

Appendix N – Assessment of Production Borehole No.3

Introduction

The proposed change at Rodbourne involves a reduction in daily take, when stream support is not active from 14.1 ML/d to 13 ML/d, and the inclusion of a third (No.3) (standby) borehole on the licence. The aim of this assessment is to compare the hydrogeological characteristics of Rodbourne No. 3 with that of boreholes No.1 and No.2, and conclude as to whether the use of Rodbourne No.3 would have any detrimental effect on the aquifer and surrounding protected rights.

Geology

The location of the three production boreholes within the Rodbourne compound are shown on Figure J1. Borehole No. 3 is located approximately 30 m from the existing Production Boreholes No. 1 and No. 2. All three boreholes are drilled through part of the Middle Jurassic sequence starting in the Forest Marble formation (interbedded limestone and sandstone beds) and into the limestone of the Great Oolite Formation. Completion of the boreholes varies as illustrated on Figure J2. Borehole No. 3 is cased through the Forest Marble and left open hole through the Great Oolite therefore providing water issued from the Great Oolite aquifer. Boreholes No. 1 and No. 2 can source water from both the Great Oolite formation and from limestone bands within the Forest Marble formation. Each borehole has been acidised to improve yield and borehole efficiency i.e., decreasing well losses.

Pumping Tests

A number of pumping tests have been carried out on the boreholes to give transmissivity (T) and storativity (S) values. A Wessex Water Technical Report (Ref J1) details the results of a pumping test in 1975 which produced a T value at Rodbourne of 3235 m²/d, and an S value of 5.95 x 10⁻⁴, although it does not specify exactly when this testing occurred.

Rodbourne No. 3 was pump tested at a constant rate of 10.08 ML/d for 48 hours in March 1992 producing a T value of 2377 m²/d (Ref J2). From the same pumping test, Borehole No.1 had a T value of 2774 m²/d and Borehole No. 2 gave a T value of 2791 m²/d. Analysis of the recovery gave a T value of 2812 m²/d, using data from Borehole No.3. These transmissivity values are comparable with the values obtained from the 1975 test.

Storativity of Borehole No. 1 was given as 1.38 x 10⁻⁵. Storativity of Borehole No. 2 was given as 5.06 x 10⁻⁵. All values were calculated using the Cooper-Jacob analysis method.

