# BoreholeLogs

Graphic borehole logs, from the archive or your own record – in-browser app • Hydrogeological Repository

## What it does

BoreholeLogs draws a graphic log for any borehole in the National Groundwater Archive that has one – **245 001** of them, holding **466 838** logged rock units, **176 308** water strikes and **1.30 million** static water levels. Find a borehole by number, by quaternary catchment, or by distance from a town or a coordinate, then see the rock, the constructed hole, the water struck in it and the level it stands at, all on one depth scale.

Up to six boreholes can be selected at once. Each gets its own full log sheet, and all of them are drawn side by side in a correlation panel – hung either from each collar, which compares the drilling, or on elevation above sea level, which is what compares the geology.

A borehole of your own can be logged the same way. Download the workbook template, fill in the rock, the hole and the water, and drop it on the page: it is read in your browser, never uploaded to a server and never stored, and the borehole is drawn to exactly the conventions the archive's are. Your holes and the archive's can then be selected together and correlated on one scale.

## What is on a log

| Column | What it shows |
|---|---|
| **Depth and elevation** | Metres below the collar, with metres above sea level beside it wherever the borehole records a collar elevation. |
| **Lithology** | Every logged unit as a hatched column, from a 244-code standard covering unconsolidated sediment through sedimentary, igneous, metamorphic and mineral rock. The hatch is assigned by rock family; the fill colour follows the long-standing South African convention for these codes where one exists. |
| **Description** | The unit read out the way a geologist writes it – colour, fabric, rock, then texture, hardness, sorting, weathering and fracturing. Fields the logger left empty simply do not appear. Labels are placed clear of each other with a leader back to the unit, so a 1 m unit in a 200 m hole is still legible. |
| **Construction** | The hole drawn to scale across its width: each drilled diameter, the casing and screen with their materials, and any annulus fill. A change of diameter and a casing shoe show up as the steps they are. |
| **Water** | The rest level as a dashed line with the standing water shaded below it, and every strike as a wedge aimed at the hole with a bar for the yield blown at it, on a scale of its own. |

## Where the archive data comes from

Every borehole comes from the Department of Water and Sanitation's **National Groundwater Archive**. The archive stores a log as numeric codes spread over ten tables against forty lookups; those are resolved to words once, when the app's database is built, so nothing is interpreted at the moment you look at it. Only boreholes that actually carry a log are included – a record with nothing but a position is of no use here and is left out.

| What | Boreholes | Detail |
|---|---|---|
| **Lithology log** | 145 168 | 466 838 units, each with the rock type and what was recorded about its colour, fabric, texture, hardness, weathering and fracturing. |

| What | Boreholes | Detail |
|---|---|---|
| **Water strikes** | 148 470 | 176 308 strikes with the depth, the aquifer type and the yield blown at each. |
| **Construction** | 228 275 | Drilled diameters, casing and screen, and annulus fill. |
| **Static water level** | 68 330 | 1.30 million readings flagged as a static level. Drawdown and recovery readings belong to a pump test rather than a log and are left out. |
| **Pump test** | – | 46 244 tests with their rates and durations, and transmissivity, storativity and specific capacity where they were derived. |

## Three things about this archive that change how a log is read

**Most positions are farm centroids, not drill sites.** Before GPS, a borehole was recorded at the centroid of the farm it fell on; the archive then nudged records sharing a centroid a few metres apart so they are separable in a GIS. **71 134 boreholes – 29 %** – sit within about 100 m of five or more others, and the largest such group holds 134. Those are one farm, not 134 boreholes on one spot, and none of them can be found in the field with a GPS. The map draws a ring around every such group and the log says so on the borehole's own sheet.

**Elevation is usually a 20 m contour reading.** 73 % of collar elevations are an exact multiple of 20 m, because for most of the archive's history they were read off a contour map rather than measured. The elevation scale beside every log, and the elevation datum in the correlation panel, are reliable to about that and no better.

**There is no total-depth field.** The depth quoted is the deepest depth anything was recorded at, and every log says which table supplied it – a depth from a measured diameter run and one from the lithology log are not the same claim. Where the diameters stop short of the hole, the log draws the rest with a broken wall rather than inventing a width. 8 574 boreholes carry a placeholder depth of 9 999.99 m in the archive; those are treated as no depth at all rather than as 10 km holes.

