

Jersey Groundwater

Assessment of BGS Survey Reports

J.S. Sutton, PhD

TEXT

Introduction

This note presents a brief assessment of the two reports :-

Robins, N. S. & P. L. Smedley
Hydrogeological and hydrogeochemical survey of Jersey
 BGS Geological Survey Technical Report WD/91/15
 BGS, Keyworth, Nottinghamshire
 1991 ISBN -

Robins, N. S., P. L. Smedley & R. Kitching
Jersey groundwater - year 2: further observations and groundwater model
 BGS Geological Survey Technical Report WD/92/22
 BGS, Keyworth, Nottinghamshire
 1992 ISBN -

Copies of these reports were provided by Mr G. Baudains and the work was carried out during the period May 7 - 14, 1993.

The reports present the results of a hydrogeological survey of Jersey carried out during 1990 / 91 and 92 and of groundwater modelling carried out in 1991. The basic conclusion of the reports is that the level of groundwater abstraction (estimated at 3.7×10^6 m³ / a) is sufficiently close to the estimated amount of natural recharge (5.5×10^6 m³ / a), that there is a serious risk of long term depletion of groundwater reserves. Additionally it is concluded that nitrate and potassium levels in groundwater sources indicate a potential problem with groundwater quality.

Assessment

The principal conclusion of the reports and the results of the modelling presented are totally dependent on the accuracy of the groundwater recharge calculation based on both meteorological records and on soil moisture deficit calculations. Both of which the authors recognise to contain significant approximations. It would

Jersey Groundwater

Assessment of BGS Survey Reports

J.S. Sutton, PhD

COMMENT by Groundwater Review Group

¹ We accept that there is an unfortunately large degree of uncertainty in the recharge calculation because of the unknowns in the source data but equally accept that whatever reasonable figure is taken the results suggest that Jersey's ground-

perhaps be of interest to enquire as to why estimated annual infiltration for Jersey is so much less than that quoted for the three comparable islands in table 9 of the 1991 report. In spite of the uncertainty of the recharge estimate it is used as sole basis for the statement that *'the groundwater resources of the island are being overpumped and are not wholly replenished in a normal recharge year'* (1991 report, p. 77). This conclusion is unsupported by either chemical evidence or by the limited water level data presented.

While the recharge estimates provided are recognised as being approximations this approximation is insignificant when compared with an extremely basic omission from the calculation. The island of Jersey is a developed community and the vast majority of the population receive piped water supply. For Jersey the figures presented in the introduction to the 1991 report suggest that 80% of the population receive piped water from public supply, 96% of which is derived from surface sources. This would suggest that surface water supplies a volume three to four times greater than groundwater ($12 - 15 \times 10^6 \text{ m}^3 / \text{a}$). In any piped water system leakage is likely to be of the order of 20% (compare Twort, Hoather & Law, 1974), the bulk of which will return to the groundwater reservoir. This suggest that, for Jersey, a recharge estimate based solely on natural recharge underestimates the volume of recharge by $2 - 3 \times 10^6 \text{ m}^3 / \text{a}$. Other significant contributions to groundwater recharge are likely to be derived from large surface storage reservoirs and from soakaway type sanitation.

It is therefore suggested that the principal conclusion of the BGS reports is derived from an initially erroneous estimation of recharge volumes and that, in terms of volume, the groundwater resources of the island of Jersey are not under stress.

The chemical evidence presented in the reports does not provide any indication of the over exploitation or of developing saline intrusion. It does, however, provide cause for concern in view of the consistently high levels of nitrate and potassium reported. This indicates increasing contamination from human activity which in turn serves to underline the gravity of the omission of anthropogenic sources from the recharge calculations presented.

For a groundwater regime as complex as that of

water is more or less at risk.

² We are surprised that this is questioned since a recent or comparatively recent volcanic field is probably both highly fissured and porous. There can be no comparison in this sense with Jersey. The point of the table is to demonstrate the very low abstraction rates for these islands.

³ Since this is the only and best serious contender for a calculation at the present, it would be foolhardy to ignore it. One of the major thrusts of the BGS work and of our own is to seek the information to refine the base data to improve the calculation. Unfortunately, experience has shown that without the backing of the law, borehole and other relevant users will not co-operate.

⁴ This point needs consideration by us.

⁵ We do not quite follow this since the JNWW figure is known at, for example, $6 \times 10^6 \text{ m}^3$ for 1985.

