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Storage survey

for accurate volumes

Often storages are not built accurately to the 'design' and actual volumes can differ by up to 20 per cent. In addition, a build-up of silt and slumping of dam walls can change the dimensions of your storage. Therefore a storage survey to obtain an accurate depth-to-volume and surface area relationship is essential if you want accurate measurement of water volumes in your storage.

Ideally a storage survey should be re-done after any remedial construction work on the banks or any other changes to the floor or borrow areas. Additionally, it is worth considering doing an EM survey at the same time to differentiate the soil types within the storage.

Below is a brief summary of the methods for completing a storage survey. Government regulations will apply to both storage survey and storage meter standards and specifications that shall be used for measuring Floodplain Harvesting in the near future. The current Healthy Floodplains Project for NSW is an example of this work currently being completed.

Surveying a dry storage

While your storage is dry your local surveyor can easily survey your storage using a quad or utility mounted with a GPS. You may be able to do it yourself if you have access to RTK GPS, such as Beeline (with an accuracy of 2 to 2.5 cm) in your tractor. Your local surveyor or engineering consultant can process the data for you.

Surveying your storage yourself

What's critical is that you have a benchmark, this will be a stake/post hammered into ground level up on the bank of your storage, somewhere up near your walkway. This is the benchmark that all the other points taken across your storage are related to, so you must run up and over this benchmark at least 4 or 5 times during the survey. Parking on top of it and collecting extra data from this point while having smoko is a good tactic. At the end of the day, all the data collected from this point is averaged, so the more data collected from the benchmark the better.

Treat your storage like a field, going back and forth right across the storage (every 8 or 12m, whatever your GPS is set on), broken up with four or five trips back to the benchmark. When you finish turn around and go the other way, so you have traversed your storage both directions (a grid pattern). Where there is an area too wet to drive on, if its standing water you should try to get a measure of the water depth in that area.

The data is then sent into your local irrigation engineer, surveyor or precision Ag technician who so long as he has the software to accept your base GPS readings can analyse the data and produce an accurate volume-depth-surface area relationship for your storage.

Surveying a storage with water in it

A storage survey is also possible when your storage has water. Local surveyors have the necessary electronic equipment (eg RTK GPS survey equipment mounted on a precision Echo Sounder) to take depth measurements from a small boat. This typically requires a minimum of 600mm of water covering the storage floor.

The boat is operated using a GPS guidance system to traverse the storage on a grid pattern. This survey of the water in the storage is then extended to include sufficient cross sections of the embankment above the water. The data is combined to provide a contour plan of the storage with an accuracy of +/- 2–2.5cm. The data is then used to calculate an accurate storage volume. Boat surveys are just as accurate or even more accurate than ground surveys and are often quicker as you don't have to negotiate round rough ground or long grass.

What next? Storage volumes

Suitable benchmarks are retained on the storage to enable the landowners to install a storage gauge board or an electronic storage meter. The hydrographic surveys can be presented in various formats including a simple table as presented in Table 1.

The data can then be used to prepare a storage graph to produce a quick field check of storage capacity and water use. The data is also essential for preparing accurate farm water balances and crop planning activities.

For more information, contact:

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Reduced Level (m)	Depth (m)	Surface area (Ha)	Storage Volume (Ml)	Notes
6.9	0.00	0.0	0.00	Bed of borrow
7.0	0.10	0.0	0.00	
7.5	0.60	2.95	3.12	
8.0	1.10	7.90	31.70	
8.5	1.60	13.63	84.57	
9.0	2.10	21.89	168.82	
9.5	2.60	80.00	429.39	
10.0	3.10	89.84	867.16	
10.5	3.60	92.10	1322.23	
11.0	4.10	93.98	1787.72	
11.50	4.60	95.10	2260.67	Top water level
11.60	4.70	95.28	2355.85	
11.70	4.80	95.45	2451.22	
11.76	4.86	95.55	2508.52	Average crest

Table 1: Storage survey data to obtain an accurate depth-to-volume and surface area relationship (Hydrographic survey).

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