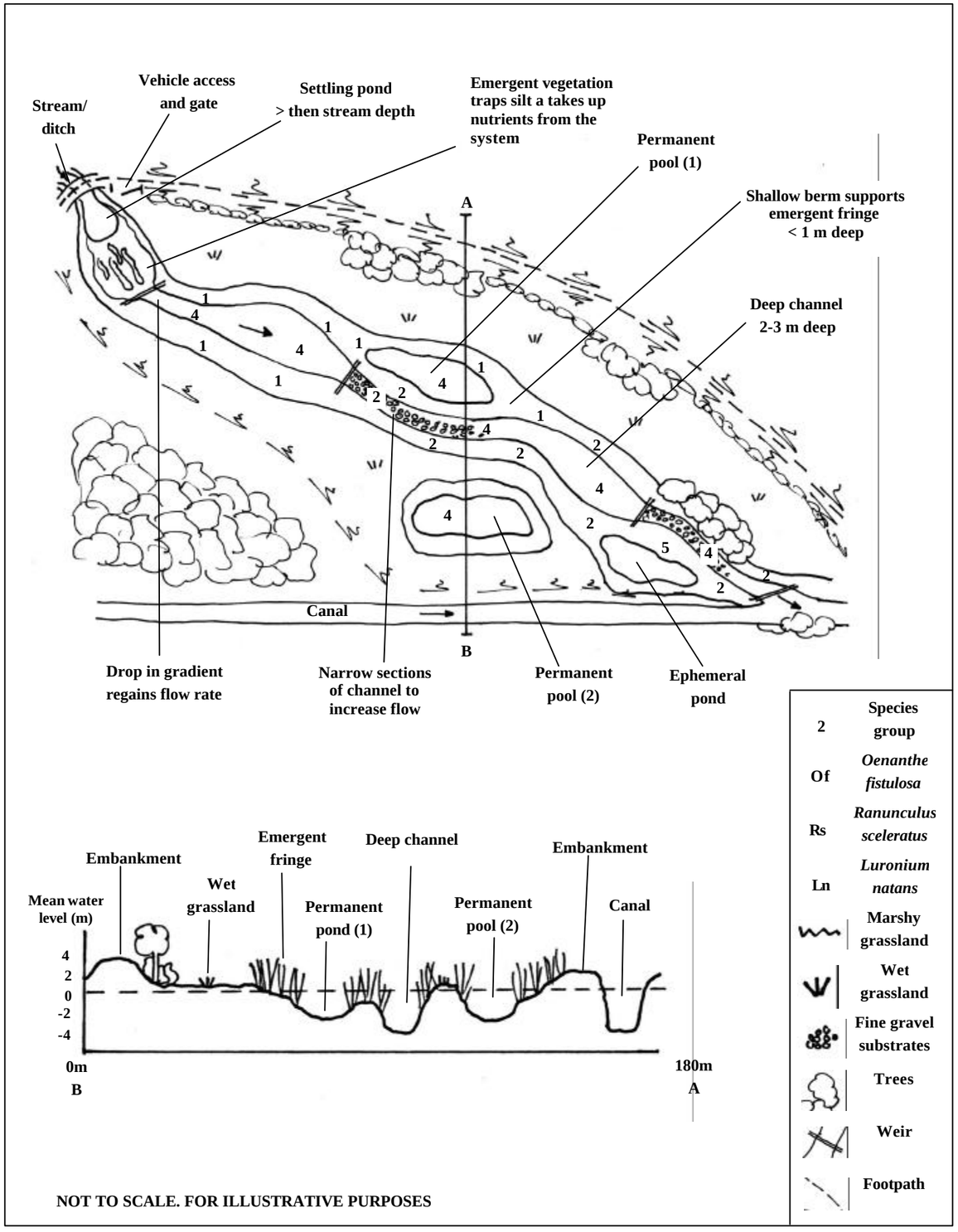


## Figure 5 – Concept Design 5

| Design considerations | |
|---|---|
| Optimum size | Wider stretches of the deep channel can reach 20m if water quality is good. The emergent fringe in the first pond should satisfy this requirement. The narrower sections would be 10-12m to accelerate flow again. The pools are fairly small and elongated to discourage wildfowl, particularly geese, although coots and mallards, for example, will graze any pond irrespective of size. The emergent fringe should be a minimum of 5m wide. A buffer of c.20m from channel edge should be left to minimise risk of pollution from run-off. For lower, slower flows the channel would need to be narrower and/or have steeper banks to obtain adequate flows and weirs adjusted to control water level. |
| Profile and shape | The shape is long and linear to maintain flows and discourage wildfowl. This design aims to maximise flows with a relatively straight channel and by keeping some sections deep and narrow to accelerate flows following broader, slower flowing sections. This may be preferable if the gradient across the site is only just adequate to maintain flows i.e. 1 lock depth in 250m of canal. From the settling pond the bed level first rises and then drops over a shallow gradient to the first weir. This increases retention times to maximise nutrient uptake by emergent plants. The first weir is relatively high, which also slows flows through this first pond. The other 3 weirs downstream are set lower so flows are faster i.e. moderate to slow and are there as a precaution against flows dropping below critical levels for the target species. Moderate flows will occur immediately downstream of the weirs. The confluence of the canal with the new channel would be at an acute angle to minimise erosion through scouring. Ponds and ephemeral pools are included in the design to provide hyrologically isolated and linked habitats to support a metapopulation of the target species. The bed of scrapes should undulate with gradients of 1 in 20 to 1 in 100 with winter water depths of >0.3m to prevent freezing. Ponds should reach at least 1.5m in depth to prevent vegetation encroaching with edge gradients of c1 in 3-15. The channel would have shallow shelves and drops in gradient of l in 3 to deeper areas and gently sloping banks with a range of gradients from 1 in 20 to 1in 3. |
| Flow | Flow could be taken by re-directing a stream or from drainage ditches off agricultural land running in close proximity to the canal. Permission would need to be sought from the Environment Agency to alter a water course under their jurisdiction. A site with an adequate gradient (a minimum of approx. one lock depth over 250m) is preferable to ensure adequate flow. The meanders wave length is long and with low sinuosity to keep resistance to flow low. The main, deep channel would have a width of 8-15m at 2-3m depth to maintain moderate to slow flows, where as flows would be slow to very slow through the emergent vegetation. |
| Other habitat creation | Trees and scrub, an important habitat for invertebrates and birds, are located away from the emergent fringe and open water to minimise shading, except along one bank near the outflow to the canal to provide appropriate conditions for *Potamogeton praelongus* and *P.compressus*. The trees are located at the downstream end of the site to prevent a build of the organic matter through the site. Wet grassland fringes the broad emergent and marginal vegetation and has value for its plant assemblage and invertebrates. |
