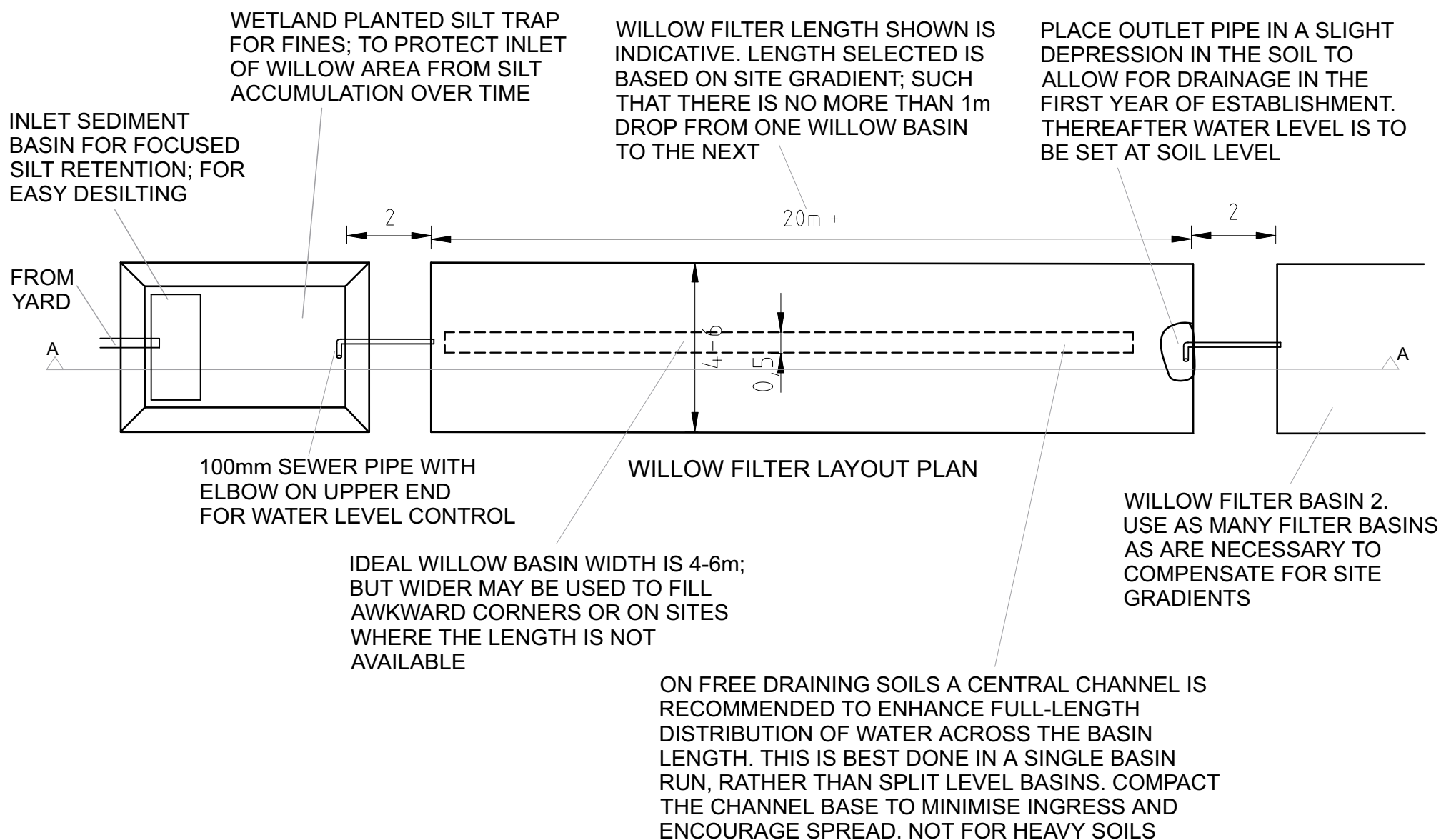
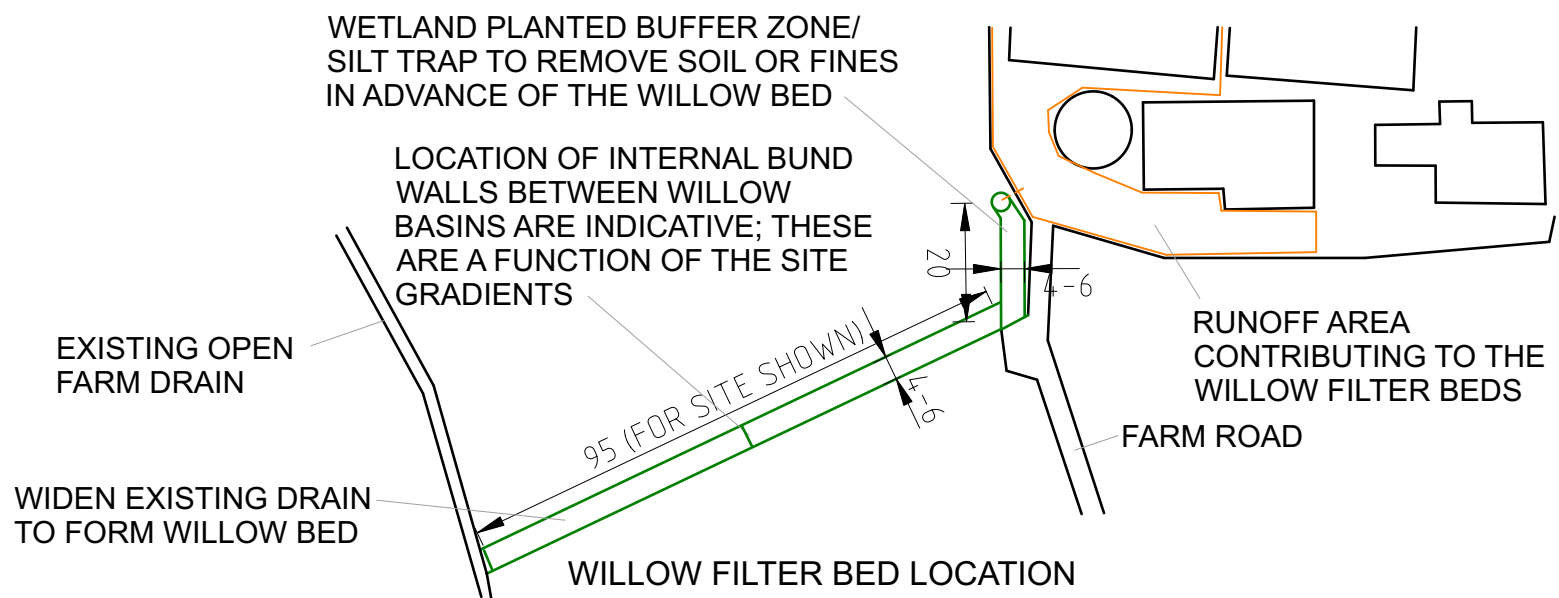


