CONTENTS

1. INTRODUCTION

1.1 The objectives for this review are -

to establish whether there was a real need for legislation on the management and protection of the Island's water resources;

to examine the supporting evidence;

to assess the stated benefits which the draft Law aims to achieve;

to assess the impact of the draft law on businesses in the Island, particularly Tourism and Agriculture;

to consider whether the stated benefits might be met through an alternative, more cost-effective approach to regulation.

1.2 The Shadow Scrutiny Panel

The Shadow Scrutiny function was established by the States of Jersey as part of the reforms of the Machinery of Government. The principles and guidelines of Shadow Scrutiny in Jersey are set in the report and proposition of the Privileges and Procedures Committee P.186/2003, adopted by the States on 27th January 2004.

Senator E.P. Vibert was appointed as Chairman of one of the Shadow Scrutiny Panels. However, the panel decided that, for the purposes of each member gaining experience in the shadow process, members would assume different rôles for each review. For the purpose of the review of the draft Water Resources (Jersey) Law 200-, the Panel agreed that it would be constituted as follows -

Senator J.A Le Maistre (Review Chairman)
Senator E.P. Vibert
Deputy R.C. Duhamel
Deputy F.J. Hill, B.E.M.
Deputy P.J. Rondel
Deputy G.C. Baudains

Officer support: Mr. M. Haden, Scrutiny officer.

2 TERMS OF REFERENCE

The Panel agreed the following terms of reference -

To review the consultation draft of the proposed Water Resources (Jersey) Law 200- ;

To consider the evidence supporting the rationale for the draft Law's stated objective of 'protecting water resources in Jersey'; and

To review the degree of regulation to be applied under the Law and the resultant resource implications.

3. KEY FINDINGS AND RECOMMENDATIONS

3.1 Key Findings

3.1.1 The Panel rejects the case put forward by the Environment and Public Services Committee that the Island's water resource is under serious threat from over-abstraction and that there is a need for a law to monitor and control abstraction via boreholes. The Committee's case is not supported by evidence presented to the Panel. In addition, the prediction in the Riley Report in 1992 of '*catastrophic consequence on the economy, ecology and environment'* unless action was taken to introduce protective measures to manage the water supply, has not materialised. (The Panel implies no criticism of the Riley Working Party as the evidence clearly shows that they relied on the information provided in the studies carried out by BGS, which subsequently proved to be erroneous)

3.1.2 From the evidence presented to the Panel, it is clear that the Committee's consultants, the British Geological Survey (BGS), have failed to fully explore the complex geology of Jersey and its potential ground water resources (section 6.2.13) -

they resisted considering deeper levels of water resource because of their insistence on conceptual model of Jersey's groundwater which restricted significant groundwater movement to shallow levels (depths of 25 to 40 metres) (section 6.2.8);

they ignored calls by the panel of local geologists (the Groundwater Review Group) to research deeper levels (sections 6.2.2), where the Water Diviners and Engineers believe that there is abundant water (section 6.2.8).

they persistently ignored the local knowledge of the Water Diviners and Engineers and treated them with disdain.

3.1.3 Consequently, the Panel is of the view that BGS – who have received fees totalling

£257,457 since 1989 - have not fully carried out the instructions of the Committee given to them in I989, when they were originally engaged. The principal elements of the brief given to BGS, in relation to the quantity of groundwater resources, were -

(i) Establish a hydrogeological database for the Island to determine location and quantification of available groundwater resources together with yield and response to abstraction, rainfall and drought, including risks of marine invasion; and

(ii) The quantification of the relationship between ground and surface water, including the effects of agricultural irrigation on recharge.

3.1.4 Evidence discovered by the Panel shows that a senior officer within the Public Services Department gave inadequate briefings to the Committee -

The views of the Groundwater Review Panel were misinterpreted in a report to the Committee in 1994 claiming that the Group strongly supported the BGS work when, in fact, they were critical of it, especially the computer model which the Review Group did not think was suitable for Jersey's complex geology.

Subsequently, when the Trinity Catchment Study had confirmed previous criticisms of the recharge estimates, resulting in a revision of BGS own position on the risk of severe depletion of the groundwater resource, advice to the Committee continued to maintain that Jersey's water resources were under serious threat.

3.1.5 The Panel was disappointed at the approach taken to the scrutiny of the Law by the Environment and Public Services Committee. For example -

The Committee did not support the Panel's request to invite Dr Robins, the head of the BGS team in working in Jersey from 1989, to attend the Panel's public hearing as a witness. The Panel had important questions about the research into Jersey's water resource position which could only be answered by him. The Panel feels that the Committee had a duty to insist that Dr. Robins appeared (See section 7.3).

The Committee initially refused to give the Panel information on the costs of the BGS contract since 1989, claiming that it was outside the Panel's terms of reference. Only when it was shown that the information was already partly in the public domain did the Committee supply the information (See section 7.4).

3.1.6 No firm or reliable evidence has been given to the Panel of existing boreholes harming the water supply in neighbouring properties, nor was it clear how a regulator would decide whether

or not a proposed new borehole might have a detrimental impact on a neighbour's use of the water resources.

3.1.7 In the absence of any evidence of progressive depletion of groundwater levels over the period 1990 to 2002, the case for the new law is now confined to establishing new special measures in case of drought, getting information about abstraction rates, protecting the wild-life and plants and meeting the environmental objectives of the EU Water Framework Directive (see section 6.3). The Panel

accepts that special provisions for drought situations are sensible and will enable the Committee to apply appropriate controls to certain areas which might experience shortages for whatever reason. However, no compelling argument was put forward of the necessity of this being linked to the proposed system of licensing and registration;

has not been given convincing evidence of the occurrence of saline intrusion in coastal areas;

considers that more needs to be done to understand and balance the needs of the environment and those who depend abstracting water from boreholes for their water supply.

3.1.8 The Environment and Public Services Committee has not fully explored voluntary means of obtaining the information desired on abstraction levels and the location of boreholes. Only if such means prove ineffective should legislation be contemplated to oblige information to be divulged through a system of licensing and registration.

3.1.9 The Panel has set out a programme for the proper investigation of 'Deep Groundwater' resources (Section 6.2.11). Until this work is done, no consideration should be given to introducing any law relating to the registration and licensing of boreholes. Knowing how much is pumped out of the ground has little relevance if there is inadequate knowledge of how much water there is available at deeper levels and how sustainable the supply really is.

3.1.10 There is a debate about the possibility of a groundwater connexion with mainland France, which cannot be dismissed as lightly as BGS has tried to do. The Panel considers that, whilst this may be a complex issue to resolve, sinking a test drill at the Ecréhous would be a useful contribution to this debate. The Panel hopes that the offer made by the Water Diviners and Engineers will be renewed (see section 6.2.9).

3.1.11 The Law Officers advice to the Panel was that the draft Law, if passed by the States, would supersede customary rights to water on the basis that it was in the general public interest to manage the Island's water resources.

3.1.12 It has become clear during the Scrutiny process that the Committee has not fully explored voluntary means of obtaining the information it considers it needs. Witnesses declared that they would be willing to co-operate in a programme to measure use of resources.

3.1.13 The Panel was pleased to note that following the evidence given by Water Diviners and Engineers and the Groundwater Review Group during the scrutiny process the Director of the Environment invited them to enter into joint discussions, together with Jersey Water, to share information. The President wrote to the Panel on 24th November 2004

> *There is ongoing work to do in further quantifying the deeper geology and groundwater resources so that we can better determine licence conditions under the proposed law. I anticipate that this will require the continued involvement of BGS along with the Jersey geologists, Jersey Water and the well drillers and water diviners. As the provisions of the Law to register boreholes and share information take effect our knowledge base will again improve – this is an ongoing and continuous process.*

The Panel will monitor this development with interest.

3.1.14 The States has recently unanimously approved a proposition of the Policy and Resources Committee (P.34/2004) requesting all States Committees to carry out a review of all current and proposed legislation with a view to reducing restrictive regulation and red tape and moving towards a 'lighter touch' government. The Panel has concluded that the draft Water Resources (Jersey) Law 200- will introduce an unnecessary burden of additional regulation and bureaucracy on the Island. In this respect, adopting the Law with its compulsory registration and licensing scheme would run counter to Aim 1.3 of the States agreed Strategic Plan 2005 - 2010 (P.81/2004).

3.2 Recommendations

3.2.1 The introduction of a compulsory licensing and registration scheme should not be considered unless it has been clearly demonstrated that voluntary and co-operative measures are inadequate.

3.2.2 With a view to developing a better understanding of the Island's groundwater resources, the Panel recommends the implementation of -

a. A scientific investigation, to commence as soon as possible, into the Island's potential deep groundwater resources, making use of local knowledge, on the lines proposed by the Panel (Section 6.2.11);

b. A study of the geology and the exploitation of water resources in neighbouring French mainland;

c. Improved public information on the importance of gaining further knowledge of the Island's deep water resources in order to encourage a voluntary approach to gathering information on groundwater levels and abstraction data.

d. A clear statement of how this information will be used to develop further understanding of the Island's water resource position.

e. The engagement of hydrogeologist, on a part-time contract basis only, to work with Jersey geologists, Jersey Water and the Water Diviners and Well Drillers to assist in quantifying the deeper geology and groundwater resources and to develop a suitable programme of resource measurement. This contract should be based on competitive tendering.

f. An analysis of the types of business that would be affected by the proposed licensing system quantifying the administrative and financial impact it would have on small businesses dependent on borehole water sources.

g. Clarification of the implications of the EU Water Framework Directive, together with an assessment of the resource implications for the Island, in order to promote public awareness of the issues.

h. An assessment of the actual ecological needs of specific catchment areas balanced with the needs of abstractors.

i. An assessment of the potential long-term impact of climate change in order to develop an appropriate framework for safeguarding the Island's water resources.

3.2.3 Further to the item on engaging a hydrogeologist on a contract basis, Panel strongly suggests that the Committee consider alternative consultants on the basis of the record of failure on the

part of BGS to provide a good understanding of the Island's water resources and to co-operate with local knowledge and expertise.

4. WRITTEN SUBMISSIONS

4.1 Environment and Public Services Committee

The Panel received a submission, dated 3rd June 2004, on behalf of the Environment and Public Services Committee, setting out -

the background to the proposed legislation from the publication of the Report of the Working Party on the Safeguarding of the Water resources in Jersey under the Chairmanship of the late Major John Riley (March 1992);
the policy objectives of the draft law;
the need for the draft law;
the precedents for the draft law;
the consultation process and subsequent amendments to the draft law;
the procedure for confirming human rights compliance;
the financial and manpower implications;
technical data and supporting documents.