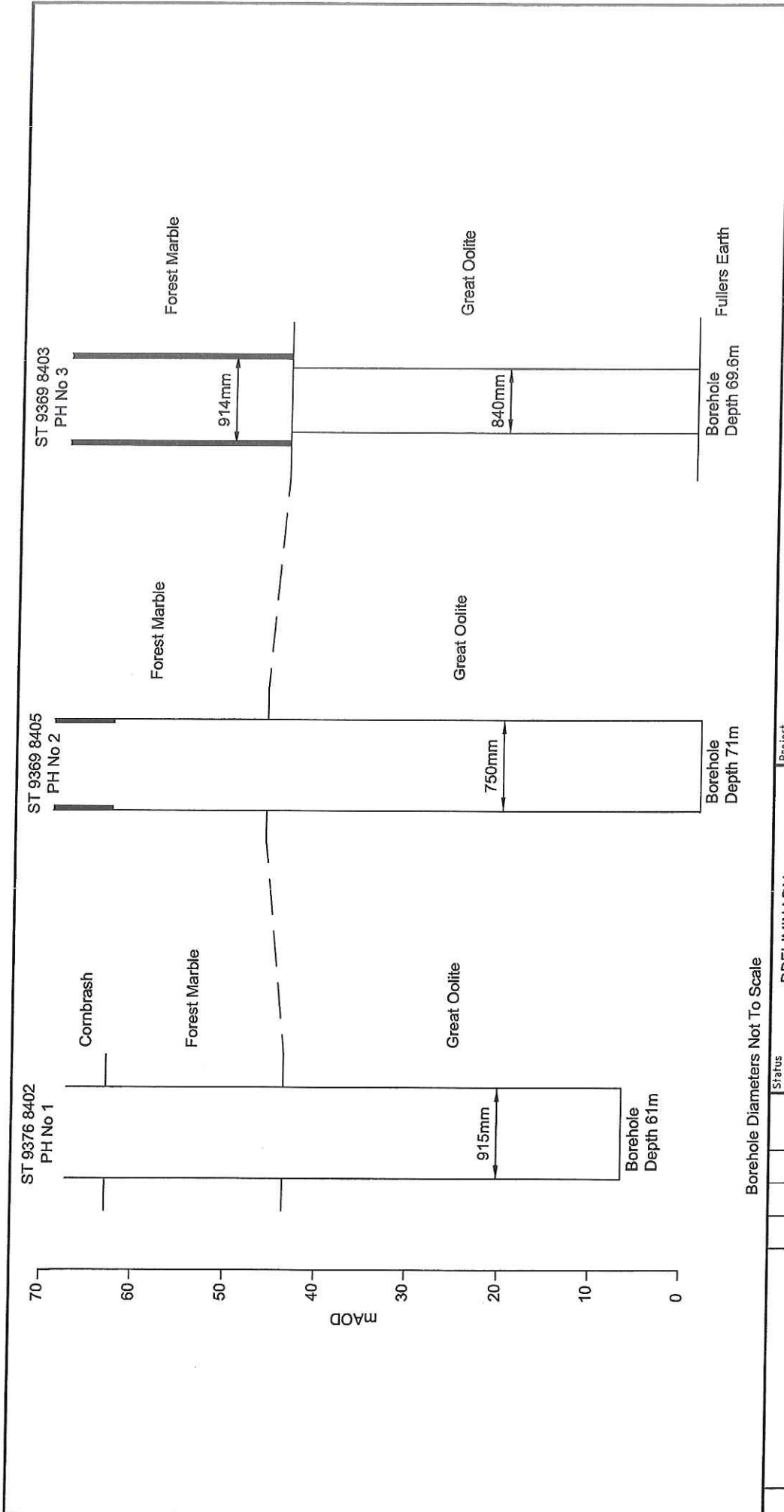
Prior to the constant rate test of Rodbourne No. 3 in 1992, step testing was undertaken. The test consisted of five 100 minute steps at the following rates (Table J1):

Table J1. Step test abstraction rates

Step No	Rate of abstraction	
	Drawdown at end of step (m)	ML/d
1	0.62	2.23
2	1.82	4.91
3	3.79	7.89
4	5.83	9.80
5	8.80	12.28
Recovery	0.38	0

During the step testing Borehole No. 2 was kept running to waste as without pumping, Borehole No. 3 was artesian. This enabled Borehole No.3 to be uncapped and a pump installed.

The results of the step test are shown on Figure J3 and indicate that Rodbourne No. 3 is an effective borehole that can produce 12.28 ML/d for only 8.8 m of drawdown. Recovery is rapid with water levels recovering by 87% after the first five minutes.



Borehole Diameters Not To Scale

Status		PRELIMINARY NOT TO BE USED FOR CONSTRUCTION			
Date	18APR05	Global Scale	NTS		
Designed by	S COLEBROOK	Horizontal Scale			
Drawn by	A CREWDSON	Vertical Scale			
Checked by	I COLLEY	Original Size	A4		
Approved by	I COLLEY	Datum / Grid			
Filename:	FigJ2_DV52205_RP1.dwg				

Project
MALMESBURY AVON
LICENCE VARIATION: ENVIRONMENTAL
IMPACT ASSESSMENT

Title
FIGURE J2
RODBOURNE PWS
BOREHOLE COMPLETION DETAILS



Hyder Consulting
HYDER MARCUS HODGES
28, Bernfield Road, Exeter, EX1 1RX
Tel: +44 (0)1392 432950 Fax: +44 (0)1392 495355

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Figure J3: Step Test - Rodbourne No. 3 Borehole