Farmscale Willow Filter Bed for Clean Yard Runoff, Roof Surfaces and Farm Roads for use with Variable Soil Infiltration Rates

Use in conjunction with:
<https://farmingforwater.ie/app/uploads/2025/01/Measures-Booklet-Single-sheet.pdf>



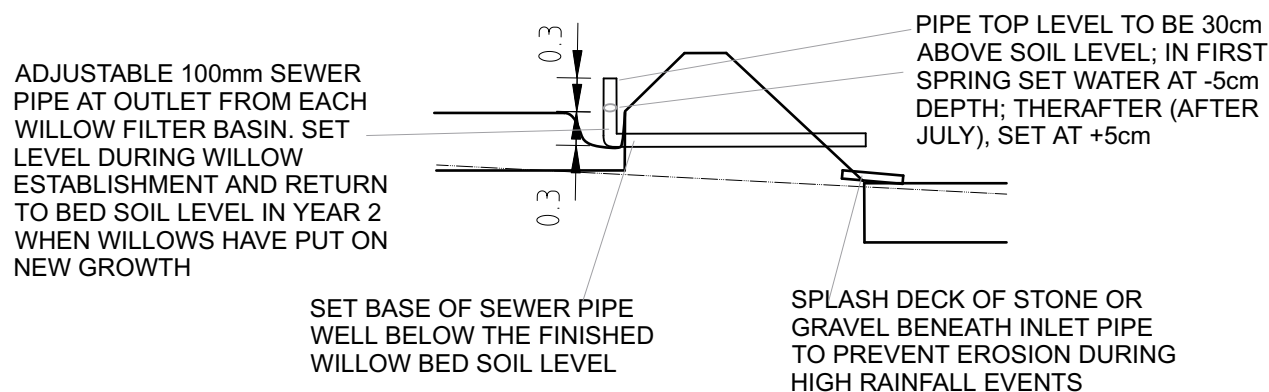
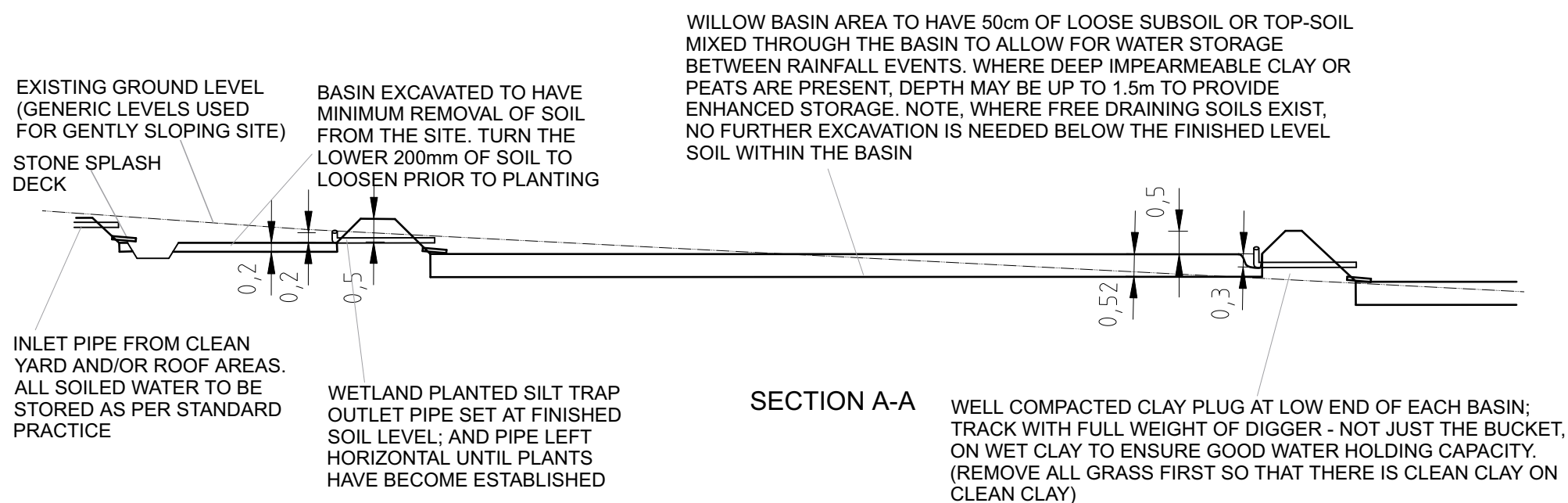
Farm Scale Willow Bed Layout
and Construction Detail - 1 of 3



FH Wetland Systems Ltd.