| Water chemistry | As water flows through the system water quality would improve as nutrients are taken up by emergent vegetation. The emergent vegetation buffers the channels from any pollutant that may run-off adjacent land. Ideally, surrounding farm land would be in CSS to minimise risk of agricultural pollution. The location of the species groups 2 and 5 depends on the pH of the canal water entering the system and the substrates. This design assumes that the pH of the canal water entering the system is basic and eutrophic and the soils are clays. In this case, the pH will decrease and water quality move towards mesotrophic through the system, as silts are deposited and water and nutrients removed by uptake by emergent vegetation. As these are the conditions preferred by Groups 2 and 5 they are locate nearer the outflow. If the catchment soils are peaty and canal water neutral to acidic the first pool (settling pool) would be lined with marl to increase pH and the exact location of Groups 2 and 5 would be more difficult to predict but are likely to tend towards the outflow as the soils become more acidic again as they flow through the peaty channel. |

| Political considerations | |
|---|---|
| Minimise excavations | Sites selection should aim for those with natural depressions and incorporate streams or farm drainage ditches where available. Excavations must be to the required depth for each of the target species to ensure sufficient water depths during summer low water levels |
| Minimise transport of spoil | Spoil could be used to construct the embankments. The width of the embankment could be proportional to the amount of spoil. Some spoil could be spread over any adjacent arable land and outside the floodplain. |
| Access for management | Access is created over the stream/drainage ditch by a bridge and into the wet grassland over the embankment. The embankment would have a gentle gradient along a short stretch to allow cattle to access the site for grazing management. The width and gradient of the access would be suitable for vehicles should dredging be required. |
| Habitat of 10-30m wide | Channel width would range from 10-25m wide if the site has adequate gradient to maintain moderate to slow flows. The edge habitat extends this to a maximum of 15m. For sites with a shallower gradient it would not be possible to maintain flow with these widths at shallow depths. Selection of sites with adequate gradient is essential to meet this specification. |
| Access by footpaths | Access to the site could cause disturbance, which is undesirable for the target species. To minimised disturbance the path runs along the embankment, away from sensitive areas. The embankment could be scrubbed or fenced To prevent access to the site. Ditches could also be used to restrict access. |
| Minimise management intervention | Some banks are steep to prevent encroaching marginal vegetation and build up of organic matter, which would also reduce the frequency of dredging. By trapping sediments in the settling pool, only this pool is likely to require dredging long-term. Weirs and embankments allow water levels to be held up to levels intolerant to terrestrial species, such as trees and scrub, which will reduce other management, such as grazing or cutting, required to attenuate succession. |