

Invasive species management and biosecurity guidance for fisheries and clubs



Contents

Why?	3
How can I manage invasive species?	4
How to control species that are already present at your water?	4
Manual control.....	5
Chemical control	6
Biocontrol.....	7
Measures to prevent invasive species being introduced.....	8
Wash down stations.....	8
1. Hot water wash down stations	9
2. Pressure washers	9
3. Use of bowsers.....	10
4. Disinfectant	10
Which biosecurity facility is the most suitable for my site?	11
Factors that need to be considered during the development of a biosecurity wash down station. ...	11
1. Location for the wash down	11
2. Access to utilities	11
a) Access to clean water.....	11
b) Electric.....	12
3. Containment of material and ‘contaminated’ water.....	12
a) Free standing or walk-in wash down station	13
b) Base of the drainage area	14
c) Barrier at the boundary of the wash down area to contain water and spray.....	15
d) Drainage	16
Types of soakaway	16
The size of the soakaway	17
Appendices.....	18
Pressure washers	18
Hose adaptors.....	19
Boot cleaners	19
a) At sites with access to clean water	19
b) Without access to clean water.....	20
Dip tanks	20

Why?

Invasive non-native species are animals, plants or diseases that have been introduced by human activity outside of their native range and cause significant negative environmental, social and economic impacts on the habitats where they are introduced.

They present one of the five top reasons for biodiversity loss worldwide, cost the UK economy at least £1.8 billion a year, and present a major threat to fish populations and the angling sector. Invasive species, can outcompete and predate on native fish populations, reduce water quality, degrade spawning areas and can inhibit angling access. In worst case scenarios it can result in the temporary or permanent closure of a fishery where species are invaded.

Invasive non-native species can be introduced by humans to a site either intentionally, or by accident. One of the major risks to waterways including fisheries is the accidental introduction of invasive non-native species into waters stowed away within damp angling equipment. Nets, waders and stink bags in particular present a substantial risk with research indicating invasive species can survive for at least 14 days within uncleaned angling gear, and can establish from single plant fragments or a few individual insects.

Prevention is the most effective and cost-efficient approach to managing invasive species in the long term and protecting fisheries and fish stocks. The term 'biosecurity' refers to a series of measures that can be put in place to minimise the risk of invasive species being introduced to, or from to a site.

Implementing these measures will also help protect fisheries from fish diseases and parasites such as Gyrodactylus which is causing heavy losses in wild Atlantic salmon stocks in Norway, and Koi-herpes Virus (KHV) which can spread through uncleaned nets, unhooking mats and boots.



Image: Giant hogweed on the riverbank. If bare skin comes into contact with the plant sap it can result in burns and blisters

How can I manage invasive species?

To manage invasive species, clubs should:

- a. Control invasive species that they already have at their site (See page 5)**
- b. Implement measures to minimise new invasive species being introduced to their site (see page 8)**

The guidance outlined below, provides advice on measures that can be implemented in freshwater environments to control invasive species and prevent the introduction of new species onto their site.

It should be noted that the best approach will vary according to your site, so this document should be used as a guide, and you should seek further advice from our [Environment Officers](#), and/or an independent consultant.

How to control species that are already present at your water?

There are four main methods available to control invasive species present at your water:

1. Mechanical removal – hiring contractors with machinery to remove species
2. Physical removal – using volunteers and organising working parties to remove species
3. Chemical control – applying licenced chemicals, often over multiple treatments to control species
4. Biocontrol – releasing natural predators to target the invasive species. These will have undergone extensive testing in the laboratory by the Centre of Agriculture and Bioscience International (CABI) to ensure they are target-specific and safe for use.

The most appropriate method will vary according to the invasive species, their abundance on your site (e.g., dense population or newly established) and the specific environmental conditions of your site. The best approach will also vary over time, and it can be effective to combine methods to increase impact.

It is essential that good biosecurity is implemented into invasive species management to prevent the spread of the species from the site. This includes measures such as cleaning equipment and clothing, minimising, and collecting plant fragments, and starting management upstream and working downstream.

Manual and chemical removal present the key options for clubs to undertake repeated action to control invasive species.

