

Determining stream order

What is stream order?

'Stream order' is used to describe the hierarchy of streams from the top to the bottom of a catchment.

There are different methods for describing stream order. The *Water Management (General) Regulation 2018* (the Regulation) uses the Strahler system, described in Schedule 2.

How is stream order used in the Regulation?

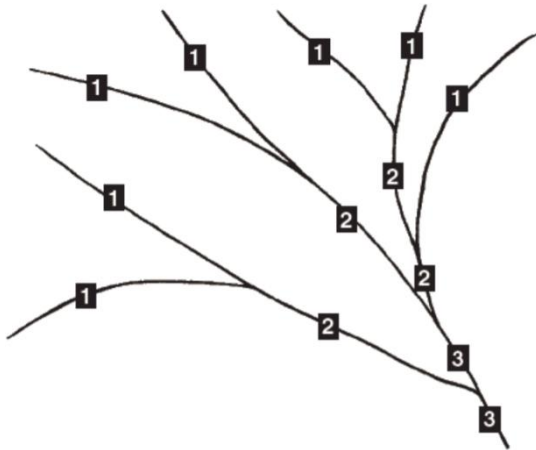
The Regulation specifies a number of exemptions from the requirement for an access licence or approval in certain circumstances. Some of these exemptions only apply to first, second or third order streams. Similarly, harvestable rights dams can only be built on first and second order streams. There are other limitations on where such dams can be built on a landholding, and they are set out in statutory instruments called harvestable rights orders:

<https://water.dpie.nsw.gov.au/licensing-and-trade2/basic-landholder-rights/harvestable-rights>.

To determine the stream order of a stream for the purpose of the Regulation and the harvestable rights orders, the Strahler system must be applied to streams shown in the Regulation's hydro line spatial data: <https://www.industry.nsw.gov.au/water/licensing-trade/hydroline-spatial-data>.

How does the Strahler system work?

Figure 1. Schematic diagram of Strahler system



The Strahler system is based on the joining of streams of the same order, as shown in Figure 1.

A first order stream has no other streams flowing into it.

When two streams with different orders join, the resulting stream has the same order as the highest order of the two joining streams. For example, when a first and second order stream join, the resulting stream is second order.

When two streams with the same order join, the resulting stream has the next highest order than the joining streams. For example, when two second order streams join, the resulting stream is third order.

A stream may separate and then converge — this is called a 'braided stream'. A braided stream retains the same stream order throughout the braid, as though it were a single stream.

A lake may be located on a stream. The occurrence of a lake does not change the stream order of a stream.

How do I use the Strahler system to determine the stream order of a stream?

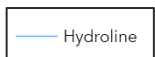
- Go to <https://www.industry.nsw.gov.au/water/licensing-trade/hydroline-spatial-data>
- Open the web mapping portal.
- Search for the location of the stream — you can search by an address, river or lake name, or locality.
 - Use the satellite imagery or topographic map to find the relevant pinpoint location along the stream where you are proposing to take water or carry out an activity. From your identified pinpoint location, follow the stream to the top of the catchment of each of its upstream tributaries.
- Next, work your way back down to the stream at your pinpoint location and identify the stream order of each tributary using the Strahler system as you go.

- To complete this step, you must be zoomed in on the map so the scale bar shows 2 kilometres or less. If you use the web mapping portal at a larger scale, not all of the streams in the dataset can be shown.
- You should make a record of how you determined the stream order of the stream at your pinpoint location. You can do this by making a copy of the map (print or save an electronic version) showing all of the relevant upstream tributaries.

Check the map shows all of the upstream tributaries you considered in determining the stream order of the stream at your pinpoint location. You may need to go back to the web mapping portal and adjust the view or make a copy of the map for several different areas.

Further information

This information will help you navigate the web mapping portal.



Streams are shown on the map by the symbol of a blue line.



The stream symbol is shown in the map's legend on the top right of the screen. It's shown by the symbol with a bullet point list.



You can change between the satellite imagery or topographic map using the Basemap Gallery on the top right of the screen. It's shown by the symbol with four squares.



You can mark your pinpoint location using the marker tool on the bottom left of the map. It's shown by the symbol of a compass.



The scale bar is on the bottom left of the map. It's shown by the symbol of a line labelled with the corresponding ground length in kilometres.

How do I know which way is upstream?

Stream systems often look similar to trees with spreading branches. The top of the catchment is the outermost tip of the branches, and the bottom of the catchment is the base of the trunk.

Do I need to determine the stream order of all of the tributaries upstream of my location?

If you are using the hydro line spatial data to determine if an exemption applies to you, you only need to determine the stream order of enough tributaries to identify if the stream at your pinpoint location is greater than third order. If the stream at your pinpoint location is greater than third order, this means the exemptions which only apply to first, second or third order streams will not apply at your pinpoint location.