Drainage
FACTSHEET

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WATER CONTROL STRUCTURES
For Organic Wetlands in the B.C. Interior

WATER CONTROL REQUIREMENTS

The development of water control is the first prerequisite to development and more intensive farming of native organic wetlands in the BC Interior.

By water control, we mean:

1. Improved drainage to provide an aerobic plant root zone and to facilitate the operation of farm machinery, and,
2. The provision of means to maintain relatively high water tables during selected periods during the growing season to provide water for plant growth and to limit decomposition (biological oxidation) of the soils.

Organic soils develop in basins which lack drainage. The organic wetlands of BC are usually characterized by a wetland area through which flows a slow moving and meandering stream. The water level in the stream and in much of the surrounding areas is at or near the surface for most of the year.

The first and usually most simple step in lowering the water table is to lower the outlet elevation of the main channel at the outlet area of the basin and to deepen the stream channel through the wetland.

Ditches must also be constructed to intercept surface runoff from the upland watershed around the wetland. (Fig. 1). This surface flow is primarily associated with spring runoff.

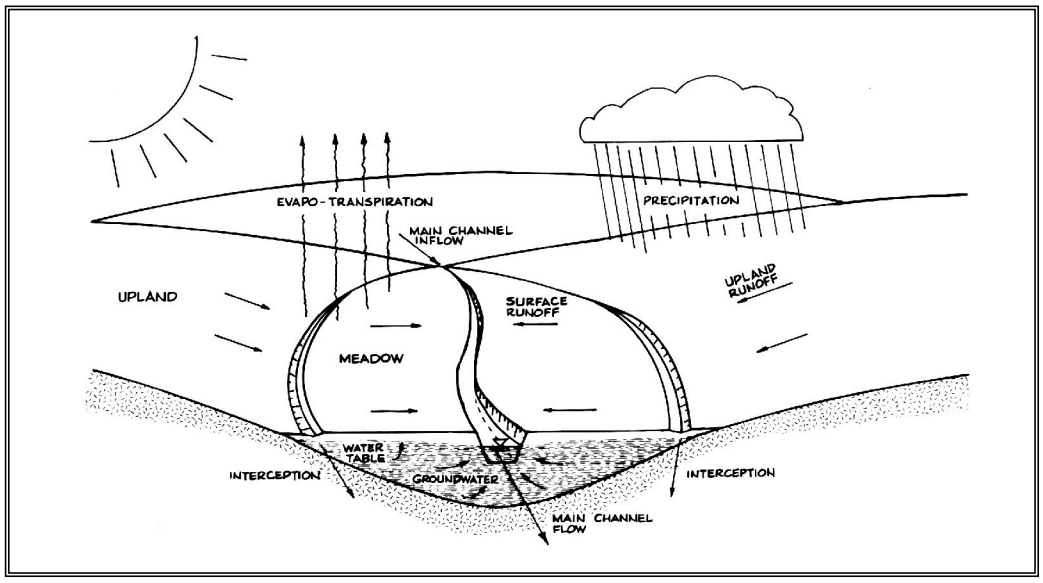

Figure 1 Organic Wetland Meadow Schematic

Interception ditches are typically shallow with a V-bottom or rounded cross-section installed at the base of the upland hillside adjacent to the meadow and flowing towards the outlet.

Water control can be provided by simple weir type structures installed in the vicinity of the outlet. Stop-logs are used to raise and lower the water level in the main channel according to cropping and harvesting requirements.

Native sedges are the predominant vegetative cover on wetlands. At the fringes of the wetlands, and in some cases in large areas, light to heavy tree growth exists. However, this growth is usually less dense than on mineral uplands soils. As a result, land clearing in these areas can usually be accomplished quickly and with smaller equipment.

Difficulties encountered often result from the inability of the ground to support the equipment. Once the outlet is developed and water control is established, equipment flotation is usually improved.

Recommended clearing methods include PTO-driven rotary brush mowers mounted on farm tractors and shearing cutters mounted on crawler tractors.

Seeding and fertilization can be carried out with conventional farming machinery. In some cases, the machinery must be equipped with additional flotation: larger rubber tires, tracks or dual wheels.

LOCATION

The main water control structure is located at the natural outlet constriction of the meadow. This is the location that usually requires the greatest amount of excavation to improve the channel drainage capacity. The adjacent soils at this location are usually mineral, thereby providing a suitable foundation for the control structure.

There are two types of water control structures that have been used successfully on BC interior wetlands. These are both wier-type stop log structures.

TIMBER WATER CONTROL STRUCTURE

The timber water control structure (Fig. 2) should be constructed from pressure-treated tongue and groove lumber. Extensive excavation is required to ensure that the structure is placed so as to cut off seepage from around or below the structure. The structure is fabricated in place.

Because of these requirements, we recommend this structure only for situations of relatively low head (e.g., less than 50 cm), in small streams or in lateral drainage ditches.

SHEET STEEL WATER CONTROL STRUCTURE

The sheet steel water control structure is fabricated using roll-formed sheet piling manufactured by ARMCO (Fig. 3). The 0.5 m wide sheet steel is available in 8 to 14 gauge thicknesses; however, 8 gauge only is recommended.