Manual control

Manual control involves the use of volunteers and members to physically control invasive species. This can include techniques such as hand pulling, cutting and digging. Manual removal can be useful for species such as Floating Pennywort and Himalayan balsam but are not suitable for other species such as Giant Hogweed.

Equipment:

The equipment you will need will vary according to the invasive species you wish to control. A non-exhaustive list is outlined below:

- Throw rakes
- Hand rakes
- Tarpaulin
- Personal protective equipment
- Long handled nets
- Booms
- Approved mink traps with otter guards



Image: Volunteers removing Floating pennywort from a stretch of the River Wey.

Chemical control

This approach uses chemicals to eradicate or limit the growth of invasive species and can be target or non-target specific. In Great Britain, the only chemical that is currently licenced for use on or near water to treat invasive species is glyphosate. Chemical control can be useful for species such as Giant Hogweed and Japanese Knotweed.

This approach will often require multiple treatments and relies on the appropriate weather condition to ensure sufficient the target species receives sufficient exposure to the chemical.

For your club to use chemicals to treat invasive species, it is essential that someone has undertaken the relevant training courses. You can apply to send someone on training through the Angling Improvement Fund.

These courses may include:

PA1 – Handling and Application of Pesticides

PA6a – Safe application of pesticides using handheld equipment

PA6aw - Safe use of pesticides to or near water

PA6 INJ – Safe operation of handheld stem injection equipment

The PA1 course must be completed before the handheld application and safe use modules are undertaken.

Once you have completed your application, before any spraying can take place near water you will need to complete a AqHerb01 form to obtain a licence to use herbicides in or near water:

<https://www.gov.uk/government/publications/application-to-use-herbicides-in-or-near-water>

Equipment to undertake chemical control:

The equipment you will need will vary according to the invasive species you wish to control. A non-exhaustive list is outlined below:

- Personal protective equipment
- Knapsack sprayer
- Stem injector kit
- Hand held spraying units



Image: Club treating Giant hogweed through chemical application.

Biocontrol

Biocontrol or biological control involves the release of living organisms, such as insects or pathogens, to target specific invasive species. It involves years of extensive research to identify specialist natural enemies of the invasive species which can be released that will control the invasive species but will not impact our native species.

There are several species that have been released into Great Britain. At this stage, many of these are still undergoing monitoring to determine their success and therefore cannot be purchased by angling clubs.

However, there is the opportunity to purchase a weevil for use against the invasive plant, Water fern (Azolla filiculoides). These can be purchased online and will be delivered by post.

<https://www.azollacontrol.com/>

Costing for 2022

Standard weevil pack (sufficient to control approximately 10 square metres) £100 each (plus VAT)

Medium weevil pack (sufficient to control approximately 50 square metres) £270 each (plus VAT)

Large weevil pack (sufficient to control approximately 100 square metres) £395 each (plus VAT)

Plus £10 for postage and packaging.



Image: Weevil to control Water fern (credit CABI)

Measures to prevent invasive species being introduced

Although this might sound alarming there are some very effective simple steps that can be put in place to minimise the risk of invasive species being introduced. These suites of measures are collectively referred to as 'biosecurity' and should be imbedded in all practices that are being undertaken at a fishery.

A key measure that should be endorsed by every fishery and club is that members, visitors, and contractors follow [Check, Clean, Dry](#).

CHECK – nets, stink bags and clothing at the bank side for mud, aquatic animals or plant material. Remove anything you find and leave it at the site.

CLEAN – any angling equipment or clothing that has come into contact with water, paying particular attention to the rims of nets, tread of boots, unhooking mats and stink bags. Ideally where possible use hot water to clean your gear as 45 °C has been found to be highly effective at killing invasive species. If this is not available then use Virkon Aquatic disinfectant, and as a final option cold water under pressure. This should be done at the site where possible, or when you return home.

DRY – your angling equipment and clothing for at least 24 hours in sunlight. This is a crucial final step to kill any remaining invasive species that may remain on your kit but cannot be seen with the naked eye.

These three easy steps have been found to be 99% effective at killing invasive non-native species and diseases trapped within damp recreational gear. They will also help your fishery avoid unwanted fish diseases.