⁶ Accepting the line of reasoning, but using the actual figure of $6 \times 10^6 \text{ m}^3$ for 1985, a 20% loss from piping returned to groundwater would represent $1.2 \times 10^6 \text{ m}^3$ for 1985 and presumably similar figures for other years.

⁷ Is it possible to get at a figure of the right order? Would $0.8 \times 10^6 \text{ m}^3 / \text{a}$ be high? If this, plus the 1.2 above, were added to the $5.5 \times 10^6 \text{ m}^3 / \text{a}$ BGS groundwater recharge figure then this would raise the latter to $7.5 \times 10^6 \text{ m}^3 / \text{a}$. The new difference between recharge and take becomes $3.8 \times 10^6 \text{ m}^3 / \text{a}$ rather than $1.8 \times 10^6 \text{ m}^3 / \text{a}$. This represents a 50% rather than 70% take of the theoretical groundwater recharge.

⁸ The question still remains as to at what level the boundary between stress and non-stress occurs. The figure of 50% is still higher than anywhere else of comparable size and situation. Comparison with islands that 'soak up' water are not good (see comment 2 above).

the fissured rock aquifers of Jersey the task of construction of a representative groundwater model is one of immense complexity and can certainly not be achieved by the use of a porous medium model such as MODFLOW. The model results are of dubious reliability and are totally dependent on the accuracy of the input parameters none of which is well defined and one of which (recharge) I would contend is seriously in error.

Conclusion

The principal conclusion of the BGS reports that the groundwater resources of Jersey are at serious risk of substantial depletion is based on an erroneous estimation of recharge volumes and is untenable. There is, however, a serious risk of declining water quality arising from human activity.

* * * * *

⁹ Our own criticisms of the use of MODFLOW, and in particular of the parameters chosen, are if anything stronger than those of Dr Sutton.

¹⁰ While agreeing that modification of the recharge model is very desirable, the balance of information from the BGS surveys plus our own understanding of the geology and engineering geology of the island rocks suggests over abstraction is occurring now and that it is likely to become uncontrollable if legislation is not passed.

Water Diviner and Engineers Group
G. Baudains, G. Langlois, L. de la Haye
Report on water supplies in Jersey
1993 (July) MS

TEXT

Introduction

Statements by Public Services that Jersey's aquifer was in crisis through overpumping caused astonishment to those familiar with local underground water supplies because there was simply no evidence to support them.

1
1

Subsequent publication of water reports by BGS suggesting that 'Jersey's aquifer' is under stress and that recharge only just matches abstraction was a cause of great concern to the Group who know that the contents of the water reports do not square with the facts in the field.

1
2

In view of the considerable amount of error in the water reports, some water diviners got together and started research of their own in order to make the truth available.

The BGS reports have been studied at great length. They have been sent to an independent firm of geologists for comment, and hundreds of hours have been spent water divining, sifting detail and researching facts.

1
3

Achievements

We have established, by extensive water divining and by reference to previous similar surveys, that streams of underground water run from East to West. This has been found to be the case in the S.E. of Jersey, in St Helier, Rozel, Bagot and other areas. We have visited the Ecréhous and Minquiers reefs and found indications of considerable quantities of flowing underground water.

1
4

We have pumped fresh water from the Ecréhous well and had analyses done of this 700 year old supply.

1
5

We have measured the water level in many wells and compared the levels with previous ones, some as far ago as 150 years.

1
6

These measurements were taken from mid '92 up to July '93, a time, we are told, when conditions

11 Whatever evidence the WDEG have they have not published it in this document; the paper is notable for its reliance on evidence by assertion.

12 As the WDEG do not quantify their 'facts' -- see comment 11 above -- it is not possible to enter into serious scientific discussion with this group of people.

13 With respect to water divining -- and we do not wish to devalue the undoubted ability of diviners to locate good sites for wells and boreholes -- it cannot be accepted as a valid methodology beyond this to determine the water policy for Jersey. Our approach is well summed up in the following quotation :-

The best you can do in science is to present data in as valid a way as possible, put it out for peer review, get it accepted, publish it and discuss it. If somebody then comes along and says, "Well, all this is rubbish," but has no new or specific evidence for saying that, it neither supports nor goes against the original data. It's rather meaningless. Jonathan Kaplan, 1993

14 We not understand the concept of *streams of underground water* in relation to the geology of Jersey. In many areas of the world where limestones occur, solution of this rock has produced vast caverns and underground rivers. No other rock type allows the development of underground spaces of this nature. Water moves either very slowly through minute spaces between grains in the rock called pores, or more rapidly but still very slowly through more or less fissured (cracked) rock or through open joints (only near the surface). However, we are at variance with the BGS stance to some extent since we consider

of below average rainfall for two or three years is causing 'aquifer stress'.

