted using the **+** and **−** buttons, and there is an option to upload a saved image/take a new image of the pass.

> **Important Information!**
>
> ***These can sometimes be difficult to spot*** *- If you are unsure of whether you have seen an eel or fish pass, please photograph the area and make this known within the notes section, so that this can be revisited during the verification process.*

Eel Passes: (also referred to as elver passes) are modifications made within waterways to mitigate the effects of obstacles (mostly man-made obstacles) to eel. These typically include '**up and over**' passes, '**horizontally mounted eel tiles**' and '**vertically mounted eel tiles**'.

Horizontally mounted eel tiles

Up and over eel pass

Vertically mounted eel tiles

Important Information!

Please make note of any fish or eel passes that are present but that appear to no longer be functioning e.g. visibly damaged, broken or clogged.

Fish Passes: Similarly, fish passes come in many shapes and sizes and include any form of conduit, channel, lift, other device/structure which facilitates the free passage of migrating fish over, through or around an obstacle, whether natural or man-made.

Photos: (Left & Middle) The Environment Agency, (Right) South East Rivers Trust.

Important Information!

At this stage you may see the Water Height data entry section. Please ignore this box for now as this is an obsolete question which will be removed.

After recording any eel or fish passes that are present, please fill in your **Experience Level** and press **OK** once you have selected the most suitable option.
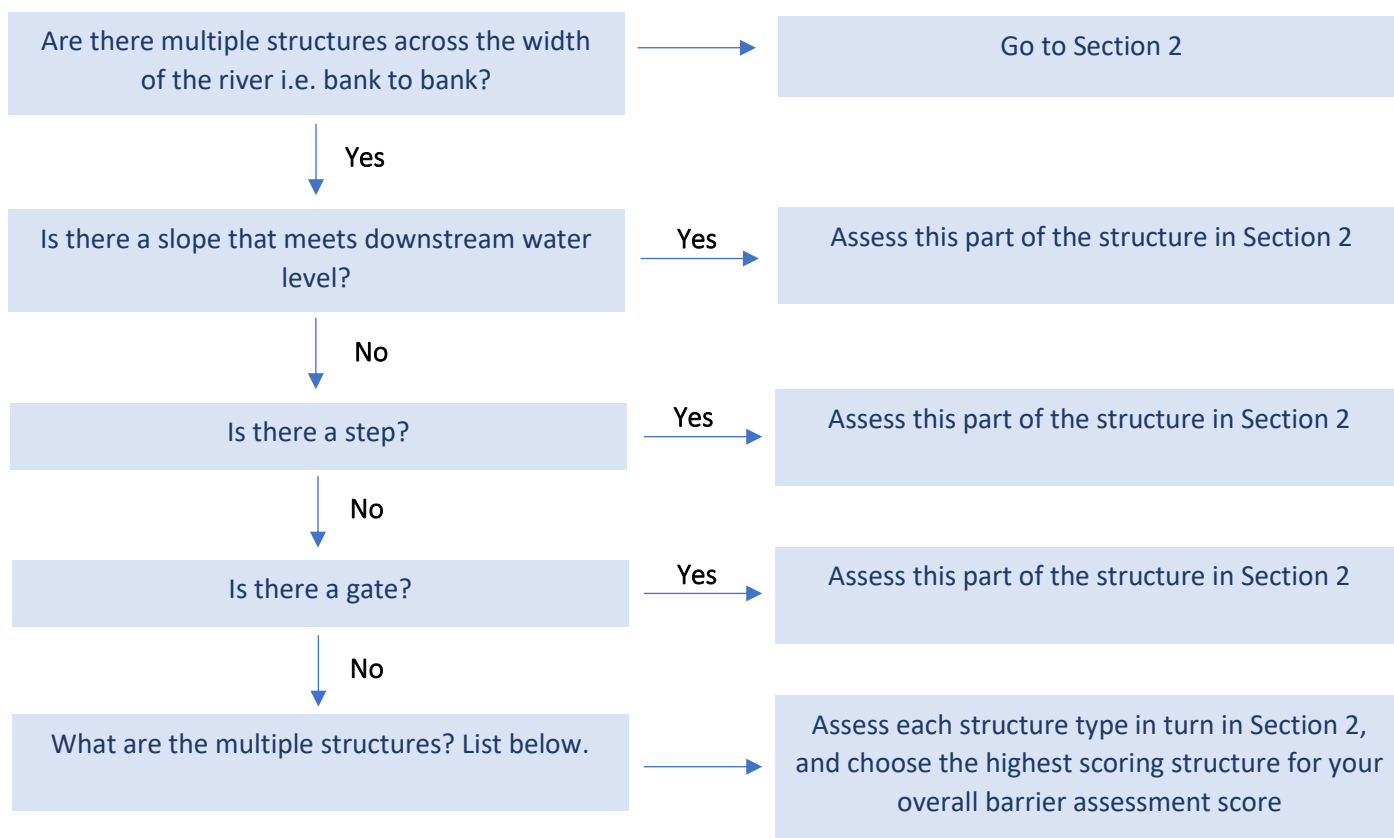
Eel Barrier Assessment Tool (EBAT) score

After submitting your experience level, the final data you will be asked to enter is the **EBAT Score**.