Our **biosecurity risk assessment** ([free to download on our AT INNS page](#)) provides more information on measures that can be incorporated into fishery management practices, and includes but is not limited to:

- Installation of Check, Clean, Dry signs at entry points
- Using native plant species for habitat improvements e.g., fish refuges, marginal vegetation
- Provision of keep nets to anglers
- Installation of wash down facilities

Before applying to install a wash down, every fishery should have Check, Clean, Dry signage in place at all their fisheries and have completed:

a) the biosecurity risk assessment template

b) modules 1 and 3a of the free e-learning on the [GB Non-native Species Secretariat website](#)

Wash down stations

By providing wash down stations on site, a fishery and club can ensure anglers can implement biosecurity when they visit/ leave the water, reducing the risk of invasive non-native species being introduced into, or spread from, the site. Biosecurity should be undertaken after every fishing trip.

Ideally this should be done before leaving a site, or immediately on return home. However, it is recognised this is not always possible. By having a wash down station available on site, this will provide an opportunity for anglers that have been unable to clean their kit to do so on arrival.

There are a number of different types of 'wash down station' available, and their suitability will depend on the space and utilities accessible at your site.

1. Hot water wash down stations

Hot water is the most effective approach to managing invasive non-native species. There are two opportunities to install hot water wash down facilities at fisheries. First is at sites that have access to a hot water tap. A hose with a high pressure nozzle can be used from the hot water tap and used by anglers to spray or immerse their equipment. A minimum temperature of at least 45 °C for 15 minutes is required to kill invasive species. Many hot taps within a home achieve this temperature minimum temperature threshold when they are running for a few minutes. It is therefore recommended that anglers immerse their angling gear and leave it for a few minutes whilst they are packing the remainder of their equipment away, or whilst they are setting up at their swim.

Where sites have access to electric source and clean water a second option is to provide a hot water pressure washer for anglers to use. A temperature of 60 °C should be used to account for cooling as the water leaves the hose nozzle before making contact with the contaminated equipment. Due to hot temperatures, extreme caution would be needed using hot water pressure washers. It is recommended that these would only be used following training provided to members for safe use. If training is not available it is recommended that a cold water pressure washer is used applying cleaning at high pressure.

2. Pressure washers

Cold pressure washers provide an effective method to remove mud, plant material and animals from angling nets, boots and stink bags. It does not kill the species (with the exception of some research found on plant fragments), but it removes the material from angling gear.

Pressure washers that run on battery or diesel are also available. This provides the option to set up wash down stations in areas that do not have an electric point but will require more frequent checks.



Image: Using a pressure washer to clean kit after removing Floating Pennywort from a water in the Colne Valley

3. Use of bowsers

At sites where no clean water is available, bowsers present an option to transport clean water onto site. These can be linked to a hose or a pressure washer to enable wash down facilities to be provided on site. Depending on the volume of anglers visiting the site, the bower will require refilling at varying frequencies. Thus, this option may be suitable to provide temporary wash down facilities for high-risk events such as competitions or undertaking invasive species management. Using a bower alongside a battery powered pressure washer provides the flexibility to set up a wash down station in different locations.

4. Disinfectant

Virkon Aquatic solution and other disinfectants have been put in place at fisheries to reduce the risk of introducing fish diseases. Disinfectants, if frequently changed and made to the correct concentrations, can also be highly effective at tackling invasive species. Concentrations should be made to at least 1% concentrations and replaced at least every 3-5 days based on frequency of use or as per the manufacturers guidelines. Disinfectant should be left in a container with a lid to prevent dilution by rainwater.

Where disinfectant is used, care must be given to the correct disposal of the contaminated material as per the manufacturers guidelines. This should be undertaken at least 100m away from a waterbody and should not be placed down a storm water drain. Ideally it should be drained over hard standing gravel, or over vegetation. Ideally the disinfectant should be left to degrade for as long as possible before disposal. Where possible, two rotating containers should be used. This will allow for one to be active and used by anglers whilst the other container containing the older solution is allowed to continue to degrade. This older solution can then be disposed of prior to rotation. Using this rotation approach will give the solution 6-10 days to deteriorate each time, rather than 3-5 days if a single container is used. further.