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Drawing dated 17Nov25



WILLOW BED OUTLET DETAIL

CONSTRUCTION NOTES FOR WILLOW FILTER BASINS

1. REMOVE TOPSOIL SCRAW (PLANTS AND ROOTS) AND SET TO ONE SIDE FOR REUSE IN THE BASE OF THE WILLOW FILTER. REMOVED REMAINING TOPSOIL AND SET TO ONE SIDE FOR REUSE IN THE BASIN.
2. MOULD THE SUBSOIL TO THE REQUIRED LAYOUT. ALLOW FOR A MAXIMUM DROP OF 1m BETWEEN BASINS; AND USE INTERNAL BUND WALLS TO DIVIDE THE AREA AVAILABLE INTO SEPARATE BASINS WHERE GRADIENTS REQUIRE IT.
3. TRACK BACK AND FORTH OVER MOIST CLAY FOR ALL MADE GROUND. THIS IS MORE EFFECTIVE THAN SIMPLY COMPACTING WITH THE BUCKET OF THE DIGGER. IT IS IMPORTANT THAT ALL WATER REMAINS IN THE WILLOW BASIN UNTIL IT REACHES THE FINAL OUTLET POINT AND DOES NOT SPILL OUT OVER THE FIELD OR OTHER AREA.
4. DIG OUT THE WILLOW FILTER BASIN TO A DEPTH OF 1m.
5. REPLACE TOP SCRAW (UPPER AREA OF TOPSOIL) INTO THE BASE OF THE WILLOW FILTER. REPLACE LOOSE SUBSOIL OVER THIS. FINALLY REPLACE THE WEED-FREE TOPSOIL ACROSS THE UPPER LEVEL OF THE WILLOW BASIN.
6. SEED PERIMETER EMBANKMENTS WITH GRASS/CLOVER MIX OR A NATIVE IRISH WILDFLOWER MIX TO MINIMISE RAINFALL EROSION OF THE BANKS.
7. LET OUTLET PIPES HORIZONTAL TO ALLOW FREE FLOW OF WATER THROUGH THE BASINS. THIS MAY BE RAISED ONLY AFTER THE WILLOWS HAVE BECOME WELL ESTABLISHED - EITHER IN APRIL OF YEAR 2, OR EARLIER IF NEEDED TO HOLD A BIT MORE MOISTURE DURING A DRY SUMMER IN YEAR 1.
8. KEEP THE WILLOWS WEED-FREE IN YEARS 1 AND 2. THERAFTER THE WILLOW GROWTH WILL KEEP WEEDS DOWN. DO NOT USE HERBICIDES, WHICH CAN BE READILY ABSORBED BY THE WILLOW STEMS EVEN IN WINTER, KILLING YOUR WILLOWS.
9. FOLLOW PLANTING AND COPPICING NOTES ON THE PLANTING LAYOUT DRAWING.

Farm Scale Willow Bed Section
Details - 2 of 3



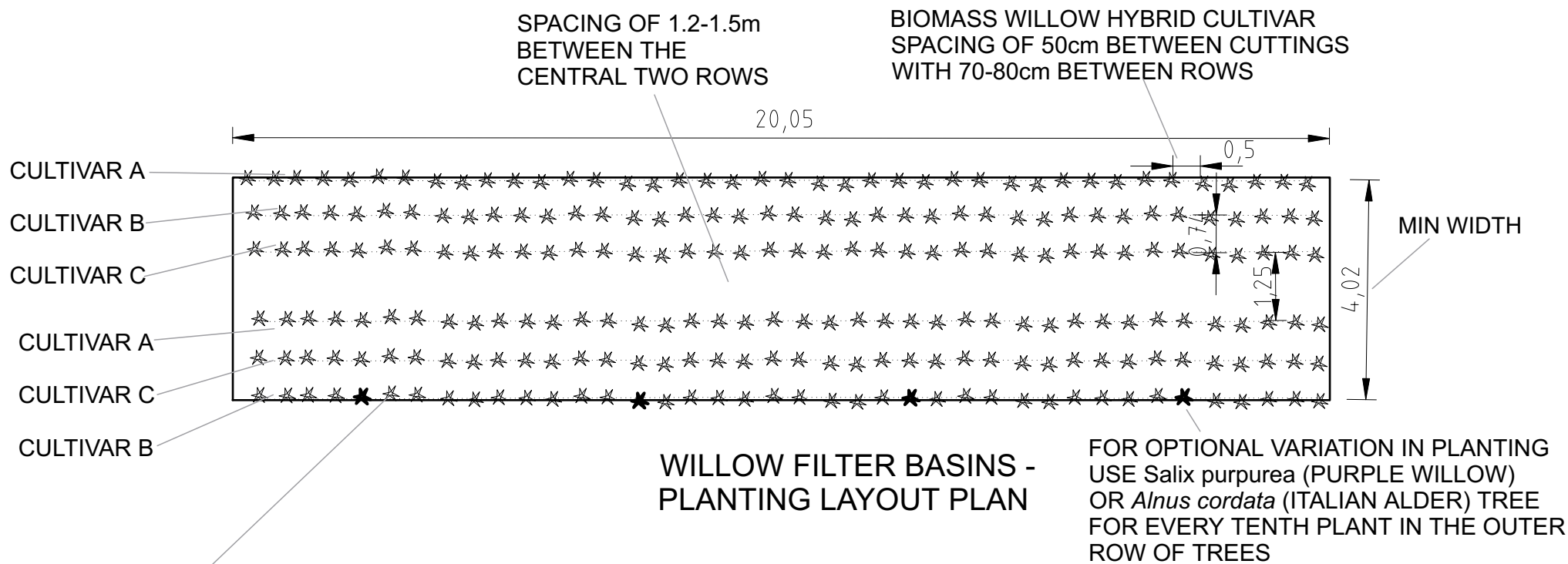
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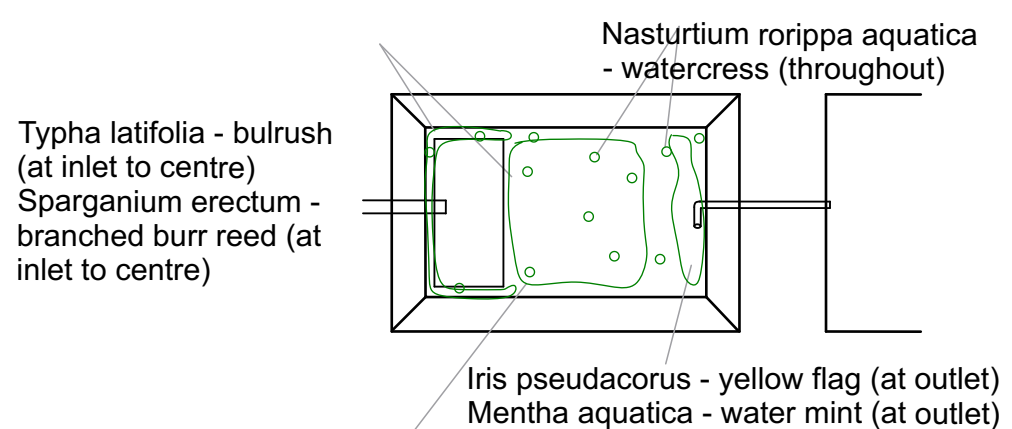
PLANT THE SIX ROWS OF WILLOW CUTTINGS BETWEEN FEBRUARY AND JUNE WITH AT LEAST 3 DIFFERENT CULTIVAR TYPES. SUITABLE CULTIVAR VARIETIES OF *Salix viminalis* MAY INCLUDE JORA, TORR BJORN, SVEN, INGER, TORHILD, TORDIS OR OTHER NAMED BIOMASS HYRIDS. DO NOT USE NATIVE WILLOWS OR BASKET WILLOWS SINCE THE GROWTH AND EVAPOTRANSPIRATION RATES WILL BE LESS EFFECTIVE THAN THE CULTIVATED VARIETIES