Step 4 - Deriving an EBAT Score (includes Crawling Media):

This score can be derived from four main criteria relating to the structure/slope, length and velocity and incorporates crawling media. The higher the score, the greater the passability likelihood for eel. This tool acts as a rapid assessment and indicates which parts of complex structures should be assessed. Please Note: *Not all structures can be EBAT assessed (e.g. culverts and flapgates.)* In **Section 1** of the EBAT guide (accessed via the link on the 'EBAT Score' page of the App) , you will be asked to follow a flow chart to assess the structure.

Are there multiple structures across the width of the river i.e. bank to bank?	→	Go to Section 2
↓ **Yes**		
Is there a slope that meets downstream water level?	**Yes** →	Assess this part of the structure in Section 2
↓ **No**		
Is there a step?	**Yes** →	Assess this part of the structure in Section 2
↓ **No**		
Is there a gate?	**Yes** →	Assess this part of the structure in Section 2
↓ **No**		
What are the multiple structures? List below.	→	Assess each structure type in turn in Section 2, and choose the highest scoring structure for your overall barrier assessment score

This flow chart is designed so that the *least* limiting transversal section of a structure (across the river's width) is assessed and that the *most* limiting features on the longitudinal section of a structure (downstream to upstream) are assessed.

From here you will move to **Section 2,** where you will be asked to choose a score for Crawling Media. **Crawling media** is a wetted rough substrate (such as algae, moss, other vegetation, roughened rock, decaying wood, etc.) that eels can climb or crawl across. This crawling media must be uninterrupted across the structure's length (downstream to upstream).

Photo: Thames Rivers Trust

A yes/no answer is required in the separate section for this parameter in the River Obstacles App and a score is required for the EBAT guide, to indicate whether or not there is a continuous path of crawling media available over the obstacle structure that you are logging.

Following this, you will be required to give an estimate for the slope of the structure. According to whether the slope you are measuring is **<1 in 4**, **1 in 4 - 1 in 1**, **>1 in 1** or **Variable** (e.g., stepped, has a lip at the crest or a step at the toe) a score from 1-4 can be matched (shown below each option). Fill in your score to the **Sub Total** box.

After completing an estimate for the slope of the structure you will now be asked to assess the length of the slope (this applies to the slope across the entire structure being assessed, downstream to upstream). There is an option to note down the number of steps if the structure is stepped. Length options **0-2m**, **>2-6m**, **>6-9**, **≥10m** and **Vertical Weir** correspond to score values below the diagram ranging from 0-4. Once you have selected a score, write this in the **Sub Total** box.
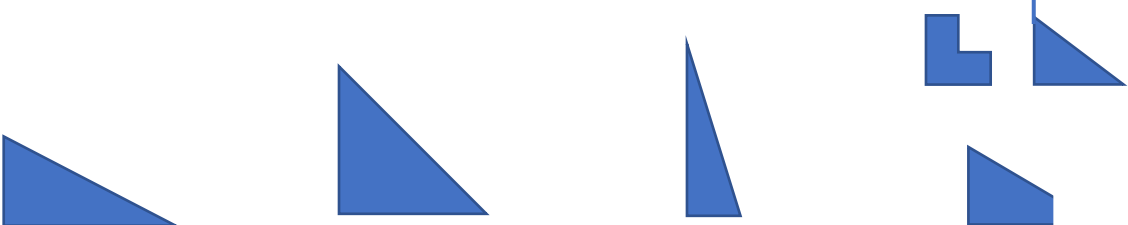
The next stage of assessment is to calculate the approximate velocity over the slope. Two methods can be used to establish a score for this question. The method using a float method or by using the pacing method. There is also a space to record the location from which velocity was recorded. Once an option has been selected based on the approximation of velocity, the corresponding score should be entered into the **Sub Total** box.
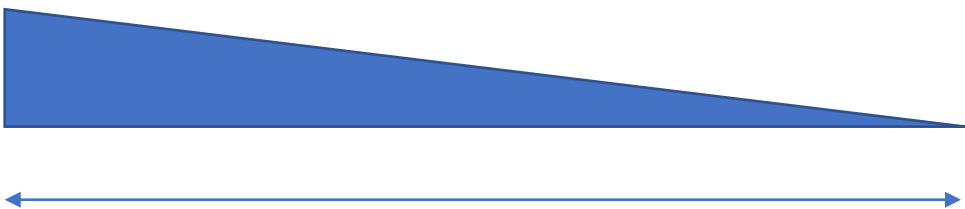
The final question for the assessment asks whether the structure is assumed to be passable to elver. A **yes/no** box is provided for the answer. Following this, all **Sub Total** scores should be added to give the final **Total Passability Score/EBAT Score**. This final **EBAT score** can be compared in the **Score Range** table seen below.