In all cases we have found the water levels to be higher than in the last few years, much higher than many years ago. In the case of the Fort Regent well, by as much as one hundred feet!

We have attended meetings with Public Services, Agriculture and Fisheries and BGS. We have questioned both Public Services and BGS. Our opinion is that that they do not understand the water situation locally at all.

We have plotted charts of underground streams and these have been confirmed on site by the presence of wells and bores where we have found indications of water, and by dry bores where we find no indication.

Geological evidence supports our findings.

One of our team has studied the water flows on the adjacent French coast, flowing east to west.

We have purchased maps and charts from the U.K. and France, the latter showing where water is to be found in the bay of St Malo, when Chausey was part of the Continent.

Current maritime charts show that at the shallowest point, at the time of low water, the deepest channel to cross between us and France is only 23 ft.

Rising tides are not a phenomenon caused by refrigeration gasses, but has been going on for centuries. We have found that the rise of sea level is of the order of one foot a century. Advanced mathematics are not required to calculate that Jersey was part of the continent around two thousand years ago.

Underground freshwater streams rarely come to an end unless the faulted rock has shifted and closed up and the fact that the sea has risen over the land would cause the flow of underground streams to cease. It must be remembered that these streams, contrary to the theories of the BGS team, usually run at depths below one hundred feet (in relation to sea level). At our own expense we have commissioned an independent U.K. geologist to review the BGS reports and comment on them. The consultant's report concludes that BGS's conclusions are untenable and based on unsustainable theories.

that the geological situation of Jersey allows the likelihood of variably fissured rock permitting considerable water holding capacity at greater depths in some places than BGS accept. See also 18 below.

15 One of us (JTR) has made a thorough examination of the Ecréhous well on Maître Ile. It is effectively a cylindrical water tank constructed in the shingle that draws its fresh water from rainfall over a very small valley in the rocks above. This valley has a thin veneer of poor soil. The nitrate levels reported are the result of contamination of the drainage by the super abundant bird droppings.

16 Unfortunately, no figures are given and, until they are, this reported data is no more than evidence by assertion.

17 The same applies as to comment 16.

18 There are one or two confusing terminologies employed by the WDEG and the word *stream* is one of them (see comment 14 above). We accept that there are preferred lines of structural weakness cutting across Jersey. The most profound and deepseated of these lie have a more or less ENE / WSW trend. It is quite likely that some of these lines, such perhaps as that of Val de la Mare descend to great depths. How far these structural weaknesses and others of probably lesser depth trending NNW / SSE act as paths to channel water movement is something we have been pressing the BGS to investigate. However, in no sense, are these to be remotely connected to any concept relating to streams of water. Flow in and along them would be slow.

19 The geology does not support the idea of streams in the sense of the WDEG. See 18 above..

20 The same argument as that developed in comment 18 applies to the adjacent areas of France but to infer, from this and the evidence of shallow water and once exposed land between the island and the coast opposite, that there is an effective underground flow of fresh water between the two is not tenable hydrogeologically. Were such links of freely moving water to exist, then there would be fountains of water rising out of the streams wherever they reached ground level, the result of the head of water above. There is land in France not far from the coast rising to more than 100 m which would give a considerable head on the French side and even in Jersey, the head would be considerable in places.. It is completely out of the

We have ourselves made detailed comments on the water reports and these are appended.

Conclusion

Our field work and research proves what we suspected, namely that there is no truth in BGS or Public Services statements that the 'aquifer' is being overpumped or is under stress. In truth, whilst there are one or two true aquifers locally, the Island as a whole is not an aquifer.

To infer such is to show a fundamental lack of understanding of Jersey's very complicated fissured rock geology. Even today that geology is not fully known and it is clear that the BGS team have chosen to concern themselves solely with what we call surface water. It appears that they have either started out with pre-conceived ideas or gone for the easy option and asked certain local bodies for information *re.* local water supplies and ended up with the ridiculous 'bubble' theory, designed, we believe, as misinformation.

It is precisely because theories have been used instead of factual research that the reports are riddled with contradictions and inaccuracies, making them worthless.