PLANTING NOTES FOR WETLAND PLANTED SILT TRAP

1. PLANTING SHOULD BE CARRIED OUT IN THE SPRING, PRIOR TO OR APPROACHING THE GROWING SEASON; AND USUAL PLANT CARE ADHERED TO.
2. THE WETLAND AREA(S) SHOULD BE PLANTED WITH LARGE GROUPS OF SINGLE SPECIES OF TALL EMERGENT SPECIES TO PREVENT THE DOMINANT SPECIES COVERING THE WHOLE AREA. PLANT SPECIES LISTED ARE INDICATIVE AND MAY BE AMENDED WITHIN CERTAIN LIMITS.
3. THE MAIN TALL PLANTS SHOULD BE PLANTED AT c.0.7m SPACING IN BASIN 1, AND MAY BE MORE SPARSE THEREAFTER IF SUBSEQUENT BASINS ARE TO BE USED. SEEDING MAY ALSO BE USED, BUT WILL TAKE LONGER TO BECOME ESTABLISHED.
4. GROUND COVER SHOULD BE ESTABLISHED AS SOON AS POSSIBLE AFTER TOP-SOIL REPLACEMENT ON BANKS. USE GRASS/CLOVER MIX OR NATIVE IRISH WILDFLOWER SEED SUCH AS FROM WILDFLOWERS.IE .
5. ENSURE THAT TREES (OTHER THAN WILLOWS IN THE WILLOW FILTER OR SMALLER HEDGEROW TREES) ARE NOT LESS THAN 4m FROM THE SILT TRAP TO PROTECT THE INTEGRITY OF THE CLAY LINED BASE. WEED OUT TREE SEEDLINGS IF FOUND.
6. WATER SHOULD BE KEPT JUST BELOW MARSH SOIL LEVEL UNTIL PLANTS ARE FIRMLY ROOTED AND GROWING WELL, TO PREVENT THEM FLOATING AWAY. A FEW WEEKS OF GROWING SEASON GROWTH SHOULD BE SUFFICIENT FOR ROOTED PLANTS. LONGER WILL BE NEEDED FOR SEEDED AREAS.
7. THE WATER LEVELS SHOULD BE SUFFICIENT TO KEEP THE MARSH SOIL MOIST. IF THE SYSTEM IS SHOWING SIGNS OF DRYING OUT, WATER WELL, WITH THE OUTLET FLOW CONTROL PIPE RAISED UP TO ENOUGH HOLD WATER AT BASE LEVEL.
8. FOR THE FIRST FULL YEAR, KEEP WATER LEVEL AT ≤10cm DEPTH. IN MAY OF YEAR 2, LEVELS MAY BE RAISED TO 20cm OPERATING DEPTH.

WILLOW BED PLANTING NOTES

- LOWER ANY HEDGE LINES WITHIN 5m OF THE WILLOW FILTER TO MAXIMISE THE EXPOSURE TO LIGHT AND WIND TO MAXIMISE EVAPOTRANSPIRATION AND EFFLUENT UPTAKE. KEEP MAINTAINED ON AN ONGOING BASIS.
- WILLOW TREES ARE TO BE COPPICED ON A 3-YR ROTATION BASIS AS SET OUT BELOW:
- 1st FEBRUARY AFTER PLANTING: CUT BACK ALL TREES TO 150mm ABOVE BED LEVEL TO ENCOURAGE STEM DEVELOPMENT.
- 2nd FEBRUARY AFTER PLANTING: LEAVE ALL WILLOWS UNCUT.
- 3rd FEBRUARY AFTER PLANTING: CUT BACK ALL THREE ROWS ON ONE SIDE OF THE FILTER AREA TO 100mm ABOVE THE PREVIOUS CUT.
- 4th FEBRUARY AFTER PLANTING: CUT BACK ALL THREE ROWS ON THE OTHER SIDE OF THE FILTER AREA TO 100mm ABOVE THE PREVIOUS CUT.
- 5th FEBRUARY AFTER PLANTING: LEAVE ALL WILLOWS UNCUT.
- 6th FEBRUARY AFTER PLANTING: REPEAT CYCLE FROM 3rd YEAR.
- COPPICING MAY BE CARRIED OUT WITH A LOPPERS OR BRUSH CUTTER OR TRACTOR MOUNTED HEDGE CUTTER. REMOVE CUT TREES FROM THE AREA AND STORE AWAY FROM DRAINS TO PREVENT RE-ENTRY OF NUTRIENTS INTO WATERCOURSES. TIMBER MAY BE CHIPPED OR LOGGED FOR FUEL, USED AS A WILDLIFE HABITAT LOG-PILE, OR FOR LANDSCAPING.
- NOTE THAT IF FIREWOOD IS DESIRED, LEAVE CUTTINGS TO GROW FOR 5 YEARS RATHER THAN 3, AND ALLOW CUT LENGTHS TO DRY FOR 2 YEARS PRIOR TO LOGGING FOR FIREWOOD.



Willow Bed and Wetland Silt Trap Planting Details - 3 of 3

Essentially any tall, flat-leaved, emergent wetland plants are typically suitable for use in wetland planted silt traps or buffer zones. If these are present on the farm, harvest by hand and use in preference to buying in stock. Plants available from FH Wetland Systems if needed.

