

**WRITTEN QUESTION TO THE MINISTER FOR PLANNING AND ENVIRONMENT
BY DEPUTY G.C.L. BAUDAINS OF ST. CLEMENT**

ANSWER TO BE TABLED ON TUESDAY, 30th JANUARY 2007

Question

- (a) With regard to the two boreholes recently drilled in order to determine the source of Jersey's deeper water, would the Minister inform members –
- (i) whether the bore at St. Catherine was drilled where the water diviners wanted and, if not, whether the alternative site was chosen in order to save money?
 - (ii) whether the drill-rig was brought back to re-drill the bore at La Rocque?
- (b) With regard to the La Rocque bore, would the Minister advise –
- (i) whether the bore had to be re-drilled and, if so, whether it now meets specification?
 - (ii) the depth of the bore?
 - (iii) at what depth flow-rate and samples were measured?
 - (iv) whether the contractor has been paid for his work?

Answer

- (a)(i) The investigation was managed through DGAG and the process has been open throughout. Two consultants (The British Geological Survey and Entec UK Ltd) were appointed by DGAG to independently oversee and quality-assure the experimental design, delivery, analysis and subsequent reporting. All aspects of the investigation were discussed by the DGAG group and members were kept regular updated. Members showed interest in the drilling work and took the opportunity to regularly visit the drill sites and to discuss various aspects with the consultants.

Both water diviners, Mr George Langlois and Mr Lewis de la Haye are members of the Deep Groundwater Advisory Group (DGAG). An essential part of the agreed methodology was that Mr Langlois and Mr de la Haye would identify two locations in Jersey which they considered to be the most probable sites where underground 'streams' exist. As well as the location, they informed DGAG that they would also identify the depth of the 'stream' below ground level.

Mr Langlois and Mr de la Haye were given an absolute free hand and as much time as they wished to identify the sites and depths to be drilled. They were given a 'window' of up to a depth of 750 feet below ground level in which to locate the 'stream'. Both the diviners gave this task their utmost attention to detail, as well as identifying spots to be drilled they further took the time to divine the respective 'streams' for some distance to and from the site. The final locations and depths identified were presented to and agreed by DGAG members.

Mr Langlois and Mr de la Haye marked the spots they had chosen with a paint cross and Mr Langlois was present when drilling commenced to ensure that the drill bit entered directly on the mark that they had identified.

One of the initial sites considered by Mr Langlois and Mr de la Haye at St Catherine was towards the top of La Vielle Charrière above Pine Walk. This was later changed when Mr Langlois discovered that the

same 'stream' could be accessed and effectively drilled into on lower ground toward the coast at Pine Walk.

The advantage of the second site was that the same 'stream' could be drilled into without pre-drilling through the overlying hill. This minimised the drilling depth (from 450 to 250 feet) and so maximised the chance of 'hitting' and drilling into the identified underground 'stream'. The cost saving of this second site was offset as an access road had to be constructed to get the drilling rig in.

- (ii) The first stage of the investigation involved the drilling out of the borehole to the depths specified by Mr Langlois and Mr de la Haye as being where the 'stream' could be located. All the planned sampling of chemistry, isotopes and recording of air-flush yields, groundwater levels, rock type and hardness were successfully completed during this stage.

The second stage of the investigation involved hydraulic testing of the aquifer to determine the yield of each borehole. This required that submersible test pump was lowered to just above the base of the borehole. The drilling rig was brought back to the site to clear some plastic debris at about 25 m depth that was preventing the pump from being lowered any further. This was cleared with no difficulty and the pump was installed at the specified depth. The hydraulic testing of the aquifer and further sampling of isotope and age then was successfully completed.

- (b)(i) As above, at the La Rocque borehole the rig successfully cleared plastic debris without re-drilling of the borehole.

The borehole at La Rocque fully conformed with the stringent specification as demanded by the investigation and agreed by DGAG members. The major evidence of this was that all the shallow groundwater (7 litres per second) was effectively sealed out permitting valid samples to be obtained from the depths of the predicted 'streams' specified by the water diviners.

The drilling process was supervised throughout by a consultant from the British Geological Survey who has extensive experience in drilling and supervising such boreholes worldwide. All information pertaining to the drilling process is included as part of the comprehensive technical report.

All members recently viewed a video of the inside of the borehole at La Rocque. This showed that the borehole was solid. This was clearly evidenced in that the cement could withstand some superficial scratching by the drill bit. The video showed no signs of having been compromised.

- (ii) The investigation specified that both the La Rocque and St Catherine borehole should be drilled through the 'stream' and to a total depth below the 'stream' predicted by Mr Langlois and Mr de la Haye. At the request of the Minister for Planning and Environment the La Rocque borehole extended some 3 m beyond this to further try to locate a high yielding 'stream'. At the request of Mr Langlois the open uncased section at St Catherine was increased, again to maximise the chance of locating a 'stream'.

The final drilled depths were: La Rocque 55.5m (182 ft) below ground level (bgl) and St Catherine 79.5 m (261 ft) bgl. Both these depths exceed the predicted 'stream' depths by Mr Langlois and Mr de la Haye streams (La Rocque 45.7 m (150 ft) bgl, St Catherine 76.2 m (250 ft) bgl).

Details of the drilling depths are given in the summary and technical reports.

- (iii) All samples and flow rates taken were fully in accordance with the experimental design of the investigation. As much data as possible was collected during the investigation.

During the first stage of the investigation (the drilling of the borehole) –

A total of 13 water samples for inorganic chemistry were taken at La Rocque at 10, 19.5, 22, 28.5, 34.5, 37.5, 43, 44, 46.5, 47.5, 48.5 50.5 and 55m bgl. Isotope samples were analysed for depths 10, 19.5, 22, 34.5, 37.5, 43, 46.5, 50.5, 55 m bgl.

A total of 9 water samples for inorganic chemistry were taken at St Catherine at 58, 68, 70.5, 72, 73.5, 75.5, 77, 78.5 and 79.5 m bgl. Isotope samples were analysed for 58, 68, 75.5, 77, 79.5 m bgl. Above these depths no suitable groundwater was found that could be sampled.

Isotope samples for analysis were taken for every depth where a variation in air-flush yield was recorded.

In both boreholes specific electrical conductance, pH and temperature were measured every 0.5 m.

In both boreholes rock chip samples were taken and a description of rock types and hardness (penetration rate) was made every 0.5m.

At La Rocque, 35 measurements of the air flush yield were taken. A total of 31 were taken at St Catherine. Rest water levels and water inflows were also recorded.

Detailed measurements and further isotope, inorganic chemistry and age-dating tracer gases samples were also taken during the hydraulic testing of the aquifer and from neighbouring boreholes.

Full details of all samples and results taken during the investigation, as well as, the comprehensive reporting of all activities are included in full technical report and summarised in a summary report. These can be accessed on the Environment site on the States of Jersey web site: www.gov.je.

(iv) The contractor constructed both boreholes to the required specifications and has been paid.