The Panel subsequently received further supplementary papers -

Information relating to water resource management legislation in other jurisdictions, including a brief summary of the position in France and the United Kingdom , dated 30th June 2004, prepared by Mr. T. Williams, Environmental Law Consultant
A non-technical summary of the BGS reports on Jersey Groundwater between 1989 and 2003, dated 5th July 2004, prepared by Dr D. Peach, Groundwater Systems and Water Quality Programme Manager, British Geological Survey.
Water Scarcity Table: Annual Renewable Freshwater per person
'The Water Resources of Jersey: An Overview', dated October 2000.
A 'Final Submission', dated 7th October 2004 in response to a number of written questions from the Panel.

The Panel also received a power-point presentation on the draft Law from Mr. G. Jackson, Assistant Director - Environmental Protection.

All of the correspondence with the Environment and Public Services Committee and its written

submissions are contained in **Appendices One and Two** and have been posted on the scrutiny website at www.statesassembly.gov.je.

4.2 Written Submissions from other organisations and the public

The Panel issued a call for evidence from the public and, in response, received written submissions from the following organisations -

Jersey Farmers Union
Jersey Hospitality Association
Concern
De la Haye Well Drilling Limited
The Jersey New Waterworks Company Limited
Water Diviners and Engineers Association

Two further organisations, the Royal Jersey Agricultural and Horticultural Society and the Jersey Landowners Association, requested an opportunity to discuss the legislative proposals with the Panel in a public hearing.

The Panel also received correspondence regarding the draft law from the following individuals -

Mr. and Mrs R.J. & M. Ison
Mr. N. Renouf
Mr. J.K. Dobbs
Dr. R. Nichols, formerly a member of the Groundwater Review Group
Mr. L. Carter, formerly a member of the Jersey Farmers Union Water Resources Committee.

In addition, Deputy Baudains, provided the Panel with a copy of an independent review of the Technical Reports prepared by the British Geological Survey, carried out by CES, the Environmental Management Consultancy, in January 2001.

All of the above written submissions and correspondence are contained in **Appendix Three** and are available on the scrutiny website at www.statesassembly.co.uk.

4.3 Technical Assessment of Evidence

The Panel's expert adviser provided a technical assessment of the all evidence received. This is

available in **Appendix Four** and has been posted on the scrutiny website.

4.4 Additional Information considered by the Panel

The Panel had access to relevant Minutes and Papers of the Public Services and Agriculture and Fisheries Committees dating back to 1989.

Mr. G. Langlois, Water Diviner, gave the Panel a collection of articles from the Jersey Evening Post and other papers, dating back to 1991 relating to the work carried out by BGS and the legislative proposals. (See **Appendix Nine**)

Dr. Renouf, a member of the Groundwater Review Group, also provided the Panel with a copy of a paper, dated October 2001, prepared for the Conseil Général des Côtes d'Amor by Monsieur G. Marjolet on the water resources of an area similar in geological formation to Jersey. (See: **Appendix Ten**)

The Panel also considered a Research Paper on the EU Water Framework Directive (see **Appendix Eleven**).

5 PUBLIC HEARINGS

The Panel received the President, Environment and Public Services Committee, accompanied by his instructing team and the Senior Assistant Law Draftsman responsible for the preparation of the draft Law, at two public hearings. In the first hearing on 19th July 2004, the Panel focussed its questions on the policy objectives and the need for the legislative proposals. In the second hearing on 26th July 2004, the Panel scrutinised the detailed provisions of the draft legislation.

The Panel also received representatives of the following organisations at two public hearings in July -

The Jersey New Waterworks Company Limited
Concern
Jersey Farmers Union
Royal Jersey Agricultural & Horticultural Society
The Jersey Landowners Association
Well Drillers and Engineers Association

Finally, in October, a further public hearing was held with representatives of the Groundwater Review Group, a group of local geologist which had been set up in 1989 to review the work of BGS (See Section 7.6 0f this Report).

In addition, the Panel conducted one hearing in private session with the Solicitor General in order to consider legal advice on the question of ownership of groundwater. This issue had previously been addressed in Correspondence, dated 8th July 2003, from Mr. R. Whitehead, Principal Legal Adviser, Law Officers Department to Deputy Baudains (see **Appendix Six**)

Verbatim transcripts of all the public hearings, together with summaries provided by the Panel's adviser, can be found in **Appendix Five** or on the scrutiny website at www.statesassembly.co.uk.

Following the public hearing on 26th July 2004, the Panel accepted the invitation of Messrs G. Langlois and L. de la Haye to visit a number of boreholes around the Island, which they had referred to in their evidence. (See **Appendix Nine** for notes of this visit.

6. ASSESSMENT OF EVIDENCE

6.1 OBJECTIVE ONE: TO ESTABLISH WHETHER THERE IS A REAL NEED FOR THE LAW

6.1.1 Background

On 29th September 1992, the States charged the Public Services Committee to prepare legislation for the better management of the island's water resources. In the report accompanying its Proposition, the Public Services Committee said that the States had previously failed '*to provide scientific evidence for the need for control, and the means by which it would be introduced'.*[1] To rectify this and in response to a cycle of 'dry years' culminating in a period of drought in 1989, the Committee had commissioned the British Geological Survey (BGS) to investigate the perceived threat to the long-term security of the Island's water resources.

BGS reported the results of its hydrogeological survey of the Island in 1991 in the first of a series of technical reports. BGS concluded that the Island's available groundwater resources were under attack from two separate directions: pollution and over-exploitation.[2]

On the basis of this report the Committee agreed that there was '*sufficient evidence of the need for better management*'. It accordingly appointed a Working Party under the chairmanship of Major J.R.C. Riley to make recommendations on the means by which better management control could be achieved.[3]

The Working Party reported in 1992 that it was -

> '*persuaded that the groundwater resources are being depleted faster than they are being replenished'.* It was '*convinced that there exists an irresistible logic and argument in favour of the passing of comprehensive enabling legislation by the States in order to bring the use of water resources in Jersey under their control'.*[4]

In its Final Observation, the Working Party stated -

> *In an Island such as Jersey, it is essential to have a good understanding of the water resources in order for them to be protected and managed for the long-term security of supply. Failure to do this could have a catastrophic consequence on its economy, ecology and environment.*
>
> *To manage the resources, the first crucial requirement is information: without this any protective measures are based upon assumption. To acquire comprehensive, reliable data, appropriate legislation is essential. It should be possible to legislate in*

such a way that current users see it to their benefit, and co-operation should be achieved. Obviously, there will be a cost for its introduction and administration, but, in our opinion, the cost will not be onerous. Compared with the potential consequences of doing nothing, the cost could be considered insignificant.[5]

Major Riley made it clear in a letter, dated 6th April 1992, to (the then) Mr. G. Baudains that the Working Party was '*not asked, nor were we qualified to do so, to question the conclusions reached by BGS ….. Our recommendation is that legislation be prepared in advance of any further deterioration in groundwater levels*.'

The Groundwater Review Group, which had been set up in 1989 to monitor the work of BGS, agreed that the Island needed a system of managing water resources -

'There is substantial cause for concern in the amount of water abstracted form boreholes in Jersey compared with the likely renewable resource. We do not question this…… We support ongoing monitoring and accept the need for legislation to compel owners to allow such monitoring and to compel drilling enterprises to lodge logs of all bores made.'[6]

The Group did however question certain aspects of BGS methodology - see Section 6.2.2)

Subsequent reports from BGS further underlined the need for management control. In 1993, the Committee noted that the BGS Technical Report for Year Three had identified that '*the groundwater deficit was even more likely than previously thought'*, due to a number of indications showing that evaporation was higher than originally estimated; water levels in the north of the island were declining; and that the effective aquifer thickness was probably nearer 25 metres than the original estimate of 40 metres. In addition, it was suggested that the fact that major users were no longer metered meant that it was likely that total demand was underestimated.[7]

6.1.2 Draft legislation

In 1995, the Committee decided to deal with the legislation in two phases:

the issue of pollution was given priority. This was addressed through the enactment of the Water Pollution (Jersey) Law 2000;

the draft Water Resources (Jersey) Law 200- is intended to complete the implementation of the recommendations of the Riley report by introducing a

registration and licensing system to manage and control the water resources of the Island in order to protect them from over-abstraction.

The original purposes of the Riley Report and Public Services Committee's to gain information and manage a resource under stress have subsequently been altered to include a number of additional purposes -

the sustainable development of water resources;
the conservation and protection of habitats and ecological systems;
the conservation and enhancement of the natural beauty and amenity of inland waters;
the proper allocation and sharing of the resource;
the protection of existing users; and
the minimisation of the negative impacts of global warming; and
compliance with the EU Water Framework Directive and international best practice.[8]

In oral evidence to the Panel, the President made it clear that, in his view, the case for the law did not depend simply on evidence of depletion of supply -

Even if one had recent evidence that groundwater was not being depleted, and indeed was still rising, would that lead you to the conclusion that you would still not be putting in place some sort of statutory monitoring arrangement for water?..... Even if one were to find a further supply of water - presumably if it exists it's deep in the ground - would that mean you would not be putting in place a regulatory framework for water conservation?..... I think there are compelling reasons for introduction of legislation to pursue the objectives set out clearly in the preamble to the Law, that this law is required, and indeed, necessary for Jersey. Jersey has a proud record of implementing environmental best practice and environment legislation, to secure the world in which we live. And certainly, I think it is a requirement for the States of Jersey to accept putting in place such a statutory framework. …….. And I repeat my surprise of arriving in Environment and Public Services and bringing forward legislation that was identified and agreed by the assembly 20 years ago.[9]

6.1.3 Further Support for the legislation

The Jersey New Waterworks Company Limited stated its support for a Law which would give the Environment and Public Services Committee powers to safeguard the Island's water

resources. In written evidence, the Company referred to the report of the British-Irish Council on climate change scenarios, published in July 2003, and warned that the effect of a worse-case scenario on Jersey would be -

> *to increase the stress placed on natural water resources available and increase the risk of saline intrusion into the aquifer. These potential scenarios reinforce the need to have in place adequate water resource management legislation.*[10]

The Jersey New Waterworks Company added that the requirement to operate the desalination plant underlined Jersey's water scarcity situation[11]. The Managing Director provided evidence to the Panel which indicated that the plant had operated on nine separate periods since 1992 for '*additional water resource purposes'.*[12]

The Groundwater Review Group felt that legislation was required in order to ensure that relevant data was collected. Dr Renouf told the Panel -

> *The acquisition of data from boreholes is too important a matter to be left to any form of voluntary co-operation…… It has been something which has been standard practice in most countries, I believe, to compel the registration of logs of boreholes because that is data and that is lost if it is not done. You cannot depend upon voluntary work to get a coherent pattern of response*.[13]

The Environment and Public Services Committee, at the end of the public hearing on 26th July 2004, submitted an additional document entitled 'Water Scarcity Table: Annual Renewable Fresh Water per Person', which it held to demonstrate that Jersey would sit in 11th place in the World in terms of water scarcity. (See also Section 7.2 of this Report). The President commented -

> *This alone in our view represents an overwhelming technical justification for the Law, which as was explained to the Panel is in addition to the overriding need to protect and manage the Island's known water resources for present and future generations.* [14]

The Environment group, Concern, stated in its written evidence that '*the need for protection of the water table from over-extraction should be self-evident*[15]. In oral evidence to the Panel, Mr. C. Leach, emphasised the principle that water is a public interest commodity of finite quantity, which needed to be protected for continuing use by future generations. Existing users also needed protection against possible commercial abstractions. The proposed law, then, provided a

tool which permitted government to deal with possible 'abuse' of the water resource[16].