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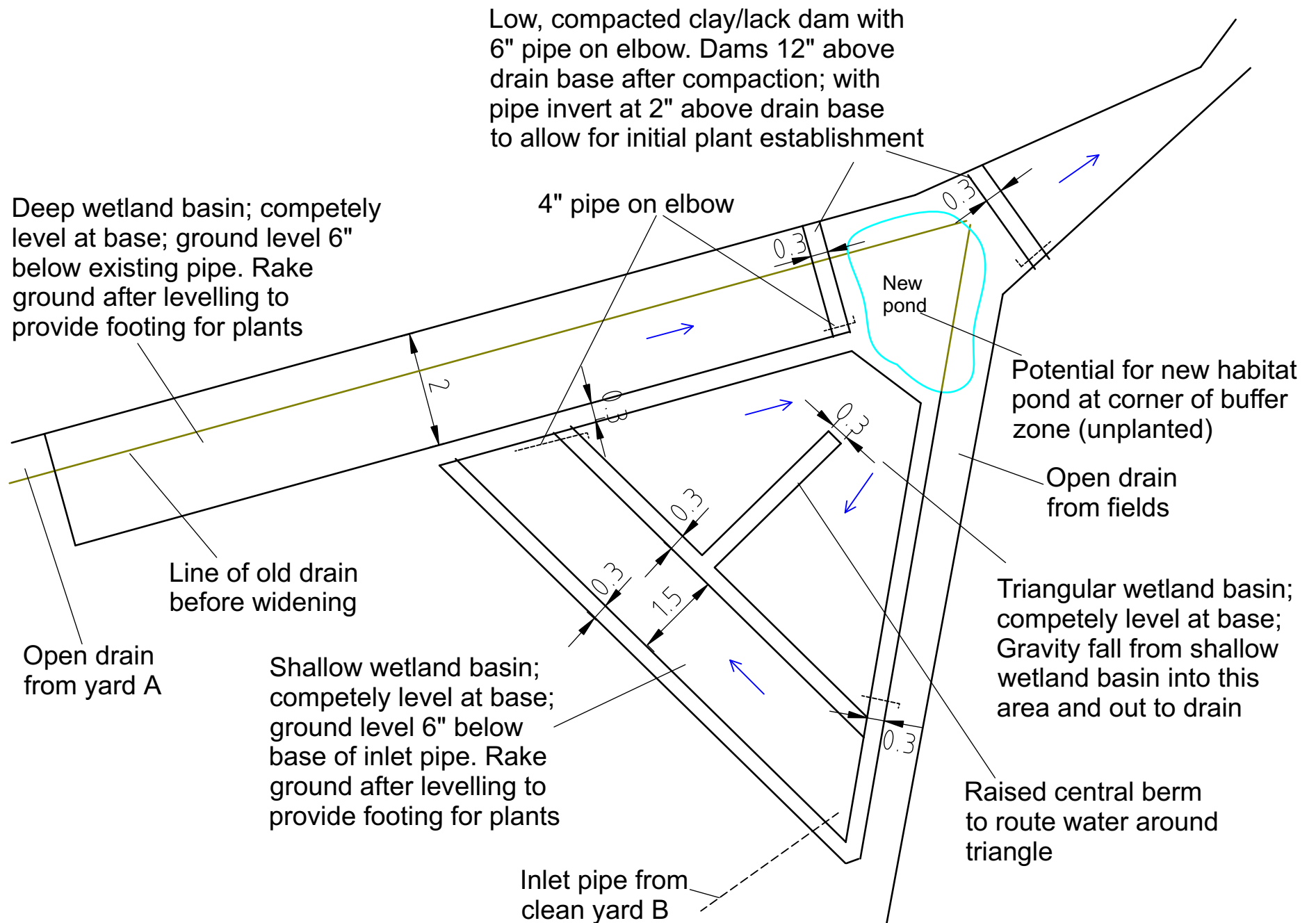
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Small Scale Wetland Pond (In-Channel Wetland) for use in Soils with Low Infiltration Rates

Use in conjunction with:
<https://farmingforwater.ie/app/uploads/2025/01/Measures-Booklet-Single-sheet.pdf>



General works procedure

- 1 - Select an area downgradient of the yard, aiming for $\geq 10\%$ of the runoff area.
- 2 - Remove scraw and topsoil and spread on fields.
- 3 - Mould subsoil to required depth, length, width.
- 4 - Ensure drain base is level L-R and front to back.
- 5 - Build embankments at lower end of each drain section.
- 6 - Set pipe (size a function of projected throughput during storm event) just above drain base.
- 7 - Compact embankments well and top with scraw to minimise erosion during storm flow.
- 8 - Fit elbow at outflow side of pipe and set at minimum until plants have become established.
- 9 - Rake base to 6" depth to provide footing for plants.
- 10 - Plant with selected species of tall, broad leaved wetland plants such as bulrush, yellow flag Iris etc.
- 11 - Raise outlet pipe elbows to 6" water depth once plants are well established (1 month of green growth)
- 12 - Continue to ensure full storage/landspreading for soiled yard runoff, slurry, silage effluent etc.

Note:

The measures here are for providing silt settlement and removal of straw and soil and other minor inputs from clean yard areas for overall improvement of water quality to filter runoff exiting well maintained, clean yard areas. If an ICW system (Integrated Constructed Wetland) is required for soiled yard runoff, parlour wash water etc, this will generally need 200% of yard area inclusive of roof surfaces; planning permission and a discharge licence. Refer to Dept of Ag. ICW guidance documents in that instance.

Small Scale Wetland Pond
(In-Channel Wetland) - 1 of 3



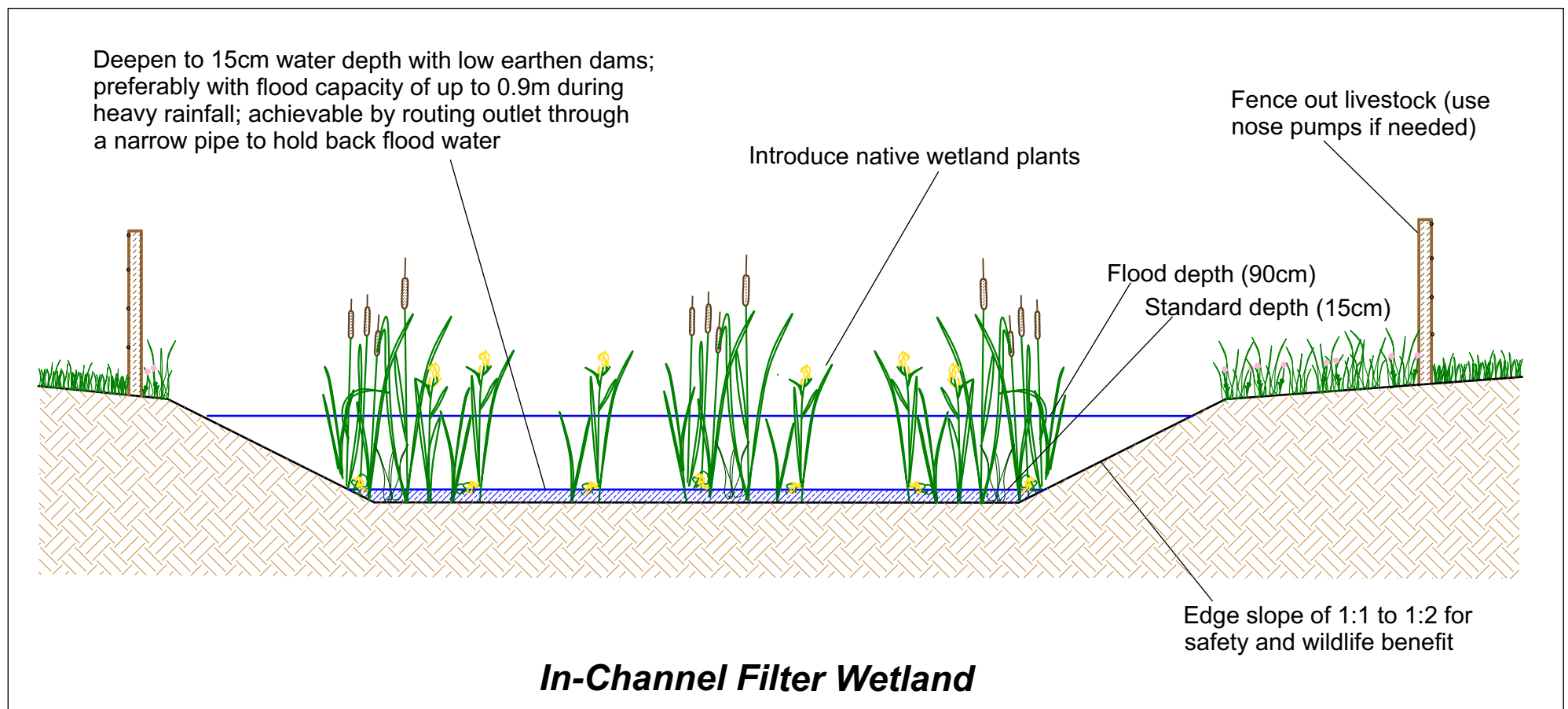
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Small Scale Wetland Pond (In-Channel Wetland) for use in Soils with Low Infiltration Rates