Which biosecurity facility is the most suitable for my site?

The type of facility that could be installed at a fishery will depend on several factors, but critically depends on whether there is access to clean water and/ or electric. Based on this, there are different options available to a club or fishery from a full wash station which includes a soakaway, through to a dip tank or boot wash.

Types of facilities:

- Pressure washer (hot/cold)
- Hose with an adapted pressure nozzle (hot/cold)
- Boot brushes
- Disinfectant dip tanks

See the appendix for images of potential wash down stations.

Factors that need to be considered during the development of a biosecurity wash down station.

1. Location for the wash down

Consider the most suitable location to host a wash down station so that it will be used by anglers coming to the fishery. This should be:

- placed in the car park, on an entry point to the water, or at a suitable alternative point such as the hut or near toilets. In order for anglers to use this upon entry or exit of the site it needs to be in an easily accessible location.
- a suitable distance away from any waters (including the fishery/club water but also any other nearby waterbodies such as ditches or streams) to ensure any invasive species material and 'contaminated' water does not pose a risk of being washed off into a nearby waterbody.
- Large enough to host a wash down facility – consider the size of the equipment that will be used to provide an area large enough for anglers to enter and move around freely with their kit.

2. Access to utilities

To determine what facilities you can install on site, consider what utilities you have available that you can use to develop an effective wash down facility, and where these are located in relation to your site and where you would like to place your wash down facility.

a) Access to clean water

Is there a tap present on site or another sufficient clean water source which you can use to provide clean water to use for the wash down station? Is the access to both hot water and cold water or is only one available?

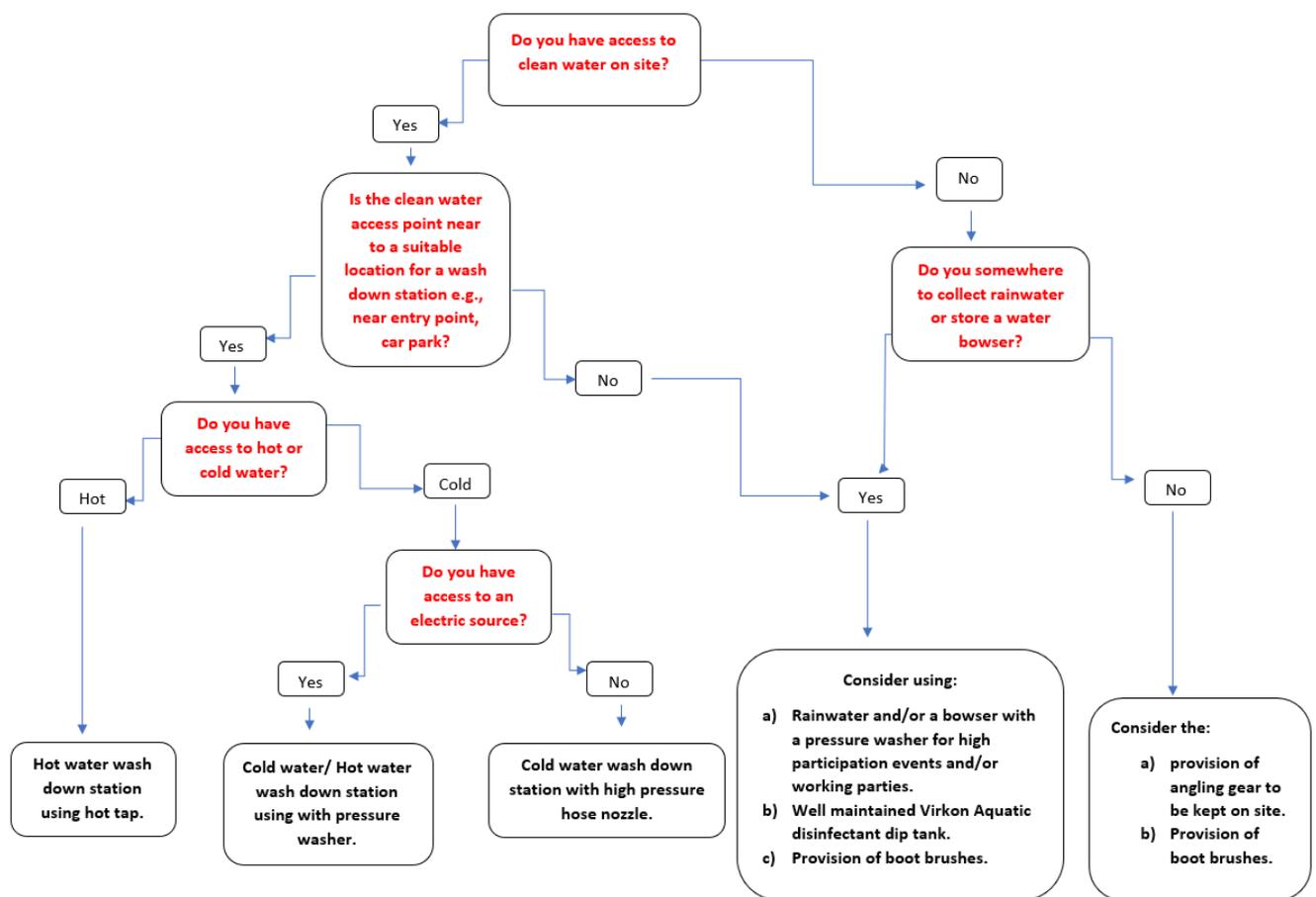
If this is not available, do you have the storage available to collect rainwater to use as part of a wash down station, or keep a potable water bowser? If there is space for these, this might present options to allow you to provide wash down stations for high participation events.