Both the Jersey New Waterworks Company and Concern stated clearly in their submissions to the Panel that they accepted the BGS technical assessment of the Island's water resources.

The Environment and Public Services Committee undertook a three month consultation process in 2003. More than 90 people and organisations were contacted and a total of 15 responded. Of these eight were supportive of the Law in principle, five were opposed in principle and two raised queries for clarification. The Committee's subsequent amendments are detailed in its written submission, dated 3rd June 2004.[17]

6.1.4 Opposition to the proposed legislation

The Water Diviners and Engineers Association (WDEA), the Jersey Farmers Union, the RJA&HS, the Jersey Landowners Association, the Jersey Hospitality Association and a number of individuals contested the need for the draft legislation. Their reasons can be summed up as follows (See Section 6.2 for more detailed consideration of these reasons):

- the conclusions of the BGS survey, and its continuing annual reports, are based on inaccurate and incorrect assumptions; consequently, the volume of water available for exploitation has been underestimated; and

- the BGS surveys have consistently ignored potential water levels below the shallow aquifer, which they identified as 25 metres below the water table;

- the impact of the law will be to impose burdensome and unnecessary regulation.

Notwithstanding the assertions made by the President that there are overriding reasons for the introduction of water management legislation, the Panel believes that it is essential to examine the reasons why the draft law has been such a contentious issue since it was first proposed by the Riley Working Party. The Panel believes that a good understanding of the Island's groundwater situation is vital to the operation of the proposed legislation, particularly since this has been the central to the case for legislation since the Public Services Committee Proposition in 1992. A great deal of public money has been invested in providing further evidence of the need for water control and management through the technical studies carried out by BGS since 1990.

In order to reach a considered conclusion on the need for water management legislation,

therefore, the Panel believes it is necessary to examine in detail -

the supporting evidence produced by BGS (Objective two);
the stated benefits of the draft Law (Objective three); and
the impact of the draft legislation on businesses in the Island, particularly Tourism and Agriculture (Objective Four).

Finally, the Panel will consider whether the stated benefits might be met through an alternative, more cost-effective approach to regulation (Objective Five).

6.2 OBJECTIVE TWO: TO EXAMINE THE SUPPORTING EVIDENCE FOR THE DRAFT LAW

6.2.1 Technical Assessment of Evidence

The Technical Assessment of Evidence by Dr S. Sutton, commissioned by the Panel, provides a summary of the data and opinions of BGS, together with a summary of the key issues raised by critics.

The Environment and Public Services Committee acknowledged that this assessment was fair and reasonable, but commented on a number of specific points raised by Dr Sutton.[18]

6.2.2 Assessment of BGS methodology and conclusions

Dr S. Sutton was commissioned by the Water Diviners and Engineers Association in 1993 to provide an external assessment of the BGS studies of 1991 and 1992. In a brief paper he challenged the basic BGS conclusion that the groundwater resources of Jersey were at serious risk of substantial depletion -

> '*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 overexploitation or of developing saline intrusion. … For a groundwater regime as complex as that of the fissures 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 presented are of dubious reliability and are totally dependent on the accuracy of the input parameters, none of which are well defined and one of which (recharge) I would contend is seriously in error.*'[19]

The Groundwater Review Group agreed with the criticisms of Dr Sutton -

> *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' groundwater is more or less at risk.*'[20] *…. We would like BGS to take the uncertainties both of*

recharge and of geological complexity more into account when estimating resource potential and using computer modelling. This is particularly important if they persist with MODFLOW which we do not accept as a sound computer model for Jersey.[21]

The Group expressed confidence in the basic approach employed by BGS but made six clear recommendations to BGS, as follows -

1. *modify their resistance to considering deeper levels of water resource;*
2. *consider geological conditions and associated structure as important controls on water storage and movement and draw up a programme of investigation to address these;*

3.provide a more detailed appraisal of the effects of weathering;
4.look closely at the MODFLOW computer model;
5.have geologists at new water bore sites; and
6.*take greater account of drillers' depths.*[22]

In 1993, arrangements were made by the Agriculture and Fisheries Committee for Dr Sutton to travel to Jersey to meet all interested parties to discuss his assessment of the BGS reports. However, BGS requested a meeting with Dr Sutton in the United Kingdom, in advance of the public meeting, to discuss the technical comments he had made. The meeting in Jersey consequently did not take place.

The President of the Agriculture and Fisheries Committee at that time, Senator J. Rothwell, expressed dismay that this meeting had been cancelled at the last moment, as a similar meeting with Dr Sharp of the Groundwater Review Group had also been prevented only a few months previously. Senator Rothwell complained that the decision had been taken by a Public Services Department officer although this was denied by the Committee.[23]

Senator Rothwell was reported in the Jersey Evening Post, as follows -

'He said … that it was clear to him that attempts were being made to thwart his Committee in obtaining more information before the proposed legislation on regulating boreholes and wells is debated by the States…... As far as I am concerned, some of the people most affected by the proposed legislation will be farmers and growers, and it would be wholly wrong for the States to introduce legislation and add another level of bureaucracy to the public sector, as well as the additional expense which that would entail, if it is not necessary.' [24]

6.2.3 Public Services Information Paper 1994

Subsequently, in a 'Information Paper on Jersey's Water Resources', prepared by the Chief Engineer, Public Services Committee, the criticisms made by Dr Sutton were dismissed, as follows -

> *The short report, which apparently amounts to only 1½ pages, prepared to an unknown brief, should be put into context and compared to the years of detailed study, analysis and reporting carried out by a team of leading professional scientists. All but one of the points raised by Dr Sutton were covered in subsequent BGS reports (which were available but not referred to by him), and the remaining point has been fully answered in correspondence*'.[25]

The Panel asked Dr Sutton to comment on this interpretation of the events of 1993. He maintained that his peer review of published scientific conclusions was both reputable and legitimate -

> *The statement attempting to compare this review of a public domain document with 'the years of detailed study, analysis and reporting carried out by a team of leading professional scientists' is both misleading and emotive.*[26]

In the same Information Paper it was claimed that '*the conclusions of the BGS studies and the need for water resources management have been strongly supported by the Groundwater Review Group'*. The paper, however, made no mention of six recommendations the Group had made (see paragraph 6.2.2).

The Panel was subsequently advised by two representatives of the Groundwater Review Group that the above statement was not a true reflection of their position. They had in fact received no response to their recommendations from BGS or the Public Services Committee at the time. Dr Renouf commented -

> '*This is the first I have heard of this, but I have no idea why. I mean, you know, the six points are clear enough and, whether one subsequently agreed with them or not, they are clear and that is what I would have expected to have had taken into account and addressed. Even if it was to address and dismiss them, I would have expected them to be addressed.*'[27]

The Panel noted with concern a further item in the Public Services 'Information Paper', where

reference was made to the fact that Jersey's water pollution problem had been made the subject of a chapter in an A-level text book on Environmental Pollution with the comment that this '*is a warning that our image is beginning to suffer'.* This insertion is totally due to the acceptance of the BGS opinion of collapse of resources and imminent disaster. In the Panel's view, it is not acceptable that the Public Services Committee of the time should have allowed BGS to reproduce such negative and controversial conclusions about the Island's current pollution laws in an academic textbook.

The Panel was unable to clarify the above issues by questioning the Public Services Chief Engineer and the head of the BGS study team, Dr. Robins. In particular, the Panel wished to know how BGS implemented, if at all, the recommendations of the Groundwater Review Group. However, the Chief Engineer had subsequently left the Department and was no longer available in the Island. The opportunity to discuss these matters with Dr Robins was sought but ultimately the Panel was unable to reach agreement with the Committee and BGS about Dr Robins' presence at a public hearing (see Section 7.3).

Key Finding
The Public Services Committee at the time was not given a balanced or fair picture of the criticisms made by Dr Sutton nor the recommendations of the Groundwater Review Group.

6.2.4 Committee Decision to defer water management legislation

Later in 1994, the Committee began to express some reservations about the groundwater position -

- in August 1994, the Committee '*expressed concern at recent press releases from the Department regarding the position in relation to the Island's groundwater resources and asked that no further statements be made until an agreed policy had been formulated.*'[28]
- In November 1994, the Committee *'accepted that the problem of pollution needed to be addressed, but was not convinced that there was evidence of depletion of supplies*.'[29]
- In March 1995, the Committee decided to convene a special meeting to consider the options to be taken in relation to the promotion of the Water Resources Law.

[30]

The Minutes of the meeting in March 1995 record the following -

> *'The Chief Executive Officer and the Chief Engineer both strongly urged the whole matter of the management of the Island's water resources should be addressed by the adoption of a complete, comprehensive Water Resources Law. However, the Committee decided that it wished to proceed as a matter of urgency to promote legislation to control pollution but that, in view of the contentious nature of the proposals in relation to the Water Management Law which had not been confirmed by data and which were being strenuously opposed by many sections of the Island's community it was not yet convinced that there was sufficient evidence on the need to proceed with these proposals.*[31]

The Committee, at this time, began to press the Chief Engineer to investigate the claim of the Diviners that there were groundwater reserves on the Ecréhous.[32] The Committee Minutes, however, show no record of the outcome of this action ever being reported back to the Committee.