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SMALL SCALE WETLAND POND CONSTRUCTION NOTES

1. Remove the scraw (plants and roots) and topsoil from base and banks.
2. Mould the subsoil to the required layout, including excavation of wetland or pond and building of perimeter embankments if needed. Select basin levels that ensure that the runoff from the clean yard areas or field will flow by gravity into the basin area.
3. Ensure that the well compacted perimeter embankments are level, except for a low section (set 10cm lower than the remaining basin perimeter to route water from one basin to the next and avoid overtopping into fields/roads/yard etc - not shown here).
4. Keep wetland edges no steeper than 1:2 for safety and habitat enhancement.
5. Rake over the wetland base (no raking needed on pond base) and embankments with the teeth of the digger bucket for ease of planting and for plant establishment.
6. Install inlet and outlet piping - variable outlet flow used for both wetland and pond design types. Compact well with moist clayey soil around outlet pipe to prevent leakage. Remove the 150mm field drain sleeve and set outlet pipe to horizontal during plant establishment; and bring back up to operating depth the following June/July.
8. Plant wetland or pond as per planting notes on this drawing; seed perimeter and disturbed soil; fence basins with post and rail or agreed fencing material.

WETLAND PLANT LIST

Recommended tall wetland plants, planted at 2no./m²:

Iris pseudacorus - yellow flag
Typha latifolia - bulrush
Sparganium erectum - branched burr reed
Glyceria maxima - greater pond sedge

Optional lower growing species, c.10% of the above numbers:

Mentha aquatica - water mint
Nasturtium rorippa aquatica - watercress
Caltha palustris - kingcup
Veronica beccabunga - brooklime
Apium nodiflorum - fools cress

See Drawing 2 of 2 for pond planting details

This species list is indicative of plants that are suitable for this habitat type; changes are permitted based on species availability or if wild seeds are readily available in the locality.

