Hydracrat
Specialist Drilling Contractor

The North Berwick Golf Club, North Berwick
Prepared by Robert W Hill

## Introduction

Extremes of weather, including periods of drought, are expected to become more frequent in the coming years, due to the changing climate. Many golf clubs across Scotland are now regularly experiencing a sustained lack of rainfall during the summer months. In turn, this is constraining the ability of their greenkeeping teams to keep their courses in optimal condition.

Having a reliable supply of water is of growing importance and thus many golf clubs are actively considering how this can be achieved.

The most obvious place from which to take water is from the public water mains system (in many cases a connection is already in place), however regular use of this system can often result in expensive water bills. The public main is already quite stretched in some areas and there is a fear that restrictions on heavy users could be enforced during the near future.

In most cases, a borehole is therefore considered a viable alternative. A borehole is constructed by utilising specialist drilling machinery to drill into the bedrock beneath our feet. This bedrock is often saturated in groundwater which can be pumped to the surface to be used for irrigation purposes. This water can in many cases provide a clean, reliable supply at a relatively low cost over the course of its lifespan and crucially, off the public mains system.

Rather than a cost, a borehole supply of groundwater is viewed as an important asset with a payback over the medium to long term, hence their popularity with golf clubs across Scotland.

## About Hydracrat

Hydracrat was founded in February 1960 and is based in Motherwell, Scotland. We are experienced borehole drilling contractors and provide a range of services across Scotland.

One of our primary services is in drilling and installing water well boreholes for commercial, industrial, and domestic purposes. Our frequent water well clients include golf clubs, soft fruit and vegetable farms, distilleries, factories, quarries, and individual homeowners.

Over the years we have worked with many of Scotland's most prominent golf clubs, including St Andrews Links, Trump Intl, Kingsbarns, Crail, Leven Links, Lundin Links, Luffness, Gullane and Pollok.

## Background

This briefing note was prepared by Hydracrat Ltd for the consideration of The North Berwick Golf Club.

It is understood that NBGC are working alongside industry expert, Adrian Mortram of Adrian Mortram Associates (AMA) to design a potential upgrade to the old irrigation system, and it is considered that the water supply will be a critical part of this process.

NBGC currently budgets in the region of £50,000 per annum to cover the cost of water bills for irrigation. Due to the potential plans for the new irrigation infrastructure, water usage is expected to increase further and thus water bills are expected to increase.

NBGC does not currently have a water borehole but would like to consider the possibility. It is acknowledged that a successful water borehole could provide the club with a sustainable private water supply for decades to come, whilst offering longer-term savings on water expenditure.

Initial site meetings have been held, attended by Stuart Bayne, Kyle Cruickshank and Robert Hill. During the meetings, the possibility of drilling boreholes to access a potential groundwater supply was discussed and Hydracrat outlined their "three-stage process" on water well projects. This project plan has been utilised with success by many of the golf clubs already mentioned.

This note therefore seeks to inform on these steps, including those already taken by NBGC and additional steps which will be required to explore and then install a borehole water supply.

**Stage 1) Desk Assessments and Site Visits**

Hydracrat recommended to NBGC that the first step to determine whether a borehole is a feasible option, should be to commission a geological desk assessment and report.

The objectives of this assessment would be to consider the geology beneath the site (from available information) and seek to establish whether a groundwater supply may be possible at locations within the confines of the golf course.

This assessment generally involves the review of a variety of different sources including geological mapping and records for other boreholes already drilled in the vicinity of the course.

Following an introduction from Hydracrat in early summer 2023, NBGC engaged the services of GeoloGIS Ltd, led by Dr Rob Barnes. Mr Barnes is a chartered geologist of more than 40 years' experience. He has been involved in many prominent projects during his time, including recent onshore wind farm developments.

Dr Barnes' initial geological review, dated 29 May 2023, concluded that obtaining a groundwater supply was a distinct possibility. He went on to suggest that a few locations in the eastern half of the course may offer best potential.

Following discussions between NBGC, GeoloGIS and Hydracrat, it was agreed that it would be prudent for Dr Barnes carry out a site walkover. The objective of the walkover was to consider the locations already identified and identify specific drilling zones.

A site walkover, attended by Dr Barnes, the General Manager and the Course Manager, was carried out on 6 July 2023. Three locations were identified and summarised in a revised version of the GeoloGIS report, dated 7 July 2023. These locations were as follows:

A) Adjacent the greenkeeping sheds
B) Adjacent the "Wee Course" cabin
C) Rough between the 2nd and 16th greens


*Figure 1: Areas identified by GeoloGIS, July 2023*

Following the completion of assessments by GeoloGIS Ltd, NBGC and Hydracrat met to discuss the next steps.