6.2.5 Revision of recharge estimates

After 1996, the water balance estimate for Jersey was revised following the Trinity Catchment Study, carried out for the Public Services Committee by the Institute of Hydrology. This study calculated average annual infiltration at 132mm per year rather than the previous estimate of 50mm per year. This effectively shifted the combined demand of groundwater and baseflow from 100% of the renewable resource to between 40% and 50%.[33]

As a result, BGS modified its position with regard to stress on the groundwater resources of the island. BGS reported on the situation in 1996, an exceptionally dry year of 1996, as follows -

> *'In summary, there appears to be no deficit in the water-balance at present. Current discharges from the groundwater system amount to between 50% and 100% of the estimated renewable resource. Although the margins of uncertainty in the estimation of abstraction and recharge are large, problems of physically unsustainable use, that is where abstraction exceeds recharge, are probably only significant in the short run during periods of 'drought' and in particular localities, rather than posing a longer term threat for the Island as a whole.'*[34]

Dr Sutton examined long term groundwater hydrographs for nine wells which were provided in the most recent BGS annual report (CR/03/102N report for 2002). The hydrographs included results for the exceptionally dry period of 1995/97 which showed falling groundwater levels due to below average recharge. He found -

> *There is no long term trend of declining groundwater levels apparent from the data presented by BGS, nor is there any indication of significant depletion of groundwater resources in the dry years of 1995/96. No evidence is presented of the relationship between groundwater levels and stream baseflows throughout this period.*[35]

BGS, however, remained concerned about the possibility of over-abstraction in particularly dry years, when possibly there might be no effective recharge.[36] Nevertheless, from 1996 onwards, BGS recognised that the water resource was generally adequate. For example, BGS reported about the year 2002 -

> *Groundwater levels remained healthy throughout the year and in some areas groundwater levels have been showing a positive trend for some years.*'[37]

Thus, the emphasis placed on abstraction licensing shifted, from the time of the Trinity Catchment Study, from the protection of a resource under severe threat to the acquisition of an accurate view of overall abstraction rates and patterns for long term strategic planning purposes. [38]

6.2.6 Renewed commitment to legislation on water resource management

Despite the revised recharge estimates, Public Services officers continued to advise the Committee that groundwater resources were under stress. In a report to a newly constituted Committee in 1999, the Chief Engineer, wrote that -

> *[The] latest BGS report has confirmed that groundwater is a finite resource under considerable demand. …… In dry years, the groundwater level (water-table) falls, baseflow (groundwater discharge to surface waters) declines and many boreholes go dry, particularly on higher ground. …… Total use of groundwater and baseflow*

represents just over half the available annual renewable resource and recharge is not always sufficient to sustain demand; there were four years with less than 300mm recharge in the period 1988-1996. Any further increase in abstraction may start to erode baseflow and so permanently damage the resource potential of the aquifer. [39]

This report contained no reference to the concerns expressed by the previous Committee in 1994 about the contentious nature of the proposals and the lack of convincing evidence for the assertion that the water supply was at risk. There was no reference to any dialogue with the water diviners and drillers having taken place. The Committee was simply reminded that the Water Pollution Law had been prioritised and was advised that -

water management has concentrated on monitoring the balance of groundwater abstraction and recharge. *This has, however, proved difficult to implement effectively due to lack of legislation to enable data to be collected on groundwater abstraction. [40]*

On this basis, the new Committee agreed in 1999 to reaffirm the commitment to continued monitoring of the groundwater reserves and the production of appropriate Law Drafting Instructions for legislation on Water Resource Management[41]. The proposed legislation was subsequently given high priority in the law drafting programme for 2001.

The Panel, in its public hearing with the President of the Environment and Public Services Committee on 19th July 2004, tried to elucidate the reasons for the reversal of the Committee's decision in 1994 to defer the water resources legislation but was unable to get a clear answer from the Instructing Team. Dr Peach, who was not part of the BGS study team, said, in apparent contradiction to the actual findings, that the Trinity Catchment Study '*gave more confidence to the idea that we were right on the edge*.' He confessed that he was unable to be precise on the matter.[42]

6.2.7 CES Review of BGS Technical reports

In 2001, CES, The Environmental Management Consultancy, was commissioned by Deputy G. Baudains to carry out a review for of BGS Technical Reports up to 1998, concentrating principally on the quantification of groundwater resources on the Island. CES found that -

Several studies undertaken by BGS have provided variable and inconsistent estimates of the volume of groundwater resources. Published estimates of annual

recharge vary from 30mm (3.5Mm^3) to 300mm (34.8 Mm^3). As a result of the complexity and differences in the hydraulic characteristics of the rocks on the Island, it is considered that use of a single recharge value is inappropriate.[43]

The CES study commented -

In the absence of information on variations in groundwater levels over a long period of time it is not possible to confirm whether there is a trend of declining groundwater levels on the Island.[44]

CES pointed out that BGS themselves had summarised the situation well in their 1996 report (WD/96/8) which had concluded that -

'*problems of physically unsustainable use … are probably only significant in the short run, during periods of drought and in particular localities, rather than posing a longer term threat for the Island as a whole'*.

6.2.8 Investigation of deep sources of groundwater

A major criticism of the groundwater studies carried out by BGS has centred on its resistance to considering deeper levels of water resource. The conceptual model of the main Island aquifer, presented by BGS in its technical reports, is of a shallow water-bearing zone approximately 25m below the water table.

For the most part, groundwater storage and transport is shallow and within the top 25m of the saturated rock (i.e. from the water table to 25 m below it). This is borne out by the mean depth of penetration of boreholes on Jersey; it reflects reduced dilation of available cracks and fractures with increasing depths and pressure of over-burden to the degree that the fractures can no longer conduct water.[45]

BGS recognised that useable quantities of groundwater might be encountered by boreholes at depths of up to 84 metres below the surface. In their very first report BGS identified a number of boreholes on the Island at various depths between c 76 and 145 metres[46]. However, BGS was not prepared to pursue an investigation of the potential water resources at deep levels as they considered that the flow available was of relatively limited volume[47]. BGS explained in a Technical Report -

Fracture dilation reduces with pressure of overburden. There is consequently an optimum depth for groundwater flow to take place and that depth is a function of

weathering and fracture interval. Boreholes have been drilled up to 84 metres below the piezometric level and these may penetrate relatively deep transmissive fractures which may allow a modest component of deeper groundwater circulation.[48]

WDEA has consistently challenged the BGS view that the shallow aquifer represents the only effective exploitable groundwater resource for the Island -

The WDEA has no confidence in the data supplied by BGS as it appears to relate mainly to the surface water and not the high volume reliable deeper supplies which they only refer to in passing. It is our belief that BGS has failed to understand Jersey's geology, failed to undertake proper research and presented as hard facts figures which are mere extrapolations of estimates and guesswork.[49]

WDEA claimed that individual deep boreholes were capable of supplying up to 10,000 gallons per hour (although more frequently the maximum supply was closer to 3,000 gallons per hour) and were more reliable than the shallow groundwater sources around the Island[50]

The Groundwater Review Group agreed that the BGS view of potential deep groundwater resources was unnecessarily limited -

'For what we consider sound geological reasons …we advocate investigation of water below 40m to determine how the different rock types and the major fissured lines of structural weakness behave.'[51]

At its hearing in July, the Panel questioned two representatives of WDEA, Messrs G. Langlois and L. de la Haye, about their views of the Island's deep groundwater resources. These witnesses told the Panel of their long experience with deep boreholes throughout the Island and complained that their submissions to BGS and the Public Services Committee had been ignored. They said they knew of boreholes at depths of 500 to 600 feet which provided plentiful supplies of water, of superior quality to shallow groundwater wells, and which had not been known to fail. They also told the Panel that they were aware of 23 artesian wells and a number of boreholes producing warm water. Mr de la Haye provided the Panel with a listing of the locations of 6 artesian boreholes and 44 boreholes, generally 200-500 feet deep producing in excess of 2000gph(3 l/s). (The Panel subsequently visited a number of examples[52])

Messrs Langlois and de la Haye said that they had provided BGS, at the commencement of its hydrogeological survey in 1989, with a (confidential) list of 50 boreholes where water had been

struck at depths of more than 40 metres and 90 metres. Some of the deep boreholes on the WDEA list were included in BGS monitoring survey.[53]

6.2.9 Groundwater from France

Messrs Langlois and de la Haye also expressed their firm belief that the Island's deep groundwater resources were recharged from the French continental mainland. They had offered to drill a test well on the Ecréhous, at no cost, to prove this assertion but this offer had been refused.[54]

BGS dismissed the suggestion of groundwater flow from France as '*mystical underground rivers*' [55], and explained its reasons in its Overview Report 2000.[56]

CES discussed this suggestion but agreed that it was unlikely that this additional source of fresh groundwater recharge could make any significant contribution to Jersey's resources.[57]

The Panel discussed the issue with the Groundwater Review Group who told the Panel that there was no likelihood of groundwater from France contributing significantly to the groundwater resources of Jersey. They told the Panel that movement of water through the ground was a slow process through pores and fissures and controlled by gradient and permeability (Darcy's Law), In their view, while drilling a borehole on the Ecréhous would be of interest in establishing the subsurface geology of the reef, the presence or absence of fresh water at deep levels under the reef would prove nothing in view of the geological history of the last one million years. The Group explained that for most of that period Jersey and France had been part of the same land mass connected by a coastal plain across which rivers flowed and valleys occurred. Much of the freshwater recharge from this period might have been flushed by seawater but it was probable that a fair proportion remained. It was likely that freshwater under what is now essentially the sea would be relic of this 'fossil' water. The Group also said that the use of tracers to try to establish a link to Jersey is unlikely to prove practicable because of time, distance and uncertainty.[58]

Key Finding
There is a debate about the possibility of a groundwater connexion with mainland France, which cannot be dismissed as lightly as BGS has tried to do. The Panel considers that, whilst this may be a complex issue to resolve, sinking a test drill at the Ecréhous would be a useful contribution to this debate. The Panel hopes that the offer made by the Water Diviners and

Engineers will be renewed.

6.2.10 Comparisons with Brittany

At the public hearing in October 2004, Dr. J. Renouf of the Groundwater Review Group gave the Panel a copy of a paper on the geology of the Côtes d'Amor area of Brittany, by Monsieur G. Marjolet. He explained that, in this area of very similar geology to Jersey, around 20% of the public water supply is obtained from wells 60m to 90m deep, principally into volcanic (andesitic) rocks yielding up to 300m^3/hour. The occurrence and exploitation of this deep groundwater requires specific geological conditions very similar to those found in the Trinity/St. Saviour area and possibly at depth through to the northeast coast.[59]

The Marjolet document provides a number of illuminating observations. It refers to

> '*the potential for output of the underground waters of the block, largely unrecognised until the mid-seventies. …… from 'haphazard' bores carried out mainly by farmers for the relatively small needs of their own animals, we have progressed to more organised prospecting, with more ambitious objectives, for the supply of drinking water to communities. …… interest has been shown in these [underground water] reserves, tapped nowadays by deep drilling, in better conditions than formerly [i.e. the arrival in the region of the percussion drilling technique which is cheap and well adapted to the Armorican block]. …… Contrary to what was 'accepted' formerly, it appears that productivity does not diminish with depth; water has in fact been found to circulate at 250m, in bore holes which are now being made deeper and deeper. The rocks of the substratum are characterised by their porosity through fissures, whose water storage capacity is generally fairly insignificant. Some examples, however, do exist, which contain large quantities; this is the case, for example, in the volcanic rocks of the Trégor where vacuoles occur.*'[60]

The Marjolet position regarding deep water resources contrasts strongly with the position adopted by BGS which has consistently denied that significant quantities of water might be found at lower levels due to the pressure of overburden (See Section 6.2.8). Dr Peach told the Panel -

> *'If I were presented with evidence that there were substantive exploitable supplies from 100 metres, 200 metres depth - which I haven't been and I don't see any*

scientific investigative evidence to show that - then I would want to be assured of the sustainability of those supplies. ……There's no doubt that would alter the calculation of the total water buffers.'[61]

6.2.11 Possible Approach to investigation of 'Deep Groundwater' resource

Dr Sutton was asked by the Panel to explain how potential resources at deep levels might be tested scientifically. He told the Panel during the public hearing -

The conventional approach would be to carry out a pumping test or a series of pumping tests that you would pump one or two of these boreholes at as high a possible rate as you could sustain, possibly for a two- or three-week period. You would monitor the water levels around it, you might need to put in purpose-drilled observation wells within 10 or 20 metres of them, and you would measure the rates at which the water level fell and then, more importantly probably, you would measure the rates at which the water levels recovered. And if there were -- if, say, you pumped for two weeks at 20,000 gallons an hour and within three days of switching off the pump the water levels had recovered to the level that they were before you started, you would be reasonably certain that, in terms of a human lifetime, you probably had a substantial resource. But if, on the other hand, the water levels never actually recovered, you permanently dropped the water level by a metre or two; you'd know you were mining water. But any investigation of resources at depth is expensive.