Alongside this, you could look into providing angling equipment such as keep nets which will remain on site to reduce the number of items that are being brought onto the fishery.

b) Electric

Is there access to an electric point on site to provide the opportunity to power a pressure washer? Where electric points are not available, the provision of a high pressure nozzle provides an alternative way to provide water under pressure for use on site.

The flow chart below will help to identify which facility is most suitable for a site.



The fishery will also separately need to consider the disposal of contaminated material and whether it is possible to install a soakaway.

3. Containment of material and ‘contaminated’ water

An important factor that needs to be considered in the development of a wash down station is how to collect and contain any mud and plant material that is washed off from angling equipment alongside the potentially large volume of ‘contaminated’ water. This water cannot be allowed to flow directly back into the water system as this would allow the introduction of invasive non-native

species and diseases into the water. For similar reasons, the water cannot be directed to outdoor drains.

There are several areas that need to be considered in the development of a bio-secure wash down area.

a) Free standing or walk-in wash down station

Depending on your fishery and the equipment being used by your members a basin structure or a 'walk-in station' might be more appropriate. Where a basin is being used, it is important to consider the depth and width of the structure to ensure it is large enough for equipment to be placed and moved for easy cleaning. Similarly, where a 'walk-in station' is used the size and height of the station walls need to be considered. This is discussed further in section 3c.

