

## Constructing a Reed Bed

Reed beds, also known as constructed wetlands, are useful for removing nutrients from nursery runoff before recycling, reuse or release. This article explains some of the considerations that need to be taken into account when constructing a nursery reed bed.

Before beginning construction, a land survey should be conducted, and if necessary, a suitably qualified engineer engaged to prepare site plans and design specifications for a Council Development Application. If a holding dam is required, the soil texture needs to be determined to ensure the dam will hold water. If not, a dam liner or importing suitable clay material to line the dam may need to be factored into the design calculations.



**A constructed wetland/ reed bed**

The water that feeds the reed bed will come from irrigation runoff and rainfall. The reed bed needs to be designed to enable normal nursery runoff to be

treated by the reed bed, but any excessive flows from high rainfall events must be allowed to bypass the reed bed to prevent scouring and damage to the gravel bed. This is achieved by installing a high flow diverter that bypasses the reed bed, and carries the runoff water to a storage dam. Sediment traps should be installed prior to the high flow diverter to remove any extraneous material, particularly organic matter, which could cause the reed bed gravel to block prematurely.

Reed beds are very efficient at removing phosphorous from water, regardless of the time taken for the water to pass through the system. However, the longer the water takes to pass through the reed bed (Hydraulic Residence Time or HRT) the more effectively nitrates are removed. Depending on the amount of nitrate to be removed from the runoff water, the HRT will usually range between 2 and 4 days.

The amount of runoff to be treated must be measured to allow calculations of the desired HRT, reed bed volume and surface area, which are all critical factors contributing to the effectiveness of the reed bed.

There are a range of materials (substrates) that can be used within the reed bed to support the plants. 5 or 10mm blue metal is one material that has been recommended in Australia. The selection of the type and grade of the substrate is dependant on the availability of local materials, and the porosity required to give the desired HRT. The size, shape and porosity of the substrate also determines the length to width ratio of the reed bed to give the desired HRT.

The distribution of water from the inlet has to be designed to provide an even flow across the reed bed to prevent short-circuiting of the flow, as this will reduce the performance of the system by reducing the HRT.

A depth of 50cm of water is recommended to be maintained within the reed bed and this is achieved by having an adjustable outlet riser on the reed bed.

More information on building and maintaining reed beds can be obtained from the Nursery Paper "Reed Beds Clean Up Nursery Runoff Water", issue number 2003/05, "Designing a Nursery Reed Bed" issue number 2003/07, and the Wetland Calculator within the NGIA Water Toolbox, available from the NGIA website. This website also has many other calculators used in water management that are free to download.

Designing a reed bed is a complex procedure and information should be sought from as many sources as possible to ensure an effective system is installed.

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