The structure is best fabricated on flat ground, preferably adjacent to the final installation location. Portable welding and cutting tools are required for this. Otherwise it is possible to fabricate the structure in a workshop and carry it to the site on a flatbed truck or wagon.

The interlocking steel sheets (minimum 2.4 m long) are first assembled to the desired structure width (at least 1 m into each stream bank). Weld the sheets together to keep them from shifting. The weir opening is then cut out using a torch according to the design dimensions (Figure 3). Steel channel to suit the stop logs is welded to the vertical edges of the weir opening and a 75 mm angle is welded full width across the top. Temporary hooks or bars can be bolted to the top to assist with subsequent lifting of the structure into place.

A trench can then be excavated in the stream to accept the structure. The trench will likely be at least 1.2 m below the bottom of the stream channel to ensure seepage cut-off. If water seeps around or underneath the steel sheets, the structure is liable to "wash out". Unless the stream is dry during construction, a temporary dam or diversion will be necessary.

The structure is then lifted into place with a suitable backhoe or crane. Estimate the weight of the completed structure (8 ga) at 47 kg per square metre area (10 lb. per square foot). For example, a typical 8 m total width structure could weigh about 1000 kg (2200 lb.). Use a surveyor's level to set the structure at the correct design elevation.

Backfill and compact. Rip-rap must be installed in the stream above and below the structure. Use 0.3 m depth of rock placed over a 0.1 m layer of pit-run gravel. (A geofabric filter material could be used in place of the pit-run gravel). Extend the rip-rap for a distance of at least 2 m above and below the structure.

FISHWAYS

Fishbearing streams may require special considerations in installation and operation of water control structures. Refer to the local fish and fish habitat protection agency for a site specific assessment prior to design and construction of the control structure.

SPILLWAY

Dams or water control structures must incorporate a spillway. The spillway is usually designed to protect the structure and the downstream from damage due to extreme flow conditions.

The spillway capacity must be adequate to handle extreme flows without overflowing.

PRE-CONSTRUCTION APPROVALS

Work "in and about the stream" requires an Approval under the Water Act. Apply to the local office of the Water Management Branch, BC Ministry of Environment. It is often helpful to present a plan detailing the proposed channel improvements and the water control structure design with the approval application.

Staff of the Ministry of Agriculture and Food are willing to assist in any planning that may be required. Contact the nearest District Agriculturist or the Resource Management Branch office.