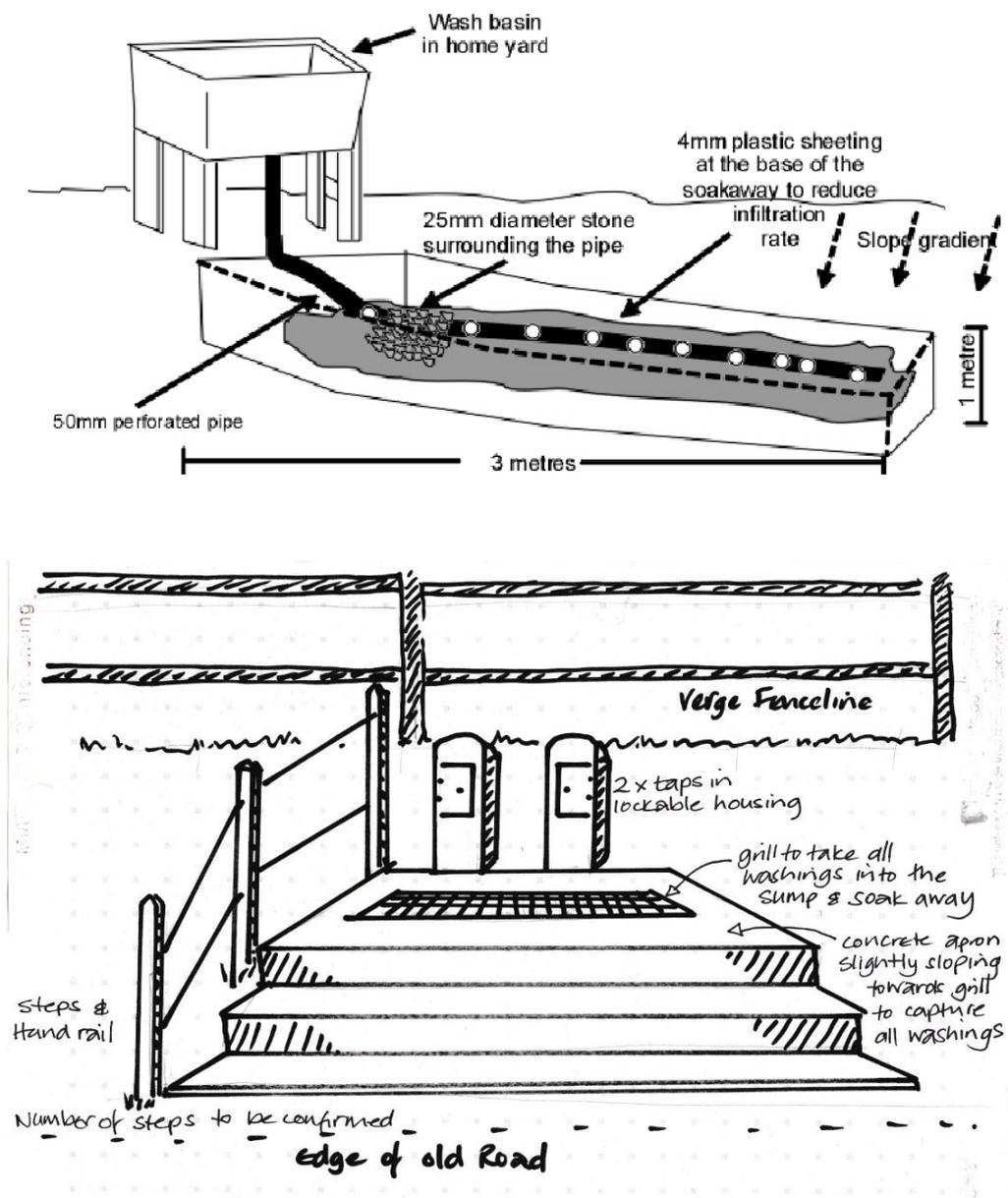


Image: Top: Potential design for a soakaway with a wash basin (Credit: Armitage et al. 2009)

Bottom: Potential design for a soakaway with drainage in the floor (Credit: Essex and Suffolk Water Company)

b) Base of the drainage area

A variety of different surfaces are available that can be used for the base of the wash down station.

- A non-slip surface should be chosen, such as concrete with rake groves added towards the drainage point, or a drain structure which covers the wash down area.
- Where concrete or an impermeable substrate is used, this should be sloped towards the drainage point to prevent stagnant water or collection of material on the surface
- It is not recommended that this is permanently undertaken on grass as this will become muddy following frequent use. Gravel may present a suitable option, but it should be noted that the gravel material will become contaminated.



Image: Example of concrete with rake markings sloping towards the drainage point.



Image: Example of large gratings that can be used for the base of the wash down facility. This allows free movement of the water and material to a contained area below. These gratings should be fixed so they can be lifted and cleaned.

c) Barrier at the boundary of the wash down area to contain water and spray.

This could be a small lip and/ or low wall (waist height) at the edge to contain spray. If you do have a lip, this may need to be sprayed in hazard colours to minimise a trip hazard. The lip or low wall does not need to be on all sides of the wash down area, but should be present on the downslope area, and on areas closest to a waterbody. Having a low wall will allow the angler to move freely within the wash down with their equipment.



d) Drainage

Drainage is one of the most critical elements to consider for your wash down area. The 'contaminated' water cannot enter into surface drains as this presents a risk of untreated water entering waters through storm overflows, spreading invasive non-native species into river systems.