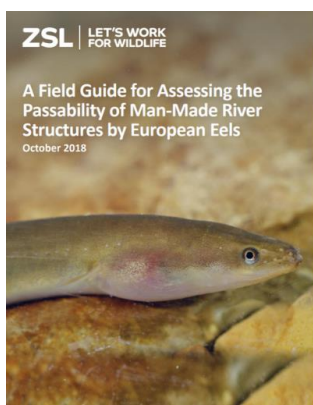| Score Range	
10-15	Unlikely to represent a major barrier to upstream migration
05-09	Partial impact, obstacle may impede passage
<05	Likely to be a complete obstacle to eels migrating upstream

Please see the EBAT scoring methods on the next page.

Is there a continuous path of crawling media over the structure?		
Yes	No	Sub Total
3	**0**	

What is the approximate slope of the structure?			
<1 in 4	1 in 4 – 1 in 1	>1 in 1	Variable e.g., stepped, lip at crest or step at toe
			Sub Total
4	**2**	**1**	**1**

What is the approximate length of the slope? This applies to the slope across the whole structure, downstream to upstream. If stepped, count the number of steps and record as a note here:				
0-2m	>2-6m	>6-9m	≥10m	Vertical Weir
				Sub Total
4	**3**	**2**	**1**	**0**

What is the approximate velocity over the slope?				
If using the float method:				
Very low (<0.5m/sec)	Low (0.5m-1m/sec)	Medium (>1m-2m/sec)	High (>2m/sec)	
If using the pacing method:				
Slow walk	Walking	Jogging	Running	Sub Total
4	**2**	**1**	**0**	
Where is velocity recorded from?				

The full **Eel Barrier Assessment Tool PDF** can be downloaded here and the Eel Barrier Assessment Tool Form PDF can be downloaded here. The River Obstacles App also provides a direct link to these documents.

Now that your **EBAT Score** has been derived, it can be entered into the River Obstacles App. You will be able to scroll between numbers to find values ranging from **0** to **15**. Once selected, click the **Confirm** button. You can now check your score before clicking the **Save** button.

Data entry is now complete (please ensure you check that all necessary information has been included as well as photographs where possible). In the App there is now an option to add another barrier by clicking the **+ Add Barrier** button or you can select **Finish**. Once you select **Finish**, you will see a notification pop up, asking if you are sure that you wish to finish your survey. App users will still be able to review and edit their sightings until the data is submitted by clicking the **Submit** button on the following screen.

> **Important Information!**
>
> *Please remember to* press **Finish** *when you have reached the end of your survey, otherwise the app will continue to track your location data, and this could disrupt the survey data.*

Step 5 - Data submission and records:

Once you have submitted your first **Survey** – this can be viewed in the **Records** page which can be accessed from the App Home Screen by clicking the tab.

All submitted surveys will be stored here as either **Pending** or **Submitted** records. **Please note:** *sighting data cannot be edited once it has been submitted and this page can only be used to view your records.*
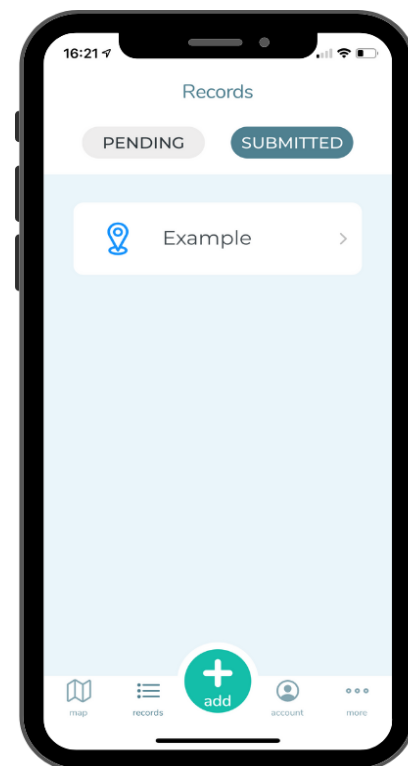
To view and download data that has been submitted to the app and verified, please visit: https://river-obstacles-theriverstrust.hub.arcgis.com/

Thank you!

Thank you for using the River Obstacles App. We look forward to receiving your survey data! Your comments and views on how to improve this guidance document would be most welcome and should be sent to RiverObstacles@environment-agency.gov.uk or your survey organiser.