Even the pollution aspect is not understood. Reducing abstraction of surface waters will allow this to concentrate, with potentially disastrous results. In Australia a desert exists where once stood trees. Cutting down the trees allowed the water table to rise, thereby poisoning plants with salt.

The BGS reports deny, except for a mention of 'old water welling up' that is not expanded upon, the existence of underground streams. Indeed Dr Robins stated that there was no water below 40 metres! We believe that the majority of borehole water comes from below 40 metres, some from four times that depth. This means that probably the largest abstraction source is not even mentioned in the reports!

Basically there are three water supplies :-

1. Reservoirs, both private and JNWW.
2. Surface water.
3. Underground streams.

The three all interact to a greater or lesser degree.

question that fissured rock at depth would not reach through to the surface, though the WDEG imply that such streams only exist below 33 m.

21 This exaggerates Dr Sutton's conclusions. It is noticeable that he eschews any reference at all to the WDEG views.

22 The term *surface water* used by the WDEG is, as near as we can determine, what geologists and geographers and water engineers refer to as groundwater. A most confusing, and seemingly illogical, use of an expression.

23 The bubble is not a very convincing cartoon by any standards. Most people do not respond well to it not grasping the conceptual idea behind it and being put off by its exaggerated shapes which go against their own instinctive understanding.

24 The concentration of salts is the result of a dry climate operating on an environment denuded of vegetation which gained its hold when the climate was wetter; the dry climate is the cause and this does not apply to Jersey. If too much pollution is applied to the upper groundwater levels in Jersey there will be pollution: that is inescapable.

25 The nature of the 'old water' is adequately explained by BGS and is unrelated to the concept of streams as used by the WDEG. With the main southward flow of groundwater in the top 20 to 40 metres in Jersey being from north to south, the water -- and particularly the deeper parts of it -- becomes older in a southerly direction too. The proof of age is offered by the geochemical studies which are dismissed by the WDEG, *e.g.* see 24.

26 This contention by the WDEG identifies a substantive issue where we ourselves differ from the line taken by BGS. We have brought this concern to Nick Robins but he has continued to maintain that the only effective source of groundwater for Jersey lies in the top 40 m. For what we consider sound geological reasons, and which have nothing to do with underground streams, we advocate investigation water below 40 m to determine how the different rock types and the major fissured lines of structural weakness behave.

27 The WDEG expression -- *surface water* -- corresponds to the standard term *groundwater* and is thereby most confusing. See comment 22 for further comment and comments 18 to 20 for *streams*.

The reservoirs are unlined, and therefore leak substantially into the ground, refreshing the surface water. This in turn keeps the pressure against the streams below. In times of drought, the process is partially reversed. It should be remembered, that if the BGS case was correct, when drilled for water, on striking it, there would be no rise of water in the bore; one would have to drill a further 10 feet to get 10 ft of water in the well. We all know this is not the case.

The Fort Regent well is a good example. Reports of the blasting (it took two years working 24 hours a day) state that at the final blast the water gushed in and rose rapidly to a depth of 70 feet. Thus the pressure in the stream was 35 psi. It is now 80 psi with a depth of 160 ft. All wells or bores have a rise of water when the stream is struck. The rare exceptions are such things as sand aquifers and surface water wells, the latter liable to dry up and suffer from the worst pollution.

Thus restricting the water reports to surface water is a meaningless exercise of no value. Indeed, it is dangerous, as it tends to mislead those whose knowledge of local water is limited.

Water diviners cannot trace puddles of still water, only that which is flowing. The streams we find flow strongly even at the end of long dry summers. We believe that this water originates on the continent and are surprised that no survey has been done to trace the streams outside the Island.

There is no case for legislation to control abstraction, for there is no truth in the overabstraction scare. This is evidenced by the fact that water levels are rising -- hardly a, symptom of overdrawing! What is the purpose of metering if you don't know where the supply comes from or what volumes are available?

The data obtained would be totally irrelevant.

We wonder if the wish for metering has more to do with politics and the statement by Public Services that private ownership of water will be gone in 5 10 years.

What is now needed, to dispel the worries generated by the water reports, is a proper and complete survey tracing and quantifying as far as possible the underground streams and faulted rock supplies.

Signed : - G.Baudains, G. Langlois, L. de la Haye

* * * * *

28 This point was picked out by Dr Sutton -- see comment 7. We do not know the likely return to groundwater though the JNWW should be able to give some idea. It should also be recalled that most reservoirs are deep in valleys and therefore lodged in rocks with permanent groundwater.