In his view, a graduated process, using knowledge of existing boreholes, would be more appropriate for Jersey -

I think I would take it one step at a time, see if there was a difference in the chemistry, look at what could be done with the existing boreholes, and if, five years down the line, it looked as though, you know, you were moving towards establishing that there was a substantial resource at depth which became an important strategic resource for planning the island's future, you then might move to the point where a sort of purpose-built and expensive test was worth carrying out. But, no, I think initially I would work with what was there and with an attempt to capture the knowledge of people who've been involved for generations.

This outline approach was set out more formally in a discussion paper for the Panel which is

contained in **Appendix Four.**[62]

6.2.12 Conclusions

Dr. S. Sutton, in his evidence in public session in July, told the Panel that, in his view, the principal scientific weakness of the BGS reports was the total absence of reference to the details of the complex geology of Jersey and the lack of recognition that the geological structure was continuous with that of the closest parts of France. He explained that the BGS concept of a shallow water bearing zone controlled by fractures caused by surface processes was derived from experience in crystalline continental geology. It was not compatible, with complexly variable, faulted and folded rocks as were found in the geology of Jersey. On the other hand, he said, the results reported by Langlois and de la Haye were consistent with the understanding of the geology of the island and the experience in similar geological environments in UK and Ireland.[63]

Following the public hearings in July, the Panel wrote to the President of the Environment and Public Services Committee, on 28th July 2004, to enquire whether, in the light of the evidence suggesting serious weaknesses in the studies carried out by BGS, his Committee believed that BGS data was robust enough to use as a means of calculating water profiles and reserves. The Committee responded, as follows -

> *The Committee is satisfied that currently the conceptual model and water balance/recharge calculations undertaken by BGS (and the Centre for Ecology and Hydrology) are sufficiently robust to support the need to properly manage and control the water resources of Jersey for both its protection from over abstraction and its equitable allocation.*[64]

Despite this expression of confidence, the Scrutiny Panel is convinced that BGS studies of the Island's geology and water resources is incomplete for the following reasons -

BGS has failed to investigate the Island's deep groundwater resources;

BGS has adopted a simplified concept of the Island's geology;

BGS has failed to address the recommendations of the Groundwater Review Group;

Consequently, the Panel does not believe that BGS has achieved a '*good understanding'* of the water resources, which the Riley Report in 1992 regarded as essential[65]. The example of neighbouring Brittany supports the case for taking a broader approach to the investigation of potential deep water resources.

In the Panel's view, it is clear that BGS have failed to fulfil the terms of the brief provided by the Public Services Committee in 1989 in respect of the following items -

(i) establish a hydrogeological database for the Island to determine location and quantification of available groundwater resources together with yield and response to abstraction, rainfall and drought, including risks of marine invasion; and

(ii) the quantification of the relationship between ground and surface water, including the effects of agricultural irrigation on recharge.

Furthermore, the Panel does not believe that the Public Services Committee in the past were kept properly informed by its Chief Engineer of developments in the understanding of the Island's water resources. In particular -

Criticisms of the work of BGS do not appear to have been addressed;

The revision of the recharge estimates following the Trinity Catchment Study was not reported to the Committee;

Action requested by the Committee in respect of discussions with the Water Diviners and Engineers was not reported back to the Committee.

In the Panel's view, the evidential case for the proposed legislation has not been improved by the technical studies produced by BGS since 1995 when the Public Services Committee said that it '*was not convinced that there was evidence of depletion of supplies*'.[66]

Key Findings **Evidence presented to the Scrutiny Panel shows that**
(a) the threat to the Island's water resources through over-extraction was overstated in the early BGS studies and is now no longer considered the principal justification for the proposed legislation; **(b) BGS has not fully explored the complex geology of Jersey and its potential groundwater resources.**

Recommendation
A scientific investigation should commence as soon as possible into the Island's potential deep groundwater resources, making use of local knowledge, on the lines proposed by the Panel (Section 6.2.11);

6.3 OBJECTIVE THREE: TO ASSESS THE STATED BENEFITS WHICH THE DRAFT LAW AIMS TO ACHIEVE

The benefits of the draft law, as currently proposed by the Environment and Public Services Committee, can be summarised under the following headings

Complementing the Water Pollution (Jersey) Law 2000
Protecting the rights of water users
Ensuring the long-term sustainable management of the Island's water resources
Implementing the EU Water Framework Directive
Managing drought situations
Combating the effects of global warming
Providing information on boreholes and abstractions on the Island

6.3.1 Complementing the Water Pollution (Jersey) Law 2000

In its written submission, the Environment and Public Services Committee stated that the proposed water resources legislation would complement the Water Pollution (Jersey) Law 2000 in lowering pollution levels that might be caused by over-abstraction, linking to the Water Quality objectives and Water Catchment Management Areas established under that law.[67]

The Panel was not given any detailed information on how these links would operate in practice.

6.3.2 Protecting the rights of water users

The Committee's Environmental Lawyer pointed out that Article 16(1)(c) provided an important element of protection which was not present under the current regime -

> *Only by putting this law in place will existing borehole extractors have any level of protection. At the moment, in Jersey, there is nothing whatsoever to prevent a person from sinking a bore hole, literally next door, and taking your water away.*[68]

In response to questioning on 26th July 2004, the Assistant Director, Environmental Protection said that he was unable to recall any specific incident of a domestic borehole derogating a neighbouring property, although there was some anecdotal evidence of a commercial hotel in St Brelade's affecting the house next door.[69]

Further witnesses confirmed that there were few known cases of borehole derogating water from a neighbouring supply. Mr. G. Le Lay of the Jersey Farmers Union said that he knew of no occasions where a commercial glasshouse unit had affected other properties, though he mentioned one case of a large house with a deep borehole affecting a neighbour[70]. Mr. L. de la Haye, Well Driller, gave an example of drilling a cluster of 15 boreholes for a housing estate and maintained that there had been no problem with supply.[71]

In its written evidence, Concern mentioned two case studies where over-extraction of water was to the detriment of other users, namely a Coca-Cola bottling plant in India and the Chateau Royal apartments in Jersey. In the first case, it was claimed that the 16 hectare plant was drawing water away from local rice paddy fields; in the second, a borehole had been sunk for garden irrigation purposes in an area (Grouville) known to have a shallow aquifer. Concern could not, however, confirm whether the garden irrigation had had any impact on the neighbouring golf course and local grower supplies. Nevertheless, Concern strongly believed that some form of control and reasonable limitation on extraction through licensing should be applicable.[72]

In the public hearing, Mr. C. Leach told the Panel -

> *'We've had experience in Jersey before of competitive drilling as water levels declined in times of drought - which emphasises the need for the protection of a public interest that water is given a degree of protection.'*
>
> '*We have anarchy in Jersey in the sense that you can sink a [bore]hole whenever you want, wherever you want, extract as much as you want, without any constraint. So, for instance if a particular landowner wanted to get into the water supply business, there's nothing to stop him. …… Or, if someone decides on a laundry, or a car wash facility, suddenly an extra big demand on a shallow aquifer. Who knows what will happen?*
>
> *There is the anticipation of the Law, should something happen that affects the public. And the public includes local farmers who've got farms dependent on the water table for their business. If you have several large apartment blocks and other uses, whether domestic or commercial, and suddenly they are without their supplies for their agriculture, then you have a crisis on your hands without any law to help you resolve it.'*[73]

In response the Panel's question, however, Mr. Leach was unable to give any example of over-

abstraction currently occurring in the Island.[74]

The Panel considers that the examples given of new large commercial uses impacting on existing local uses are not realistic in the local context where any new development would be strictly controlled by the Planning authority. Potential derogation of neighbouring water resources would be the subject of an environmental impact assessment prior to granting a permit.

Key Findings
No firm evidence has been given of existing boreholes derogating neighbouring properties in the Island was it clear how the regulator would decide whether a proposed new borehole might have a detrimental impact on a neighbour's use of the water resources.

6.3.3 Ensuring the long-term sustainable management of the Island's water resources

The Director of Environment explained that

> '*sustainable development is simply to do with the long term maintenance of a common resource…… so that we're managing the resource in a way that it can continue to be used by future generations*'[75]

The Director gave the following example of unsustainable development -

> *'On some of our coastal aquifers, or adjacent to the coast, if you were to pump down the water to such a degree that salt water was drawn in from the sea, that would corrupt the aquifer such that it wasn't available for future use.'*[76]

BGS studies had highlighted two areas of concern, behind St Ouen's Bay and the southern part of the Royal Bay of Grouville, where thin Holocene sands formed shallow superficial aquifers.[77] Dr. Peach told the Panel -

> *The issue of saline intrusion is one of vulnerability. …… If you over-exploit the sands at St. Ouen's or one of the coastal lands - and at the moment there is no way of stopping over-exploitation - you will ruin it.*[78]

The Panel was informed that regular monitoring of these areas was essential to ensure that vulnerable areas remained stable. This was occurring, for example at Coronation Park[79]. Dr. Peach maintained that the problem was one of limited knowledge of the amounts of abstraction taking place in these areas[80]. The Panel noted, however, that there were conflicting statements in the BGS studies concerning saline intrusion. For example, the BGS study in 1998 had reported that there was no cause for concern in the St. Ouen's Bay sands.

The Director of Environment reminded the Panel that the proposed Law dealt with the totality of water resources in Jersey, which included flow in streams, the possible impoundment of those flows, the proper distribution of water resources and the protection of flora and fauna.[81] He said that there were different viewpoints regarding abstraction and impoundment. For example, a potato farmer might wish to dam a stream to get all the water he required for his fields. This might harm flora and fauna downstream of the impoundment. Another example was the need to control agricultural abstraction from fields feeding the water companies reservoirs, in times of drought.[82]

The Committee's submission gave no detailed information on specific planning for the development of water management strategies for the Island.

Key Finding
The Panel has not been given convincing evidence of the occurrence of saline intrusion in coastal areas.

6.3.4 Implementing the EU Water Framework Directive

The Committee stated that the proposed law would

> *'allow a long-term integrated and sustainable approach to the management of Jersey's water resources in line with the EU Water Framework Directive, one of the most important pieces of European environmental legislation'*.[83]

The Environment and Public Services Committee provided the Panel with information on the approach to water resource management legislation followed by many other jurisdictions, both

in Europe and worldwide[84]. It was informed that there were at around 120 countries worldwide with some form of water resource management legislation already in place. The Panel was advised that all EU member states were required to have comprehensive water resource management legislation enacted by 22nd December 2003, in order to comply with the requirements of the EU Water Framework Directive 2000.

