PAT BOOK OF BOREHOLE DESIGNS

A selection of practical construction recommendations for water supply boreholes





Introduction

PAT are long established designer and promoter of appropriate well drilling machinery tools and accessories. It is a design goal to make equipment that can be4 operated by those close to the basic water need equipment needs to be simple to operate, rugged and comprehensive in its ability to construct holes for water supply in a wide variety of geological formation.

The drilling machine and its accessories are purely the construction tools used to construct the borehole. The water supply to be taken from that hole rely on the installation of some permanent equipment - the borehole pump, well linning material and the required gravel / sand packs, sealing and well apron. It is a fact that a sustainable and clean water supply will rely on how these materials are used and installed.

This booklet gives details of some basic borehole constructions that are used with PAT equipment around the world.

Some brief points:

Design Criteria

A borehole should be designed to house the pump that will abstract the water.

A hand pump vary rarely exceeds 700 litres per hour. The human body has excellent ability but is power limited to 0.2Kw

Powered pumps to work inside a 4" diameter hole can be sized to pump.

Diameter.

Every time a borehole diameter is doubled it only will only increase the water available for abstraction by 10% Every time you time you double the diameter you double the hole area, its volume and the inputs required to drill it.

Geology

Water located underground is alimited resource. It depends on rainfall to replenish and then the ability of the geology to provide soak away, storage and then release the water.

Water in fissures in hard granite rock need to be sited to intersect the cracks and fissures otherwise will be dry.

Water in fine sands need careful construction of filters to allow flow of clean water into the borhole. There are always anomalies - hard rock holes that yield water that needs sedimentation filtering out, soft gruond with hard rock layers, aquifer beds that are highly mixed layers of texture to complicate filter construction and diverse water quality from occurrence of dissolved minerals raging from the unpalatable through to the harmful.



Sample borehole designs

HOLE

DESCRIPTION

1. Granite	- 100 mm. nominal diameter unlined
2. Granite	- Consolidated hard layers in the weathered rock
3. Granite	- Lined with 4" (113 x 102 mm.) PVC casing & screen
4. Regolith	- Taking water from the weathered layer above hard rock
5. Sedimentary	- Naturally developed
6. Sedimentary	- Reduced diameter well screen for very fine sands
	requring an even gravel pack
7. Sedimentary	- Hole with small pipe as combined stabaliser and dip tube
8. Sedimentary	- Telescopic casing for natural development only



GRANITE HOLE

DESCRIPTION OF HOLE

100mm. nominal diameter unlined



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Typical 20 / 80m. deep

GRANITE HOLE

DESCRIPTION OF HOLE

Consolidated hard layers in the weathered rock





Typical 20 / 80m. deep



Typical 20 / 80m. deep

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REGOLITH

DESCRIPTION OF HOLE

Taking water from weathered layer above hard rock





Bore hole bured close to rock 15 - 40m. Typical

SEDIMENTARY

DESCRIPTION OF HOLE Naturally developed





10 / 150m. depth Typical

SEDIMENTARY

DESCRIPTION OF HOLE

Reduced diameter well screen for very fine sands requring an even gravel pack





SEDIMENTARY

DESCRIPTION OF HOLE

Hole with small pipe as combined stabaliser and dip tube



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Telescopic casing for natural development only

SEDIMENTARY