29 The phenomenon of water rising in a well above the inlet point is the result of a head operating on water that is sealed from upward escape at a particular level by the geological conditions -- which conditions can be many and varied. The borehole breaks the seal and the water rises until head, gravity and atmospheric pressure are in equilibrium. The fact that springs in Jersey do not fountain upward where they emerge from the bedrock is not proof of the absence of head merely the movement through the rock pores and fissures is so slow that seepage ceases. However, the fact that water rises rapidly in borehole -- and if the WDEG are believed, this is a common phenomenon well below 40 m -- does suggest that there is freer movement of water at the levels of input than would be the case if all fissures and pore spaces in Jersey were effectively closed below 40 m. There is a pressing need for information relating to this matter. Unfortunately, unless legislation is introduced the likelihood of having access to the boreholes needed is very low. See also comment 14.

30 We have no special information relating to Fort Regent but the same argument applies as set out in comment 29.

31 See comments 18 to 20.

31 Once again, we agree that there is the need for information on the situation below 40 m but unless legislation is introduced the likelihood of having access to the boreholes needed is very low.

* * * * *

Comments [by the Water Diviners and Engineers' Group (WDEG)] on : -

Riley et al.

Report of the working party on safeguarding the water resources of Jersey

Public Services Committee, St Helier

1992 ISBN -

[**NB** Comment and relevant note(s) from the Group's report are put in sequence and not separated; the sign § and italics are used to introduce quotes from the Riley report]

page 2

§1a : - *overexploitation* This is not true.

Note 1 : - Were overexploitation happening, water levels would be dropping. This is not the case.

Ann Street Brewery, in a letter of July 28th 1992 state '*there is no significant change in the water table. the whole matter is a nonsense.*'

Mr P. Conway, of Gorey, on July 22, 1992 states that he has kept a monthly check of the level in a bore since its construction in 1973. In that year it was at 42 ft. In 1991 it dropped to 49 ft, the lowest recorded. Since then it has been rising steadily to its present 37 ft, during a period of unusually dry weather.

Two wells I have checked periodically over the years were higher than usual during the last few years. Only in 1976 did the levels drop 2 or 3 feet. The normal level is between 3 and 5 ft below ground level.

Mr Labey has a bore that continually overflows. There is another such bore in Fountain Lane, Longueville. Ref. G. Langlois.

As for not being replenished! If a graph were drawn showing level/time, it would undulate slightly, being higher in winter than summer. The peaks of this graph would have to show a continual decline over several years for the theory to have an credence. As the water table overflows most of the time, the whole idea of insufficient recharge is a nonsense. The St Ouen sand aquifer is the only area likely to be overpumped.

§1a : - *pollution* This certainly exists in various

32 We certainly need more data on this point since our case at the moment is weak.

33 This and the following two paragraphs are the only acceptable evidence offered and some of it is more anecdotal than factual. However, there are too few examples and many, many more would be needed before serious account could be taken.

34 The water table overflows where springs occur. Some have dried up or suffered reduced flow over the past few years (anecdotal evidence from us) but we sense water table is being used differently from the standard definition. In particular, the WDEG do not distinguish between temporary and permanent water table. The St Ouen's Bay aquifer is not at risk -- see BGS 1991, p. 23.

forms, some natural and some man-made. The proposals do not address this anyway except §11b on page 14, which is also incorrect.

Note 2 :- The nitrate content of water is not clearly understood (see comments to §16). Defective soakaways are likely to make an insignificant contribution, but should be remedied nonetheless.

§1b :- *overpumping and recharge* Quite untrue. Were this so, the watertable and borehole levels would on a depth / time graph show an undulation where each peak is below the previous one.

Note 3 :- As in note 1, it is the level of water over a long period of time that is the yardstick.

§1c :- *pollution, groundwater, soakaways* Partially true, see note 2.

§1d :- *groundwater deterioration, problems between neighbours* Possible but unlikely, see note 1.

§1e :- *reliable data, monitoring, control* Reliable data, relevant to the issue, is essential for anyone to gather a true picture of the subject. Pumping volumes are quite irrelevant.