Small Scale Wetland Pond
(In-Channel Wetland) - 2 of 3



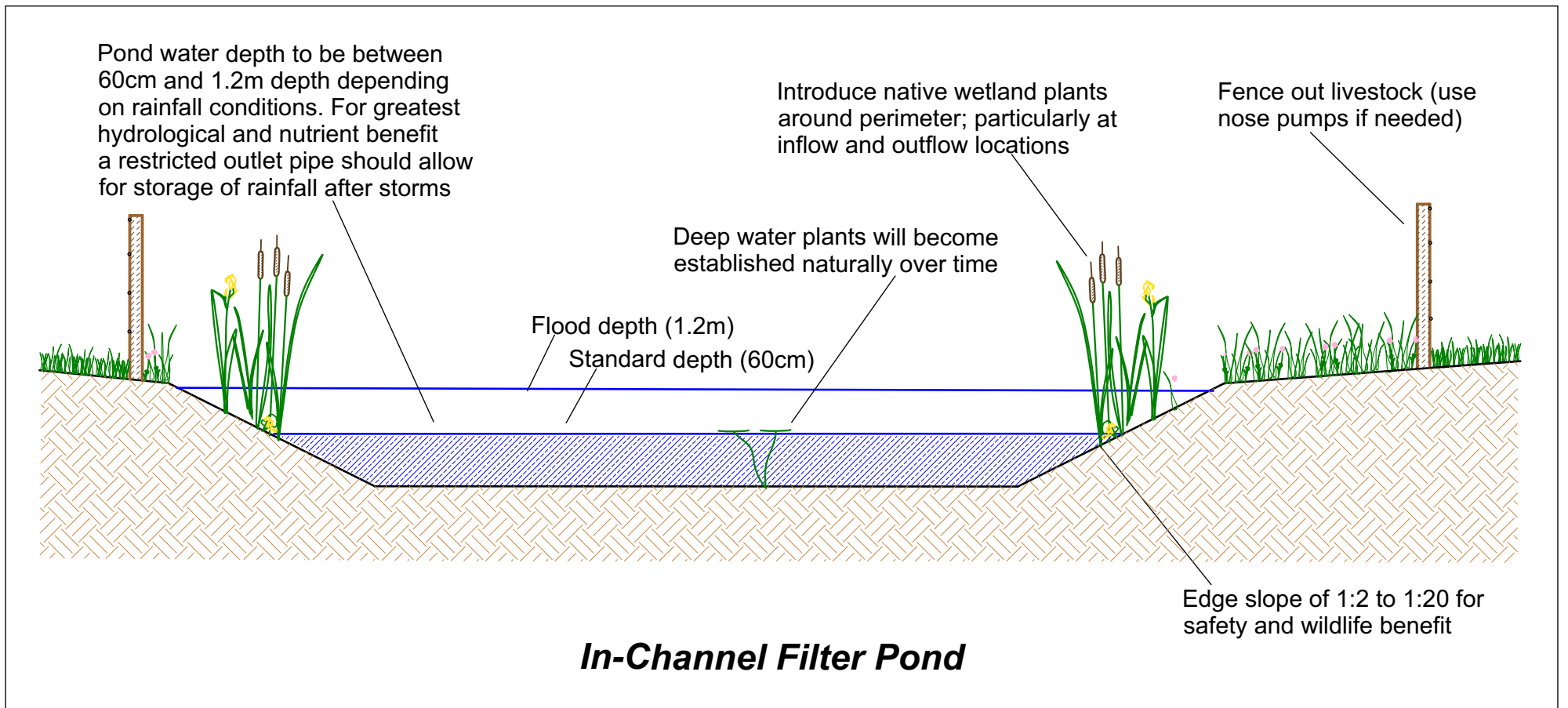
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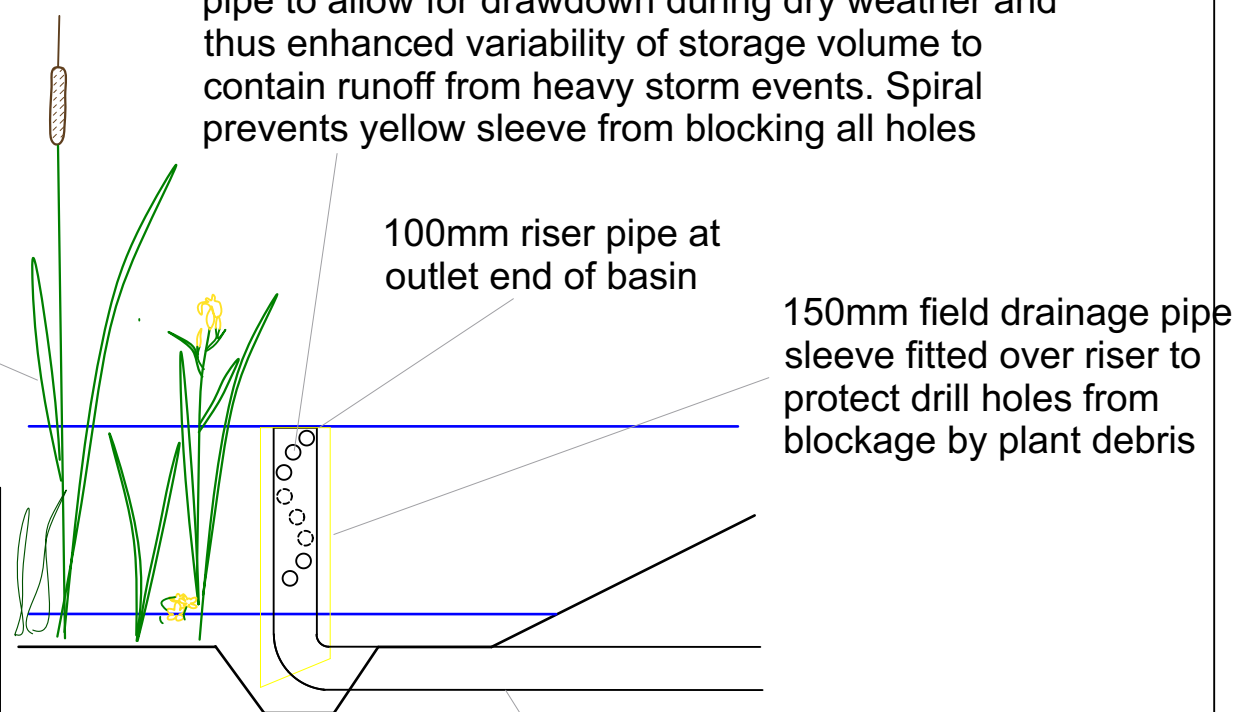
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If ponds are used following a wetland planted buffer zone or silt trap, then leave pond areas unplanted - if ponds are a stand-alone buffer zone measure then plant the perimeter as per the planting list above. These will become established naturally over time with locally growing pond species.

Drill 8no. x 30mm holes in a spiral up along the riser pipe to allow for drawdown during dry weather and thus enhanced variability of storage volume to contain runoff from heavy storm events. Spiral prevents yellow sleeve from blocking all holes



Outlet pipe set-up for pond or wetland construction types

Set 100mm outlet pipe below raked soil level to allow for draw-down during plant establishment

IN-FIELD PONDS / WETLANDS

Note that these drawings provide construction details for in-channel ponds/wetlands, for filtering and attenuating clean yard runoff areas. The same basic construction methods are used for in-field ponds/wetlands for filtering silt and soil from field runoff.

See the Earthen Bund EIP measure to assess whether to use an in-field pond/wetland or to use the earthen bund measure. The main difference is that the earthen bund may be grass seeded after construction and used for temporary water storage only; whereas the pond/wetland measures shown here are permanently wet and are more suited to heavier soil types.