Dr. Peach explained that the Water Framework Directive was forcing the whole of Europe to look at the integration of the quantitative status, the chemical status of waters, and ecological status of rivers and streams. Over-abstraction, he said, affected the base-flow to streams and would, therefore, impact on both the public supply and the ecology of streams:

> *It [i.e. over-abstraction] affects the ecology of the streams - and 20 years ago we weren't really concerned so much ecology, but times change, and we are now. The States observe European law advancement and implementation. It's not part of Europe but it likes to try and keep up with those things. The Water Framework Directive is forcing the whole of Europe to go down this route. And the ecological status of rivers is largely controlled in the summer and early spring months here, by a base-flow from groundwater.*[85]

The President told the Panel that he was surprised and embarrassed that the proposed legislation had taken so long before being introduced to the States. He stated -

> *'Jersey has a proud record of implementing environmental best practice and environmental legislation, to secure the world we live in. I think it is a requirement for the States of Jersey to accept putting in place such a statutory framework.'*[86]

The Committee's submission gave no details about the aims and objectives of the EU Water Framework Directive. Nor was there any description of how it had been implemented in any of the jurisdictions listed by the Committee, nor an analysis of its impact on agriculture and major users.

The Panel noted a research paper, prepared by the Members' Research Service for the National Assembly for Wales which was intended to provide an introduction to the Directive and its implications.[87] This document makes it clear that the Directive -

> recognises, and makes allowances for, the differences between member States in respect of the water environment,
>
> recognises that the implementation of the Directive impacts on a range of

industries and people;

provides for the designation of certain areas to be subject to special protection; and

requires consultation as part of the implementation plan both in establishing the Directive and throughout the ongoing implementation process.

The central goal of the Directive is for all areas to achieve 'good status' in terms of chemical and ecological characteristics, water quantity and how the management of the water resources affects the surrounding environment by 2015. In terms of quantity status for groundwater, which has been the subject of much of the discussion of the Panel's enquiry, the Directive requires that abstractions -

should not exceed the ability of groundwater reserves to be replenished naturally;

do not compromise the needs of the environment that depend on the groundwater.

The website of the Directorate General of the Environment of the European Commission, in its introduction to the Directive, the issue of groundwater is put into the context of the needs of the ecology -

> *There is only a certain amount of recharge into a groundwater each year, and of this recharge, some is needed to support connected ecosystems (whether they be surface water bodies, or terrestrial systems such as wetlands). For good management, only that portion of the overall recharge not needed by the ecology can be abstracted – this is the sustainable resource, and the Directive limits abstraction to that quantity.*[88]

The Committee's submission gave no information about any study that has been made of the needs of the local ecology in determining rates of abstraction from streams or groundwater.

The House of Commons Environment, Food and Rural Affairs Select Committee undertook an enquiry in 2002/2003 into the plans for the implementation of the Directive in England and Wales (which was subsequently implemented by the United Kingdom Government on 22nd December 2003). The Select Committee made a number of conclusions and recommendations, including

a lack of knowledge about the ecological status of all waters;

a lack of resources to properly meet the needs of the Directive; and

a lack of publicity about the implications of the Directive.

The Select Committee stated in its introduction -

> *The Water Framework Directive offers the potential of enormous environmental and social benefits, but at the same time it will dramatically affect the ways in which farming, industries and others conduct their activities. Therefore the first - and perhaps over-riding - conclusion of our inquiry is that the Directive needs much greater public promotion. We hope that all parties affected by the Directive, as well as the media, will now recognise the significance of the Directive, and begin to give it the attention and discussion it deserves, and that the Government gives a much clearer lead about its implications, techniques and costs of implementation.*[89]

The Panel believes that these conclusions apply equally to Jersey. Furthermore, it believes that support for 'environmental best practice' in terms of water resources needs to be translated into a plan based on an assessment of the actual ecological needs of specific water catchment areas. Further public promotion needs to be carried out, on the basis of clear information about balancing the needs of the ecology and the abstractors. This must be done before contemplating the introduction of legislation to establish an Island-wide system of licensing and registration.

Recommendations

Further work needs to be done in order to clarify the implications of the EU Water Framework Directive and assess the resource implications for the Island in order to promote public awareness of the issues.

An assessment should be carried out of the actual ecological needs of specific catchment areas balanced with the needs of abstractors.

6.3.5 Managing drought situations

In its proposition in 1992 the Public Services Committee referred to

> *the advantages to be derived from having the means to manage without recourse to the severe and arbitrary restrictions which are required when circumstances justify*

invoking the Emergency Powers and Planning (Jersey) Law 1990.

The Committee told the Panel that it was impossible to predict, with any certainty, the anticipated frequency of drought situations on the Island. However, it suggested that, according to the BGS Overview Report more than 50% of the eight year period between 1989 and 1996 were 'droughts'. This report refers to a number of '*notorious dry years 1975/76, and the periods 1989 tom 1992 and 1995/96'*. It stated -

> *These dry years are significant as it is these years of water stress that the Island needs to be able to cope with in terms of surface water storage capacity and conjunctive abstraction of groundwater*.[90]

Part Four of the draft Law sets out special provisions which may be brought into force in the event of a serious deficiency of supplies of water in any part of Jersey. These may apply -

generally throughout Jersey
to any specified part of Jersey,
to any specified activity or class of activities; or
to any specified class of persons.[91]

Key Finding

The Panel accepts that special provisions for drought situations are sensible. These measures will enable the Committee to apply appropriate controls to certain areas which might experience deficiency for whatever reason. However, the Panel has been given no compelling reason why special drought provisions must necessarily be linked to the proposed system of licensing and registration.

6.3.6 Combating the effects of global warming

The Panel was told that the British-Irish Council had commissioned a study looking at the effects of climate change on a small island scale[92]. Relevant factors included changes to the pattern of rainfall, with less rain in the summer period affecting the availability of water for crop irrigation, and the prospect of rising sea-level threatening low-lying coastal aquifers.[93]

The Panel noted the following assessment from its expert adviser -

The overall interpretation is that the most likely water resources impact for the Channel islands will be a close to 10% increase in winter rainfall and a 10-15% reduction in summer rainfall by the 2020s. However, as temperatures increase actual evaporation also increases and over 'effective' rainfall is reduced. The impact of this potential change on the groundwater recharge in Jersey has not been analysed. A potential reduction of up to 10% has been determined for other parts of the United Kingdom.[94]

The Panel recognises that there is no room for complacency in the light of persistent warnings about global warming. However, it notes that the scenarios presented in the British-Irish Council report are subject to a degree of uncertainty. In the Panel's view, decision making in response to such predictions should be based on a good knowledge of potential resource options. It has been clear in the course of the current enquiry that there is considerable room for improving current knowledge about potential water resources. This should be the first step in response to the warnings about the effects of climate change on the rainfall, followed by measurement of rainfall changes over a period of time and an assessment of the potential implications on storage capacity in the Island. These steps would give greater public confidence that an appropriate framework was being developed to deal with any future problems. The Panel does not accept that the introduction of the proposed licensing and registration scheme is the correct solution at this stage.

Recommendation

The Panel recommends that further analysis should be undertaken to assess the potential long-term impact of climate change in order to develop an appropriate framework for safeguarding the Island's water resources.

6.3.7 Providing information on boreholes and abstractions on the Island

The Panel noted that the original brief given to BGS in 1989 required them to

establish a hydrogeological database for the island to determine location and quantification of available groundwater resources together with yield and response to abstraction, rainfall and drought, including risks of marine invasion. This groundwater source database will be based on a survey of existing wells and boreholes at a

density of one per km grid squares.

In 1990 BGS carried out an extensive field survey, including a survey of 109 groundwater sources. Since July 1993, BGS have monitored groundwater levels on a monthly basis at 30 or 40 boreholes and wells. In addition, abstraction volumes have been monitored by BGS at selected sources (initially 76 in 1989). However, this was discontinued in 1999 due to the deterioration of the monitoring network.[95]

Despite this long-term monitoring programme, BGS maintained that further, more comprehensive information was required.

> '*The analysis of the water cycle for Jersey remains incomplete without measurement of source abstraction volumes*'.[96]

The Panel was advised that Article 34 of the draft Law would enable the Committee to obtain relevant information -

> *The Draft Law will allow the refinement of resource estimates by facilitating the gathering of additional data concerning abstraction volumes. In addition to the gathering of such data BGS would advocate the enhancement of the current understanding of Jersey's water resources by the monitoring of groundwater levels and the establishment of a comprehensive borehole/ well database. This would allow for the production of an improved model and consequently the better prediction of possible resource deficits in the future.*[97]

Dr Peach told the Panel that the States currently did not have any mechanism to enable it to collect the required comprehensive data on abstraction rates from all the Island's boreholes and wells -

> *In order to plan for any eventuality in the future you need to have a variety of things in place. Knowledge of where your water's coming from and how much approximately you have …, so you can cope with eventualities like drought, like extreme events, with changes in public desire, changes in demography, changes in population. At the moment the States isn't equipped to be able to do that in terms of its regulation of the shallow water resources it depends on. So you need knowledge of resource. You also need knowledge of the use. We don't even know at the moment the detail of where these 4,000 or 5,000 or 6,000 bore holes are that people rely on for agriculture and industry and private supply of its supply.*[98]

6.3.8 Value of abstraction data

CES, in its review of water resources in the Island, supported the importance of obtaining good information on groundwater resources and abstraction rates on the basis of a network of monitoring boreholes. CES made the following recommendations -

(1) Because of the finite nature of water resources on the Island, it is considered important that sufficient baseline information on groundwater levels is available to facilitate long-term planning in respect of water resources. It is recommended that a network of monitoring boreholes is commissioned on each of the main aquifers of the Island to allow trends in groundwater levels to be identified. To reduce costs, wherever possible existing disused or geotechnical boreholes should be used.

(2) The long-term management of water resources on the Island will be enhanced if reliable information on the volume of private water abstraction is obtained. It is recommended that additional information on water usage is collected from the larger private, industrial, leisure and agricultural abstractions to facilitate a more rigorous water balance calculation.[99]

In the Panel's view, the CES recommendation was already included in the original brief given to BGS in 1989 when it was asked to establish a hydrogeological database for the Island. In order to develop a groundwater source database, BGS had access, though voluntary agreements, to an Island-wide network '*of existing boreholes and wells at a density of one per km grid square*'[100]. The Panel has not received a satisfactory explanation as to why this initial network has proved to be inadequate nor why monitoring of this network has now ceased.