Note 4 :- Levels are the only yardstick. The amount of water coming into Jersey is unquantifiable. That absorbed from rain depends on the type of precipitation, whether snow, drizzle or flood, where it lands, the state of the soil at the time, etc. If JNWW pipework behaves similarly to the U.K. average, then a million gallons a day leak into the soil from the mains. Liquid manure from Bellozanne spread on the land adds more moisture. There is also the probability of external supplies, e.g. . France. How on earth can one put a figure on that, which is worth writing down? The amount taken out is the sum of all well and borehole drawings, that lost by evaporation, by vegetation (a tree can use 40 gallons a day), the loss to these from underground streams, e.g. . at Grève d'Azette, Grouville Bay, etc., the interchange between water table and underground streams. Anyone putting a figure on that must be more foolish than brave.

35 We cannot accept the denigration of the geochemical aspects of BGS reporting. The WDEG are asserting their view not proving it in a scientifically acceptable way.

36 We agree about the need for more data but make two points, the first that BGS know what data to collect and the second that legislation is needed before it can be acquired since borehole users are not co-operating -- for whatever reasons are irrelevant. At the moment the minimum figure for extraction should be achieved by monitoring what is possible. The other issues in note 4 have been fully explored in earlier comments.

§1e (contd) :- *water quality*

Note 5 :- Water quality could be monitored concurrently with a water sourcing research, a necessary part of understanding the local situation.

§2 :- *overabstraction* Where is the evidence? BGS have not done any research to identify external sources, e.g. . France (see note 6 below).

§3 :- *omissions* JNWW may have omitted the 1 million gallons a day that would be expected to leak from their mains (25%), assuming that their pipework behaves similarly to the U.K. average. Private cisterns and reservoirs appear to have been omitted.

Page 2

§4 :- *theoretical estimate of recharge estimated groundwater take.* See note 4. The percentage of the two could be 70%, 5%. It could be anything. The only important fact is that levels are either static or rising. Clearly, refreshment, from whatever source, is not exceeded by drawings, see note 3.

§5 :- *statutory control and safeguarding* The second part of this paragraph is not true. For example, the second water report states that water levels are generally static. As for the first part, one gains the impression that a person, or persons, want water legislation, or State ownership, and that "facts" and figures are produced to fit the answer. All my research shows there to be no problem with the various water supplies (there are several different ones) with exception of some pollution, which is easily controllable.

§6 :- *ownership of water* With Queen's Valley in operation, the JNWW have no storage problems for the foreseeable future and beyond.

§7 :- *importance of JNWW submission* The JNWW has been, understandably, biased against private water supplies for decades.

Note 6 :- Several people have, over the

37 The It would be useful to have an estimate made of the number/capacity of such cisterns and reservoirs

38 The WDEG should not reduce the level of argument to one of near abuse. It is they who have not published evidence and a vital reason for legislation is the need to gather the data which both sides agree are needed but which is unobtainable because of the lack of co-operation of borehole users. The WDEG should appreciate that the information is needed to manage the supply **for the benefit of all.**

years, told of this persuasion. Mr K. Le Cocq, when at Gorey, offered during one summer drought, to re-open a well in order to assist the JNWW by using less of their water. Their reply was to the effect that, if he did that, they would disconnect his supply and, should his well prove insufficient or troublesome, they would not re-connect him, and that he should think carefully in view of the fact that he was running a sizeable guesthouse.

39

§8 :- *agriculture and horticulture critical* Yes, but no monitoring is likely to be allowed now legislation is proposed. Percentages at the end of the paragraph are irrelevant, see note 4.

40

Page 4

§9 :- *sources of water for Public Services and golf courses* No consequence.

§10 :- *statutory control* A landowner has absolute right over water under his property. Should that right be removed forcibly, especially without good reason, compensation would be sought by landowners. IDC recommended course in last sentence -- yes.

41

§11 :- *500 new bores a year* 500 bores is nowhere accurate -- about 70 is correct, 50% of these replacing defective ones (collapsed linings, silting, etc.). Groundwater usage is expensive -- bore drilling, maintenance, pumping cost, etc. and therefore not wasted. Water requirements of the Island, other than mains supply, can't be increasing more than slowly -- where is the evidence for the statements here? As to the first part of the paragraph, 5 bores, owned by parties biased toward legislation, measured over 9 months is a basis only for dangerous guesswork.

42

Page 5

§12 :- *U.K. administration comparison* Does not apply here.

§13a :- *reliable data* Reliable data are essential to get a correct picture. Legislation is not needed

39 The WDEG demonstrate here their lack of understanding of water chemistry. The JNWW cannot allow contamination of the mains supply and such actions as are specified here would have created this risk. Would the guesthouse owner have been prepared to have two completely separate plumbing systems in his establishment?