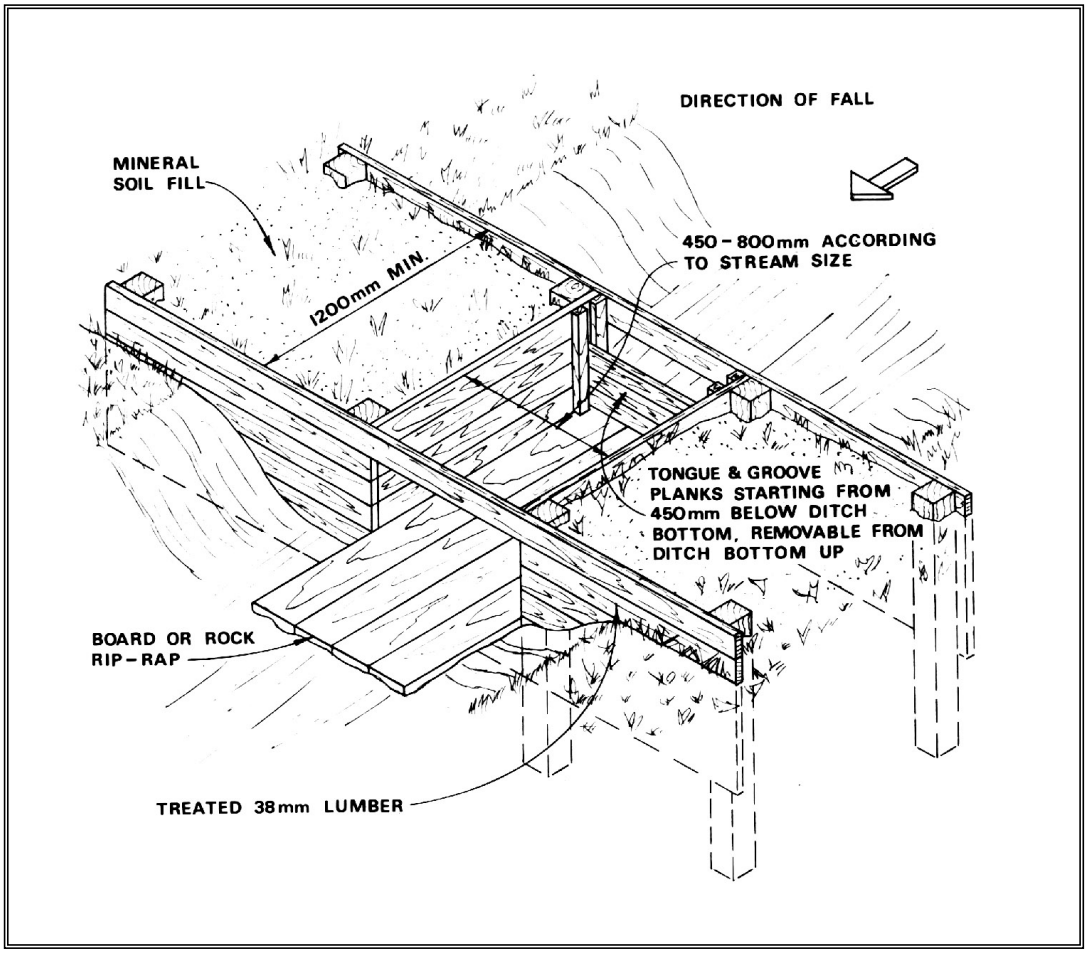

Figure 2 Timber, Stop-Log Water Control Structure

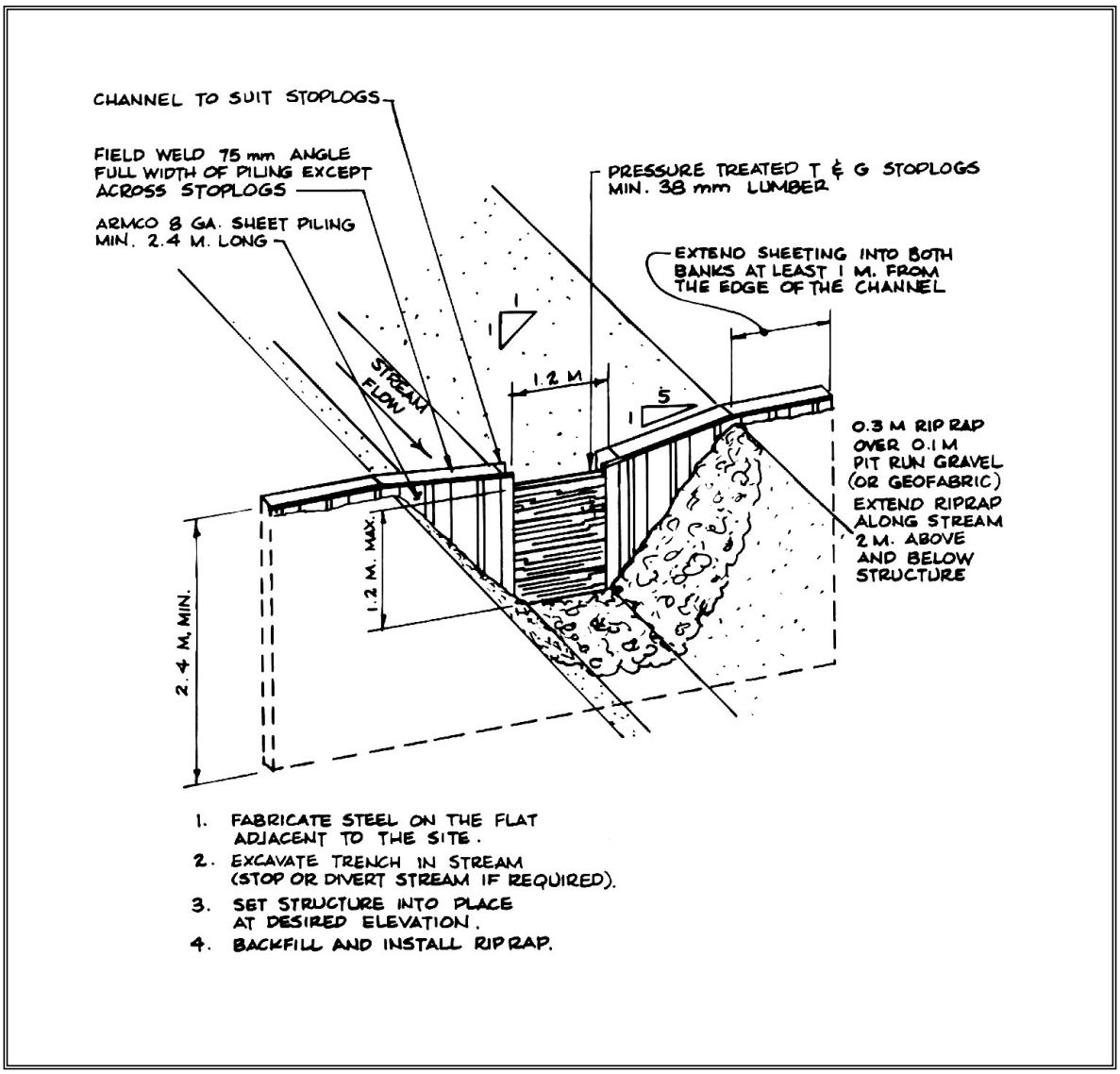

Figure 3 Sheet-Steel, Stop-Log Water Control Structure

For further information on related topics, please visit our website

Resource Management Branch

www.agf.gov.bc.ca/resmgmt

Linking to our

Publications and Conceptual Plans

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