## Reading a strike yield

On an air-percussion log the yield written against each strike is normally the *accumulated* blow yield at that point, not the strike's own contribution. Where a borehole's strike yields never decrease with depth – the signature of that convention – the log says so, and tells you to read the deepest figure as the hole's blow yield and the steps between bars as what each strike added. Summing the bars would otherwise overstate the hole several times over.

## Logging a borehole of your own

The template is generated by the app rather than shipped as a file, so it cannot drift out of step with the reader that parses it back. Only the **Borehole ID** is compulsory, together with a depth on each interval row. Everything else is optional, and a blank cell means "not recorded" – which the log states plainly rather than filling in with a guess.

| Sheet | What goes in it |
|---|---|
| **Borehole** | One row per hole: id, coordinate, collar elevation, catchment, date drilled, contractor, method, total depth, rest water level, status and purpose. Without a coordinate the hole does not appear on the map; without a collar elevation the log carries no elevation scale and cannot be hung on a common datum with others. Leave the total depth empty and it is taken as the deepest depth anything on the other sheets reaches. |

| Sheet | What goes in it |
|---|---|
| **Lithology** | One row per logged interval, with a code from the Rock codes sheet and the description that is printed beside it. A gap between one interval and the next is drawn as a gap, never carried down from the unit above. |
| **Water strikes** | The depth struck, the blow yield in litres per second, and the aquifer type. *To* may be left empty for a strike at a point rather than over an interval. |
| **Construction** | One row per length of hole, casing, screen or annulus fill, with an **Item** column saying which – Drilled hole, Casing, Screen, Gravel pack or Seal. The archive splits these over three tables because that is how it stores them; a driller does not, so the template asks for one and the reader routes each row. Leave it empty and the construction column says that nothing was recorded rather than drawing a hole of invented width. |
| **Water levels** | One static reading per row. Drawdown and recovery readings belong to a pump test rather than to a log; drawn on one they would read as the rest level moving. |
| **Rock codes** | The archive's own 244-code lithology standard, written into the workbook so the code column can be filled by looking one up rather than by guessing at it. |

A log already kept in your own spreadsheet can be dropped in without being copied into the template first. Headings are matched loosely – case, spacing and the unit in brackets are ignored, and a column may arrive under any of several names – and a single sheet carrying both the rock and the yields, which is how a driller actually writes one, is read twice, once as lithology and once as strikes.

The rock code may be left empty and the description used instead. The archive codes the rock and not its condition, so "weathered granite" has no code of its own; what is matched is the longest run of words in the description naming a rock the archive knows, and the weathering stays in the description, where it is printed anyway. A description naming no rock the archive holds is left uncoded and drawn in the "nothing logged" hatch rather than under a rock somebody guessed at.

A row that cannot be used is reported rather than silently dropped, with its sheet, its row number and the reason – no borehole id, an interval with only one of its two depths, a casing with no diameter to draw it to scale, a rock code outside the 244. A partly loaded file is then visible as one, not as a quietly short log.

**An uploaded log is never presented as an archive one.** The sheet prints the name of the file it was read from where an archive log prints the National Groundwater Archive, and the first line of its **What this record does not say** panel states that nothing in it has been checked against the archive or against anything else. The archive-specific caveats – the farm-centroid position, the contour-map elevation, the missing total-depth field – are not repeated over data that has none of those problems.

The per-borehole CSV exports are streamed straight from the database, which is only possible for boreholes the database holds. Where the selection includes one of your own, all four are written in the browser instead, under the same headings, so a mixed selection comes out as one file rather than as an archive half and a missing half.

## What comes out

- A full log sheet per borehole: identity, site, drilling and construction, the graphic log, a legend of the rock types it actually uses, and every row of the record.
- A correlation panel of up to six boreholes on one scale, on either datum.
- A standalone printable report of the whole selection – the map, the summary, the correlation panel and every log sheet – that opens in a new tab and prints to A4.
- PNG export of the map, drawn from its own geometry rather than screen-grabbed.
- CSV of the lithology, the strikes, the construction, the water levels, the selection summary, and every borehole in the searched area.

- The selection written back out as a filled template (.xlsx), archive boreholes included – which is how an archive log is corrected against a driller's own record: export it, edit it, and upload it again as yours.

Each log sheet carries a **What this record does not say** panel, written from that borehole's own record: where the lithology was never logged, where the casing stops short of the hole, how many water level readings were left out and why, and whether the position or the elevation can be trusted. A field left empty is shown as empty and never as a zero.