40 See comment 38.

41 The WDEG underplay the basic selfishness of farmers and other major borehole users who have shown scant respect for the rights of others. Their lack of co-operation in allowing access to the gaining of legitimate information is one aspect of this.

42 500 must be an error in the original report.

at all. To suggest it is essential in order to obtain data is misleading and untrue.

§13b :- *user friendly legislation* Read - legislation must be dressed up to fool the public into thinking it is necessary.

§13c :- *cost of legislation and adminⁿ of it* Read -- pass on the cost of administering the legislation.

§13d :- *use of experts in water management* Read -- close all loopholes to obtain effective State ownership.

§14 :- *Groundwater Review Group's views* The G.R.G. apparently have little understanding of Jersey's various water supplies.

§15 :- *pollution and overpumping* This concerns the saturated soils or aquifers, generally shallow and the most vulnerable to pollution. Soil moisture deficit? The ground is at times too wet to walk on. Saline intrusion. This is not understood by the survey. I believe the only area where this happens is at Rozel, east of the road..

Note 6 :- Saline intrusion. this happens at Rozel, where a bore is tidal if sunk to the east of the road. Elsewhere, such as at St Clement, a certain amount of salt has always been present (as far back as the early fifties to my my own knowledge). This salinity is worse inland than by the shore, which makes the theory of sea intrusion curious. Mr Hereve once tried continuous pumping to rid the salt, and succeeded, an unlikely event if sea was 'backing up' fresh water. The moment he stopped pumping, it was back. This is because the salinity is present in the ground from years ago when it was beach in that area; constant pumping 'flushes' it. No doubt the same applies to the high manganese and iron content of eastern waters -- it is leached from the rock / ground it comes through. Sea water and fresh water do not readily mix (ref. Red Sea).

§16 :- *nitrate pollution and EC standards* It has been proven on an Open University programme, less than a year ago, that fertilizer forms an insignificant part of nitrates in the soil / water.

43 Unfortunately the tone of the comments over the next few paragraphs §13b - §14 degenerates into emotional statements.

44 Soil moisture deficit is a technical term which the WDEG do not know as such. The question of saline intrusion -- this and the next paragraph -- is one of geochemistry which the WDEG do not have the expertise to handle. See comment 35.

Nitrates are naturally occurring, caused by thunderstorms, bird droppings but mostly by the natural breaking down of humus by organisms in warm weather, which is then leached out by autumn rains. Organic farming is therefore more likely to raise nitrate levels because of the extra ground disturbance with weeding, etc.

The well on the Ecréhous, where fertilizer is not used by man, has a nitrate level of over 2400 mg / litre.

§17 :- *pollution of private water sources and MoH* no comment.

Page 6

§18: - *Agriculture and control of pesticides, etc.* Agreed.

§19 :- *JNWW, polluted private sources and sensitive areas* Maybe.

§20 :- *extension of mains sewerage and piped water* The drains cannot cope now (note Le Hocq). Extending will exacerbate the difficulties.

§21 :- *groundwater modelling and ongoing work* Computer modelling may work for areas such as the Lake District in the U.K., but I have severe reservations about its ability to produce useful or reliable information from such a complicated and diverse underground system as exists in Jersey. As the water table remains substantially full throughout the year then one would not expect 'an improvement as a result of last winter's recharge'. An appendix lists the form that further investigation must take if it is to produce an accurate picture.

§22 :- *the law and the right to abstract water* Yes.

Page 7

§23 :- *Over depletion of groundwater resource* Not so. Proper investigation and measurement of levels will prove this is not the case.

45 The concern over nitrates is not confined to one or another source but to their effective control. For this Agriculture and Fisheries are working hard to exercise this control over farming of all kinds and likewise Public Health and the IDC combine to safeguard groundwater from soakaways as far as they are able. The use of the Ecréhous example by the WDEG exposes their weakness in such geochemical areas for the nitrate level there is undoubtedly from bird droppings in a very small catchment with very thin to non-existent soil.

46 Our own reservations in this area exist.

47 The question as to how 'over' is defined must always be difficult and will probably have to be defined by negotiation rather than by the arbitrary imposition of some figure by geologist or other interested party.

§24 : - JNWW supplies OK but private not
Possibly. Filter.

§25 : - *over short monitoring period to date*
Hear, hear! The world authority on
groundwater recommends decades.

§26 : - *need for legislation and its scope* Logic?
The proposed law relies on assumption, estimate
and unsustainable statements.