Water needs to soakaway on site. Where permanent structures are being considered a soakaway should be installed to allow invasive species material to be collected, and the water to drain away through groundwater.

Considerations for a soakaway

- The depth of the water table. Dig exploratory pit if required to ensure the water table is well below the intended site for the soakaway.
- The soil type - Soakaways rarely work when dug out in heavy clays as clay soils do not allow water to pass through, instead water collects like a pond. In these places, it may be better to explore other options which use lower volumes of water.
- Distance from buildings. If you are considering installing a soakaway it should be 5m away from any buildings
- Calculate the required storage volume
- Consider space requirements
- Ability to access the drain for maintenance and removal of material
- The soakaway is sunk lower than the area being drained so that the drains slope towards the soakaway.

Specifications for the soakaway:

- Pipe flowing into soakaways should be at least 75mm diameter which is the minimum pipe size for any surface water drainage. **100mm recommended size.**
- Soakaway pipe should be laid to a fall of 1 in 40. i.e., for every 4m of pipework the trench should slope down by 100mm. Keep the run as short and straight as possible
- The soakaway should be a minimum of 1m x 1m x 1m with at least a 1m depth below the bottom of the incoming pipe.
- The size of the soakaway will depend on **how much water the soakaway will be processing** and the **percolation rate** of the surrounding soil i.e., how quickly the water will soak into the soil around the soakaway.
- The hardcore (stone infill) should completely surround the pipe and **finish approximately 100mm above it.**
- Where you are using soakaway crates these should be covered with a tough but porous material such as a geotextile membrane. This will allow water to pass into the crate but will prevent the crate being filled with soil and sediment.
- The floor layer for the wash down station can then be placed on top of this. This should include a drain to capture the contaminated water from the drainage pipe.
- Critically, the soakaway should not come into contact with the water table and have sufficient drainage capacity.

Types of soakaway

Basic soakaway:

- Dig a large hole, line with heavy duty landscaping fabric to keep the earth from over time clogging up the gravel.

- Dig the trenches that are discharging into the soakaway ensuring adequate fall along the entire length.
- Connect the trenches to flow into the hole. Tidy up the soak away and trenches by removing any loose soil that has fallen in.

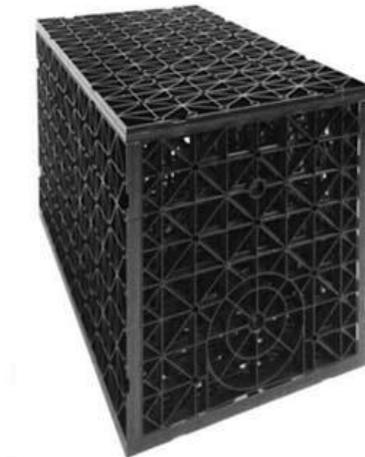
Soakaway crates:

There are quite a few soakaway crate options on the market, sometimes referred to as Aquablocks, water blocks or soakaway drainage crates.

These products effectively take the place of the rubble infill in the soakaway pit. They look very similar to large milk crates but with a bit more constructive stability and are purchased in a flat pack form that clip together to form a box shape.

Different colours sometimes signify where they can be used but this can vary according to the manufacturer. Green soakaway crates can be used in non-traffic areas (as they are not built to take the weight of a vehicle) and are most likely to be relevant for biosecurity wash down stations. Blue crates can be used in areas such as under driveways as they can take the weight of a vehicle.

Crates can save time and effort as you will not then have to transport the rubble from source to your soakaway pit. They are also a benefit in ensuring you get the correct permeability for the soakaway. However, they can be quite expensive compared to the cost of using traditional methods, especially if you already have the required materials available.



The size of the soakaway

This will depend substantially only on the volume of anglers that are coming to the site. Getting the size of the drainage area correct to be able to handle the volume of water is important.

A worked example is provided in the box below to demonstrate how to calculate the volume of the soakaway. However, **it is strongly recommended that expert advice in sort to assist in the design of a soakaway** as every fishery is different and therefore parameters for the soakaway are likely to differ.

Example of calculating the size of the soakaway

This formula below has been used to develop soakaways for building structures and is a guideline to calculate the volume of the soakaway and should be suitable for most situations.