The argument for a comprehensive system of gathering data about boreholes was supported by the Groundwater Review Group who believed that flow and level recording was necessary to build up a complete resource picture. In addition, it was suggested by this Group that well drillers should be required to provide a drilling log for all new wells and boreholes, the cost to be added to the drilling costs). Dr Renouf told the Panel -

This will improve our knowledge immensely of the relationship of the Island rocks' capacity to hold and yield water.[101]

Dr Renouf suggested that ongoing monitoring with scientific instruments inserted into boreholes should not be considered intrusive -

The monitoring thereafter, using scientific equipment, that is going to interfere with the operation of the borehole to some extent. It won't actually compromise it, but it will mean that there will be an intrusion on to a person's property and information will be taken from their borehole. … .I think once the instrumentation is down it won't interfere with the borehole at all.[102]

The Panel acknowledges the long-term value of such scientific investigation in improving the understanding of the Island's resources but understands that the proposed law will not provide for this type of research. Article 34 of the draft Law requires anyone who has documents or records relevant to the purposes of the Law to allow the Committee or its authorized officers to inspect and copy them. However, what it does not do is to require persons to keep records, or to allow scientific instruments to record information about the borehole, unless this was stated as a specific licence condition.

The Panel was advised by Deputy Baudains, that the value of the raw information on abstraction volumes that would be obtained through the proposed comprehensive licensing and registration system would be of limited value. He explained that the information gained represented only one part of the resource balance equation[103]. He told the Panel that data about the volume of water abstracted from a borehole was simply a record of what was *actually* drawn off by users to meet their needs - this did not give true indication of the *potential* yield of a borehole. Similarly the borehole's pump capacity was determined by the needs of the user. The potential yield could only be measured by pumping the bore right down in order to calculate the 'draw-down cone'. In normal circumstances a borehole user would not attempt this as the process could cause damage to the pump.

In addition, Deputy Baudains pointed out that information on abstraction volumes from boreholes gathered through the proposed licensing system would be limited to those boreholes extracting significant quantities of water (more than three cm^3). Private domestic boreholes would only be required to register so information from the vast majority of boreholes on the island would be excluded. In effect, it was estimated by the Environment Department that only 400 boreholes (less than 10% of the Island's boreholes) would require licensing. It appeared, therefore, that much of the current abstraction from the Island's groundwater resources would not be recorded.

6.3.9 Obtaining information through voluntary co-operation or compulsion

The Groundwater Review Group told the Panel that, in their view, legislation was required due to the historical lack of co-operation from borehole owners who had prevented access to gaining legitimate information[104] In oral evidence, Dr. Renouf told the Panel -

> *It would seem to me that it is not sufficient to rely on the voluntary system in this case. Had we had legislation in place in 1989 which compelled a number of things, but essentially which compelled information to be acquired when boreholes were put down and what the geology was and a continuation thereafter of monitoring, if we had had that in 1989, this discussion now would not be needed, because many of the issues were are discussing this morning would not be taking place, because we would have the scientific data which would have answered them.[105]*

Dr. Renouf, however, said that while there were legislative controls in place, the authorities in Brittany also maintained an ongoing dialogue with interested parties in order to acquire the information they sought -

> *The water company there issue regular bulletins every three months which state what they are doing, and it is very clear from all of this that the whole thrust is towards working with the landowners, with people to achieve exactly the ends that we are after. [106]*

A number of witnesses, including the Water Diviners and Well Drillers, the Jersey Farmers Union and the Jersey Landowners Association, told the Panel that they would be quite willing to co-operate with the Environment Department in allowing access to boreholes for gathering information, if it did not resort to legal compulsion. It was apparent that their historical reluctance to co-operate was due to a number of factors, including -

- a sense that local knowledge of the Island's geology and the actual flow from boreholes was being ignored by BGS;
- a resistance to perceived 'interference' in the rights of landowners by the authorities. This reluctance to co-operate was only strengthened by the 'threat' of legislation;
- preserving client confidentiality (Mr. de la Haye, however, told the Panel that he was quite prepared to release information provided borehole owners agreed that their names could be divulged).[107]

The Panel noted the view of its Technical Adviser on this issue -

The collection of information by legal coercion is no longer considered good practice. Stakeholder involvement and consultation is now generally accepted as the most effective procedure to gain information and improve understanding.[108]

This is in line with the United Kingdom Environment Agency Catchment Abstraction Management Strategy (CAMS) which places great emphasis on gaining stakeholder involvement and understanding -

CAMS allow 'in-river' needs and the needs of abstractors to be balanced in a more open way. …… Public consultation is an integral part of the CAMS process. There is a pre-consultation period involving key stakeholders during the early stages of CAMS development. This ensures that all issues and water needs are identified and raises awareness of the formal consultation exercise.[109]

The evidence received by the Panel in the course of the enquiry suggests that key stakeholders in Jersey have not been consulted properly. The proposed licensing and registration scheme is perceived as an imposition from a bureaucratic authority rather than as a solution to any recognised problem in the water supply.

The Panel believes that it should be possible to obtain information on the location boreholes through census returns, rather than by a compulsory registration and licensing scheme. The 1996 census, for example, showed a figure of 5196 boreholes and wells. Another way of locating domestic abstractors would be to consult a map showing households not connected to the mains.

The Panel is pleased to note that, following the scrutiny hearings, a co-operative scheme has been discussed with water diviners and well drillers (See Section 7.5). The Panel will monitor this development as it progresses.

Key Findings
The Environment and Public Services Committee has not fully explored voluntary means of obtaining the information desired on abstraction levels and the location of boreholes. Only if such means prove ineffective should legislation be contemplated to oblige information to be divulged through a system of licensing and registration.

6.4 OBJECTIVE FOUR: TO ASSESS THE IMPACT OF THE DRAFT LAW ON BUSINESSES IN THE ISLAND, PARTICULARLY TOURISM AND AGRICULTURE

The impact of the proposed law can be summarised under the following headings:

Infringement of property rights
Licensing requirement for abstraction over 3 cubic metres per day
Costs of licence fee, metering and administration

6.4.1 Infringement of property rights

A number of contributors to the Panel questioned the right of the States to interfere with a landowner's customary rights to ownership of water on his/her property or beneath it. They quoted the maxim '*qui a le sol a le dessus et le dessous'* [Whoever owns the ground owns that which is below and above it]. The Jersey Farmers Union, for example, stated -

> *We believe the proposal will infringe the Human Rights of our members. In particular, we have been advised that it is a potential infringement of Article 8 of the Convention for the Protection of Human Rights and Fundamental Freedoms. Clearly as a position of natural justice, it is inappropriate for the government to usurp privately owned resources without compensation.*[110]

This issue was covered in correspondence from the Law Officers' Department and in a confidential hearing with the Solicitor General. The Panel was advised that

> Under the Human Rights Convention, the right to 'property' can be amended by statute if it could be demonstrated that this amendment is in the general public interest;
>
> There was no Law in Jersey (customary or otherwise) relating to ownership of underground water. The draft Law would set out, to a large extent, the position regarding subterranean waters.
>
> As regards a spring, customary law authorised the landowner to do what he liked with the water;
>
> As regards water flowing in a defined channel, use of that water was restricted to the 'field' through which the channel flowed;
>
> Whether underground water flowing through fissures could become a 'defined channel' had not been tested by the courts.[111]

The view of BGS and the Public Services Department was expressed as follows -

The underlying principles to Jersey resource management at present relate to Norman Law whereby whatever flows through or under a person's land belongs to him or her. This archaic understanding of environmental resources must be replaced with some ruling to promote sharing of the resource and community responsibility for water resources.[112]

Key Finding

The Law Officers' advice to the Panel was that the draft Law, if passed by the States, would supersede customary rights to water on the basis that it was in the general public interest to manage the Island's water resources.

6.4.2 Licensing requirement for abstraction over 3 cubic metres per day

The Draft Law requires anyone abstracting water from a 'source of supply' to apply for a licence from the Environment and Public Services Committee unless -

the water comes from a self-contained source of supply, such as a sealed pond, which makes no contribution to the overall resource of the Island; or

the abstraction relates to certain activities which are 'exempt' from full licensing requirements. In the main, this is intended to apply to abstraction of small quantities of water (in particular of domestic use) where there will not be a significant effect on the resources of the Island.[113]

Under the draft Law, abstractions not exceeding $3m^3$ per day per unit would be exempt. However, all abstractions, including domestic boreholes, would be obliged to register. The Panel was advised that this limit was set to provide a balance between the requirement for a government to regulate use of a scarce resource and the need to minimise bureaucracy. The Director of Environment said -

Actually, what we've set out to do is to have effectively a de minimis condition. We've tried to find a level at which we have appropriate powers of intervention and appropriate knowledge of water resources that basically recognises the fact that water on Jersey is a scarce resource. The amount of water that falls as rain shared

out amongst the population is very limited. And it's our belief that two cubic metres a day, subsequently up to three, is an appropriate balance between the need to have some regulatory control and the administrative inconvenience to people of having controls at lower levels than that.[114]

On this basis, 90% of abstractors would be excluded from the requirement for a licence. The cost of the licensing and monitoring system would then be borne by an estimated 400 licence holders. The Director of the Environment said -

Where we're coming from is we need a process that allows for the proper management and regulation and redistribution of resource. So where we started off from is capturing within the envelope of control those 10% of users who, by the definition we've just kicked around, will probably be commercial users, who are caught within the envelope of what we're able to regulate in future. If that proves to be either too little or too much the capacity is there to vary but we do need a starting position where we've got something to play with.[115]

The Panel was informed that the abstraction limit in the United Kingdom, under the Water Resources Act 1991 (Sect 27) was 20m^3 per day rather than 3m^3. Other European countries had lower thresholds[116]. The Panel asked the Environment and Public Services Committee to explain why such a low limit was considered suitable for Jersey.[117] The Committee replied that raising the limit to 10m^3 (half of the United Kingdom) would exempt 250 additional abstractors from licensing leaving only an estimated 150 requiring a licence. In the view of the Committee, this would represent a significant proportion of the Island's water resources which would be unlicensed.[118]

The Panel has seen no analysis of the type of borehole owners who would be excluded if the exemption limit was raised to 10m^3 or 20m^3 per day nor any assessment of the value of the information which might be lost if boreholes abstracting up to those limits were exempt from licence conditions. It was informed however that the 3m^3 was likely to bring into the licensing system small guesthouses or hotels taking around 15 guests.[119]

6.4.3 Licence exemption for abstractions from water sources below 25 metres

The Panel asked its Adviser to comment on a suggestion that water from deep groundwater in fissured rock should be exempt from the proposed licensing system. Dr Sutton told the Panel that, in his view, this would be a sensible approach on the basis that fissure flow in low

permeability rocks was effectively unpredictable. He suggested that present understanding did not permit rational analysis of the impact on other abstractors or surface flow majority of groundwater flow to boreholes.[120]

The Panel asked the Environment and Public Services Committee for its view on such an exemption, given its stance that there were no significant exploitable water resources below the first 25 metres of the water table.[121] The Committee responded that it recognised that groundwater flow might exist below 25 metres and maintained that the draft Law should apply to all groundwater beneath the Island, irrespective of depth. It did not, however, give any justification for rejecting the suggestion for licence exemption for groundwater pumped from deep sources.