§27 : - *ownership of water* If one can do nothing
with one's water, even having to pay for it, then,
to all intents and purposes, it is State owned.
Again, we are being urged to accept legislation
'because everyone else (supposedly) has it'.
What basis is that?

Page 8

§23 : - *immediate implementation of some matters*
Read -- Give me the power and I promise not to
abuse it.

§29 : - *immediate registration of major users* It
is not in the interest of anyone to do anything
about them because there is no need.

§30 : - *action on new boreholes now* Why is it
obvious?

§31 : - *welcome to Pesticides Law* No comment.

§32 : - *nitrates control and need for legislation*
Organic farming will probably increase nitrate
levels (see comment on §16).

§33 : - *IDC 1987 support of water control* In
Jersey, rainfall is relatively high with good
storage capacity. Why should it be accepted that
Jersey people should own the resource (s) as a
whole? A farm with water is worth more than
one without. It is now proposed to relieve such
owners of their premiums? this is a form of

48 The relatively short period of present
monitoring is accepted but this merely reinforces
the need for legislation to secure eventually an
acceptable and meaningful set of data. The
WDEG should not castigate those who are
working with insufficient data when its members
are working to prevent the acquisition of such
information by opposing legislation in an area
where voluntary co-operation has been shown not
to work.

49 Water ownership has always been a contentious
issue back through the ages. What is clear beyond
all doubt is that a free for all by borehole users
will result at some time or other in many people
being deprived of the water below their land (the
so-called *Qui a l'dessous*) by the bores on
surrounding properties.

Further more the dismissal of the argument that
because everyone else has it we must also have it
misses the point. Everyone else has it because it
has been demonstrated as the best procedure
producing the most equitable results for all.

50 See comment 46 above for the implications of
the WDEG's own comment on §25.

51 There are clearly problems with any law but
these should be addressed rather than allowed to
prevent necessary legislative control of
groundwater. We all have our fears of state
ownership but the density of population and the
problems of water in the late 20 century require

communism. Have the IDC really supported State ownership since 1987, long before all these incorrect 'facts' emerged? Why?

§34 :- *real danger of over abstraction therefore . .*
Untrue.

Page 8

Recommendations

§35 :- *Public Services should be vested with Water Authority* No, even without considering their disastrous track record.

§36 :- *main users should be identified* Absolutely no need.

§37 :- *until law passed IDC should be given powers* Unnecessary, possibly legally unenforceable, see comment on c.

§38 :- *until law passed Agriculture, etc. should observe a voluntary code* Unnecessary.

§39 :- *continue with BGS monitoring* See appendix.

§40 :- *Public Services to be given powers to draft law* No. Unnecessary.

§41 :- *Public Services to consult about extension of mains sewers and piped water* Sewage extensions, see comment on §20.

Final Observation

§42 :- *need for understanding of water in island* 5Rubbish. A good understanding would be superior to that existing at present, but unnecessary. There is no problem.

action to be taken.

52 This extreme position is both emotional and untenable in the absence of evidence obtained by current international methods to support it. None has been produced apart from abundant *evidence by assertion.*

Page

§43 :- crucial need for information and thus need for legislation to acquire it this has been covered before.

* * * * *

Appendix of the Water Diviners etc Group

It is clear that the two water reports, and others, have succeeded in creating considerable confusion due to their many errors. For example, it has been shown, in several areas, that water flows east / west, not from Les Platons to all parts of the island! It is clear that what must be done now is to carry out thorough research to correct these mistakes and obtain the real picture, as far as that is possible. In order to achieve this, I recommend the following forms part of the research :-

- 1. Divine as many streams as possible to find direction of flow.
- 2. Source as many streams as possible.
- 3. Drill two bores on Les Ecréhous, one on Les Minquiers, both to sample the water, identify and, by dyeing, see if it arrives in Jersey. This would be done concurrently with water analysis locally.
- 4. Monitor water levels across the Island over a period of at least 5, preferably 10 or more years.

* * * * *
* * * * *
* * *

3
4
5
6

53 We do not accept the existence of streams as defined by the WDEG -- see comment

54 As previous.

55 The boreholes would yield interesting scientific evidence but not on the state of groundwater in Jersey. At the risk of being accused of not being willing to expose ourselves to the test, we deny a water connection between Jersey and the offshore reefs of the sort postulated.

56 We agree on monitoring but stress again the absolute pre-condition of legislation to gain access to the boreholes and related information.