- $C = (AxR)/3$

Where C is the capacity or volume of the soakaway in m³

A is the area of drainage area in m²

R is the volume of water used by an angler in m/h (metres / hour).

e.g. example for calculating soakaway size

For a pressure washer 2000mm per hour of water could be used which equates to 2.00m/h. Using this formula we can quickly calculate the size of the soakaway that needs to be installed. Say we have a wash down basin area of 4 m² and we use the water used by an angler of 2.0 m/h the calculation is as follows:

- $C = (4 \times 2.0) / 3$
- $C = (8) / 3$
- $C = 2.67 \text{ m}^3$

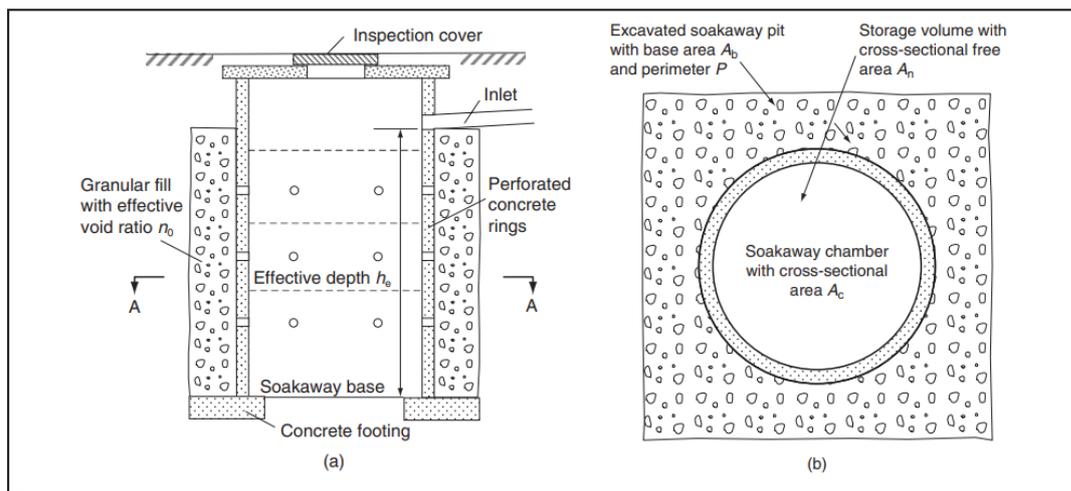


Image: A potential design of a soakaway with pipe inflow and inspection cover for maintenance (Credit: Chen and Stevenson, 2008)

Appendices

Pressure washers

There are a variety of different pressure washers available, including cold and hot pressure washers and those which are powered by electric, battery or diesel.



Hose adaptors

Where you have access to clean water, an alternative to a pressure washer is purchasing an alternative nozzle for a hose. There are a variety of hose guns available for purchase. Where a hose nozzle is being considered it is important to ensure that a spray head is purchased that will provide sufficient power to remove material from nets and boots. It is also advised to purchase a hose with a trigger handle to give the user the ease of turning the water on and off when they are moving between pieces of equipment.



Boot cleaners

a) At sites with access to clean water

Where there is access to clean water, a boot cleaning station could be set up as part of the wash down station to assist anglers cleaning the treads of their boots and removing mud and other aquatic material. This could include:

- the provision of a brush
- attaching a brush head to the end of the hose as used at building site locations (see figure below). This could be linked to a hose or alternatively linked up to a bowser.

b) Without access to clean water

A boot brush could be placed underneath signs at access points. These can be provided for use by angler and then cleaned and/or replaced by the fishery owner or designated club member.



Image: Left – Boot wash station at Nottingham Piscatorial, Right – Sign with boot scrubber (Credit North West Wildlife Trust)

Dip tanks

Disinfectant can also be used to clean angling equipment and boots. Facilities should be stored at the entrance to a fishery in secure containers. These containers should have a lid to prevent dilution of the disinfectant from rainfall and be large enough to allow full immersion of nets. The solution will need to be checked regularly and changed every 3-5 days.



Image credit – Above: South West Water, Right: Weston Pools