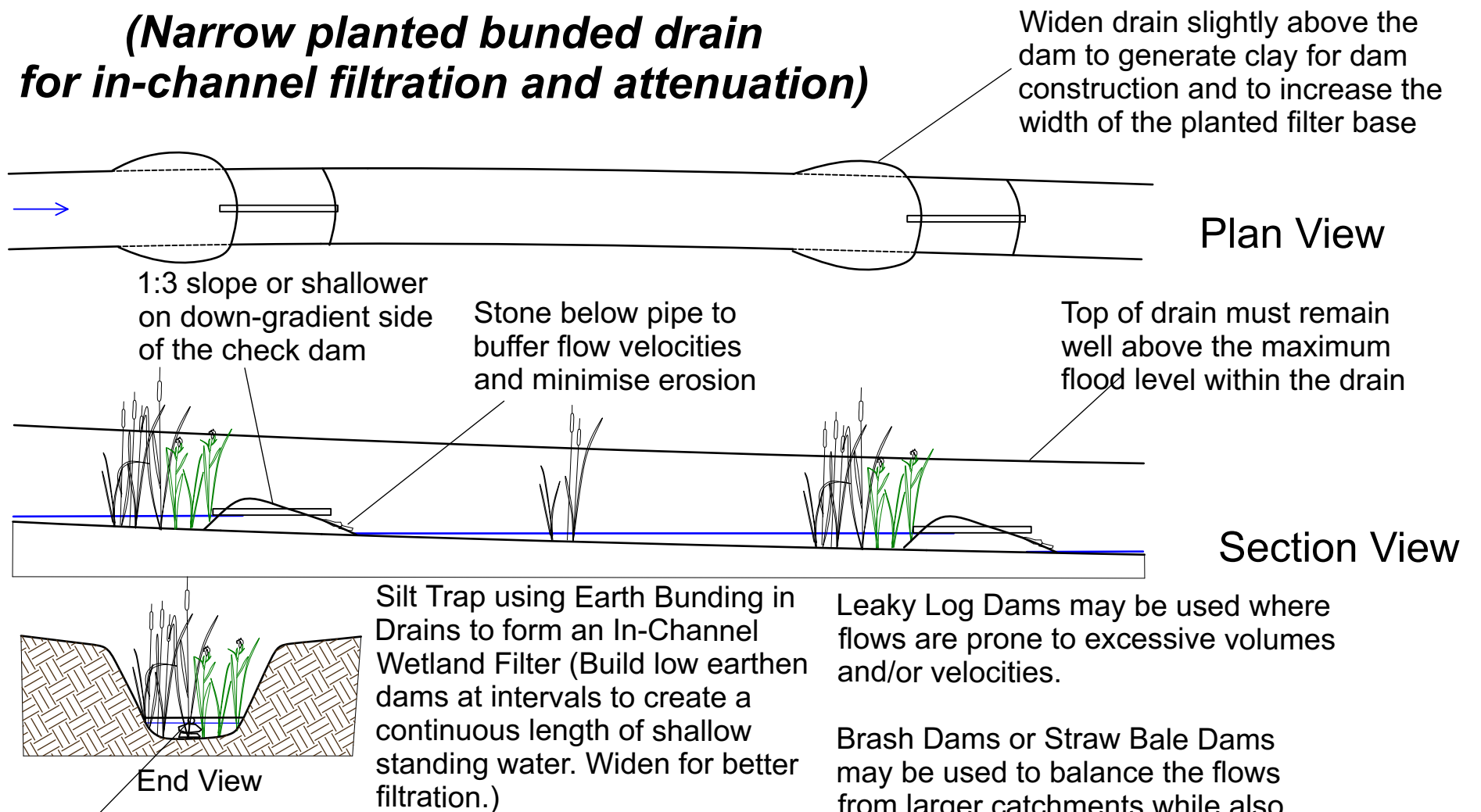
Small Scale Wetland Pond
(In-Channel Pond) - 3 of 3



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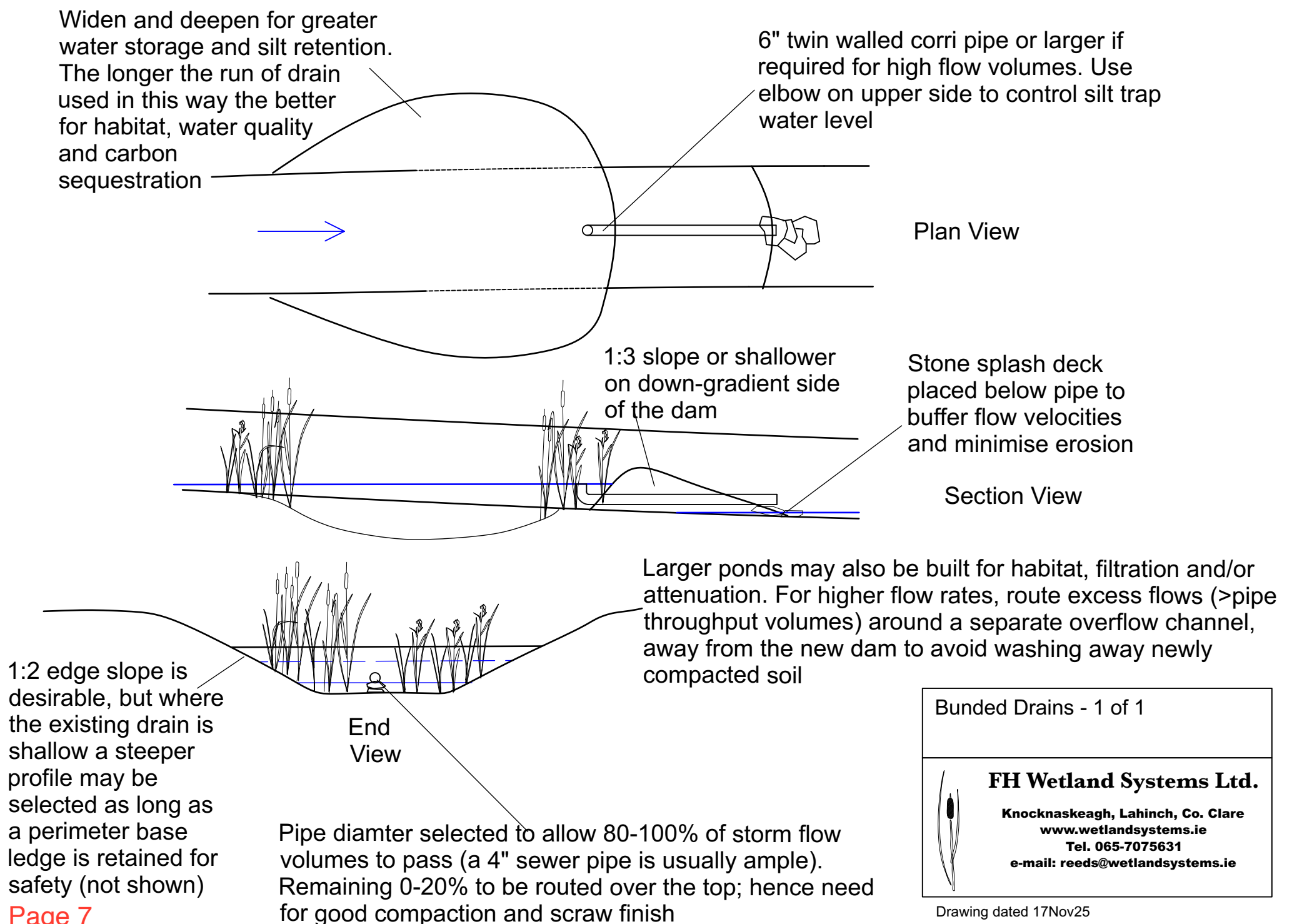
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Bunded Drains **(Narrow planted bunded drain for in-channel filtration and attenuation)**



Pipe diameter selected to allow 80% of storm flow volumes to pass. Remaining 20% to be routed over the top; hence need for good compaction and scraw finish

Bunded Drain **(In-channel silt trap)**



Bunded Drains - 1 of 1

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