

Dugout Site Testing



Before constructing a dugout soil conditions should be checked. Areas of sand dunes or thick layers of wind deposited soil will be unsuitable. Areas with layers of sand, silt and clay are doubtful. However, an area of clay soil will likely be satisfactory.

Soil testing can be carried out by backhoe or auger. Sampling should go down one metre deeper than the proposed dugout.

Storage Dugout Checklist

- Soils to a depth of one metre deeper than the dugout should be a water-tight (impervious) heavy clay, clay, silty clay, sandy clay or clay loam.
- Any evidence of fractures or cracking at depth in clay type soils indicates a marginal or unsuitable soil. In this case or in the case of light loam soils, local experience should be relied on in determining water retention on a long-term basis.
- If soil testing encounters a layer of sand, silt or sandy loam soil, the area is unsuitable for a storage dugout.
- Should a test hole indicate silt, sand or gravel less than 0.9 m thick, a suitable site is indicated provided:
 - other test holes do not show unsuitable material, indicating a limited size pocket and not an extensive layer
 - during construction the silt, sand or gravel layer is over excavated 0.6 m and replaced with compacted clay to isolate the pocket from the dugout

Lined Dugouts

Where a water storage dugout is required and a site composed of water-tight (impervious) soil is not available, a lined dugout may be required. Liners of compacted clay, bentonite and clay, straw layering, or plastic sheets have been used successfully.

All liners need a covering of about 0.3 m of soil. This will protect plastic liners from ultraviolet light damage, and clay liners from cracking due to drying. It also reduces accidental damage (especially from cattle), and hydraulic uplift from local soil moisture.

For a lined dugout, it is critical to check water table depth. It must be at least one metre below the proposed dugout bottom.

Seepage Dugout Checklist

Check the following if soil testing uncovers an aquifer with the water table near enough to the surface to be exposed with an open hole:

- that the aquifer is an extensive layer, not an isolated pocket
- the aquifer is at least 0.15 m thick for a gravel layer or at least 0.9 m thick for fine sand
- for livestock use, the groundwater salinity should be less than 3,000 mg/L, although some use may be made of water as high as 7,000 mg/L (depending on laboratory analysis recommendation)
- any excavation penetrating through an aquifer must not come within one metre of fractured bedrock or another aquifer that could be contaminated by seepage from the surface

A seepage dugout doesn't have to be very large since the amount of water stored will not improve its ability to supply water through a drought.

A well is preferred over an open excavation for household use to avoid contamination from livestock, wildlife or airborne pesticides.

PFRA provides technical assistance to farmers for planning the most suitable water supply for their farms.