NBGC were keen to ensure that they had “left no stone unturned” in attempting to de-risk the project. Various options were discussed, one of which was to engage a second geological report to verify the GeoloGIS assessment and to identify any further opportunities.

Subsequently, NBGC engaged the British Geological Survey (BGS) to carry out this secondary assessment. It should be highlighted that the BGS is the UK government agency body for geological matters and is widely considered to be one of the premier providers of objective and authoritative geoscientific data. In layman’s terms, there is no higher body than the BGS when it comes to geological matters within the United Kingdom.

The BGS assessment focused primarily on Location A as identified in the GeoloGIS report, next to the greenkeeping sheds. This location is considered by NBGC to be the most “ideal” given its proximity to the greenkeeping sheds, current irrigation tank and electricity supply.

Fortunately, the BGS report once again proved to be favourable and noted that of the three locations identified, Location A (greenkeeping sheds) was likely to offer the best potential for groundwater.

In addition, both reports noted that any groundwater was likely to be present predominantly in faults, fractures and other discontinuities between differing strata (effectively layers of rock).

The BGS report provided a very helpful illustrative cross-section of the geology beneath the course. This cross-section (Figure 2) demonstrates different strata by colour-coding. As is shown, differing strata is believed to crop out at the surface at different points across the eastern half of the course and “dips” to a gradually increasing depth beneath the course. As shown in Figure 2, there is therefore potential that vertically drilled boreholes in each of the different locations may encounter different faults, fractures and discontinuities between the differing strata.

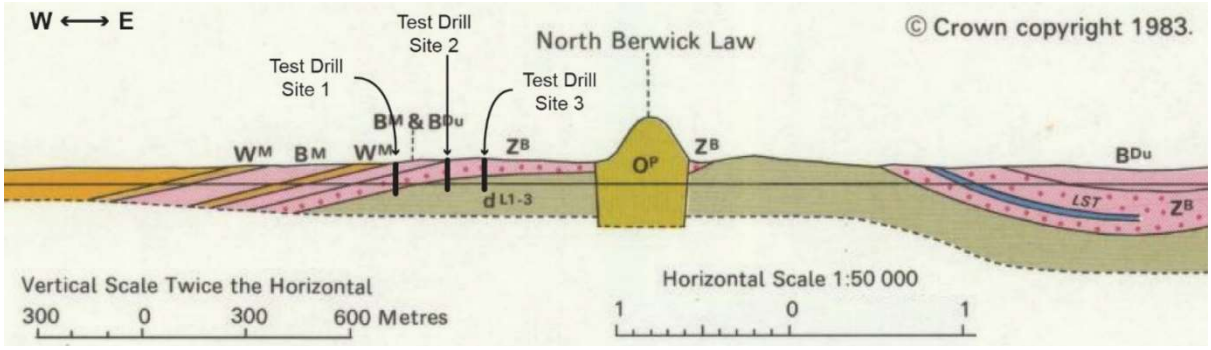


*Figure 2: British Geological Survey, 2023*

**Stage 2) Probe Boreholes**

It should be highlighted that whilst the initial prognosis from the two geological assessments has been encouraging, they cannot act as a guarantee that a suitable groundwater supply will be available. For this to be confirmed, it is necessary to carry out physical checks at each of the locations identified.

It is therefore now proposed that “probe” drilling be carried out at the three locations identified.

A probe involves the drilling of a borehole in a small diameter and is a relatively inexpensive way to check the existence of groundwater within the underlying bedrock. This has been preferred by many of the aforementioned golf clubs as a means to de-risk the overall project.

Drilling timescales can vary depending on the geology encountered but we would estimate a duration of 1-2 days to drill a test borehole at each location requested.

During probe drilling, Hydracrat's drilling team will endeavour to estimate an approximate flow of groundwater at each location. Hydracrat will also be able to collect water samples in bottles (where recoverable), should NBGC wish to send these to a laboratory for chemical analysis.

This will, in turn, help to further inform the greenkeeping team at NBGC, whether a full production borehole or boreholes would satisfy their existing and future water needs for irrigation.

Assuming one or more of the probes successfully identify a potential groundwater source, Hydracrat will then be able to drill and install a full production borehole at the preferred location(s).

**Stage 3) Production Borehole**

This stage involves the drilling of the existing probe borehole into a larger diameter, before installing a submersible water pump/motor, riser pipe, electrical cables and well screen within the borehole. The borehole is capped with a valve at the surface, and typically finished off above ground with a small concrete plinth.

Whilst timescales can vary, we would estimate a duration of 5-10 working days to complete our works at this stage.

Following completion of Stage 3, the borehole will be ready for subsequent plumbing or electrical work which will be required to connect the borehole to the irrigation system storage tank.