It does not accept that a good case has been made for the introduction of a licensing system. However, should the States decide to adopt the draft Water Resources (Jersey) Law 200- despite the Panel's reservations, the Panel would recommend that the exemption threshold should be amended -

- the exemption threshold for the generality of the Island should be raised to at least 10 m^3 if not 20m^3 per day. This would remove the majority of small scale businesses and farms from the licensing requirement;
- a lower licensing threshold could be set for certain vulnerable areas, for example, St. Ouen's and Grouville, where signs of stress (saline intrusion) have been reported;
- the bulk of groundwater present in deep fissured rocks (e.g. below 25 metres) should be declared as licence exempt.

6.4.4 Costs of licence fee, metering and administration

The Environment and Public Services Committee informed the Panel that the estimated overall costs of implementing the draft Law, including staffing and overheads, would amount to £120,000 per annum. This would include the engagement of a dedicated hydrogeologist to administer the Law and analyse the information gathered.

It was planned to recover this cost on the 'user pays' principle. The Jersey New Waterworks Company, as the biggest abstractor on the Island, was expected to bear the major costs (approximately £100,000 per annum). If it was assumed that this would be recovered from the Company's customers, this would add approximately £3 per annum to an average household's

water bill. The remaining £20,000 would be recovered from the other licence holders, mainly commercial abstractors. Shared between the estimated 400 licence holders this would equate to approximately £50 per annum per licence holder.[122]

Opposition to the draft Law, on the grounds of its impact through the cost of the licensing fee, metering and the additional administrative burden was voiced mainly through the Jersey Farmers Union, the Royal Jersey Agricultural & Horticultural Society, the Jersey Hospitality Association and the Jersey Landowners Association[123]. The principal objections can be summarised as follows -

The need for monitoring and control of water resources was not justified by reference in the Island Plan. Some policy statement justifying the need was required;

The draft law would impose considerable additional costs on two key Island industries, Agriculture and Tourism, where margins were already minimal. Costs of meter installation alone were estimated at £800-£1000 per borehole in addition to costs of borehole and pump maintenance;

A number of irrigators use their boreholes on an irregular basis, yet it appeared they would have to pay an annual licence fee, whether they used water or not;

There was no clarity in the means by which restriction of water abstraction would be applied.

Practical enforcement of the proposals of the Draft Act would be difficult and expensive.

The farming industry could see no practicable benefit to agriculture from the proposed law, they see it as expensive to enforce and asked if cost benefit analysis had been carried out.

There was a substantial risk that the expense of licensing would drive people to abandon their private supply sources and move to public water supply thus imposing greater stress on public resources.

The water resource situation varied across the island and the imposition of uniform island wide regulation would be unjust.

They would prefer a much less draconian approach to resource management with substantially higher licence thresholds.

The Panel agrees with the view that the draft Law would impose additional costs and an unnecessary administrative burden on a range of relatively small scale abstractors. As the

President admitted, setting the exemption limit at $3m^3$ effectively brings into the licensing system small commercial guesthouse and hotels taking in about 15 people per day.

The Panel, however, is not convinced that the administrative costs quoted above are fully necessary. The requirement to engage a hydrogeologist for the island on a full-time basis is questionable. In the Panel's view, expert advice could be obtained on a contract basis at a fraction of the estimated £120,000 costs of the Environment and Public Services Committee employing its own hydrogeologist.

The Panel recommends that the contract for future work should be subject to a competitive tendering process.

If the Environment and Public Services Committee retains confidence, as it has stated, in BGS, then they might be retained for these services. However, the Panel believes that, if this were to be the case, assurances should be sought from BGS that they would be willing

- to modify their resistance to the study of deep groundwater resources
- to work with the Groundwater Review Group and the Well Drillers and Water Diviners in achieving a good understanding of the Island's water resources.

Recommendations

An analysis should be carried out to show the types of business that would be affected by the proposed licensing system and to quantify the administrative and financial impact it would have on small businesses dependent on borehole water sources.

A hydrogeologist should be engaged on a part-time contract basis only, to work with Jersey geologists, Jersey Water and the Water Diviners and Well Drillers to assist in quantifying the deeper geology and groundwater resources and to develop a suitable programme of resource measurement. This contract should be based on competitive tendering.

6.5 OBJECTIVE FIVE: TO CONSIDER WHETHER THOSE BENEFITS MIGHT BE MET THROUGH AN ALTERNATIVE, MORE COST-EFFECTIVE APPROACH TO REGULATION

The Panel is conscious that the States have recently adopted a proposition of the Policy and Resources Committee which requested all States Committees to carry out a review of current and proposed legislation, with a view to reducing the burden of legislation (P.134/2004, adopted unanimously on 15th September 2004). The Report accompanying the proposition states -

> *The 'States Strategic Plan 2005 to 2010' (P.81/2004), which was adopted by the States on 29th June 2004, highlights reasons why Jersey needs to move towards a lighter touch government and how this should be achieved. The Plan points out that a "thorough review and overhaul of regulation placing the emphasis on government guidance and facilitation in place of restrictive regulation and red tape will encourage individual and business responsibility and self-management" (page 6). It also lists one of its overarching policies to be "a thorough review and overhaul of government regulation and bureaucracy" (page 9). Further emphasis to this policy is given in Section 1 of the Plan, where it is stated that the "the States will reduce unnecessary regulation and bureaucracy in the Island" (Aim 1.3).*

In the Panel's view, there appears to be little justification for the proposed Water Resources (Jersey) Law 200-, in as far as it introduces a complex and potentially punitive licensing a registration system as a means of initiating a programme of measurement of resource use. The Panels suggests in its detailed recommendations that alternative means of gathering the required information should be pursued before the introduction of a compulsory and comprehensive licensing and registration system is contemplated.

The Panel noted that the Economic Development Committee, in its comment on the draft Law, whilst supporting the draft Law in principle, also expressed '*concern regarding the probable degree of Regulation to be applied to the Law and the resultant resource implications'* and asked the Director of Environment to identify where resources and regulation might be minimised.

The Panel accepts that a framework should be developed by the Environment and Public Services Committee to ensure essential public resources are protectable against the unexpected and are conserved for future generations. However, this should be based on a firm understanding of

the complexity of the Island's geology,

the extent of the Island's resources, (including the potential deep groundwater resource),
the relationship between groundwater and surface water
the ecological status of the Island's streams and wetlands
the changing patterns of rainfall due to climate change.

The Panel does not believe that a good understanding of the above issues has yet been achieved. In its view, legislation to establish a framework for water resource management would not be acceptable until further investigation studies have been carried out on the lines suggested in this report.

The Panel believes that general public awareness on these issues needs to be raised. A future deficit of water resources would affect everyone in the Island and the significance of the Island's position should be fully understood and explained to the public.

The Panel is convinced that the proposed compulsory licensing system would be counter productive.

7. ISSUES ARISING IN THE COURSE OF THE REVIEW

7.1 CONFLICTS OF INTEREST

Questions relating to conflicts of interest arose during the Panel's undertaking of the review in the relation to the engagement of the Panel's expert adviser and the role of Deputy Baudains.

The Panel decided to engage an adviser to assist in understanding the technical issues involved in the review and to undertake an assessment of the evidence it received. Dr. Sutton, Associate Director of Entec UK Limited was chosen for this purpose. He fulfilled the following role for the Panel -

He provided the Panel with a Technical Assessment, dated 30th June 2004, of the evidence presented to the Panel together with a number of other comments on documents subsequently submitted by the Environment and Public Services Committee This document was made publicly available on its website following the public hearings in July.

He attended the three public hearings and provided summaries of the evidence given during these sessions.

He was invited by the Panel to act as a witness in the hearing on 26th July 2004 in order that he could publicly answer questions posed by the Panel on the evidence given by the Environment and Public Services and other witnesses to date. The Panel chose this course of action in order that the views of Dr. Sutton would be clearly in the public domain and thus open to scrutiny.

Following the public hearings in July, the Panel asked Dr. Sutton to clarify a number of technical queries by e-mail.

He also provided comments on a number of subsequent documents submitted by the Environment and Public Services Committee.

Finally, the Panel requested Dr. Sutton to supply an outline proposal for a test programme to investigate 'deep groundwater' resources of the Island.

The President of the Environment and Public Services Committee criticised the appointment of Dr Sutton as the Panel's expert adviser. He stated '*in our view [Dr. Sutton] could not conceivably be regarded as independent*'. This criticism is based on Dr Sutton's 1993 review of

the BGS early published technical studies. The President said that '*Dr. Sutton had previously acted as an Adviser to the Water diviners and drillers'* and that '*he had acted in that capacity for many years*'. He suggested that this amounted to a '*conflict of interest' issue which should have prevented a professional person form also acting as Advisor to the Panel'*. The President also questioned whether '*all the Panel members (other than, of course, Deputy Baudains) [were] aware - at the time of his engagement - of Dr. Sutton's previous extensive involvement on behalf of the Water Diviners/drillers'*.[124]

The Panel would like to make it quite clear that the President's criticisms are erroneous. At all times the appointment of Dr. Sutton has been completely open and transparent. The facts are as follows -

The Panel was fully aware of Dr. Sutton's previous acquaintance with the issues regarding Jersey's water resources and of his work for Deputy Baudains in 1993. This amounted only to a brief assessment in 1993 of the early BGS technical studies

When the Panel approached Dr. S. Sutton, who is an Associate Director of Entec UK Limited, Dr. Sutton told the Panel -

> *At this stage it may be worth noting that the comments I gave to Deputy Baudains are now more than 10 years old. There may be new data available which could support (or not) the BGS conclusions of that time. Any advice we [i.e. Entec UK Ltd.] would provide would be based on assessment of the current evidence on its merits and would not be bound by previous opinions.'*

In response to a suggestion from Mr. C. Leach of Concern, the Panel also approached Dr. P. Herrington, Department of Economic, University of Leicester, who had been brought over to the Island by Concern at the time of the Queen's Valley Reservoir debate.

The Panel noted that Dr. Herrington was an economist and that he had been heavily involved in work for DEFRA and the Scottish Executive on the European Union Water Framework Directive. However, he told the Panel that he had no specialist knowledge of geology and hydrogeology and so could not advise on the veracity or credibility of relevant scientific claims.

The Panel decided that Dr. Sutton, whose CV showed extensive worldwide experience in groundwater resource development, was better suited to undertake the tasks it required under its terms of reference.

The Panel then made a formal request for approval of this decision to the Privileges and Procedures Committee in a report, dated 24th May 2004.

In response to the criticisms of the Environment and Public Services Committee, Dr Sutton again clarified his position -

> *I believe that 10 hours input eleven years ago, reviewing a published, public domain, technical document for Deputy Baudains is neither 'extensive' nor working 'directly' in Jersey, nor working for WDEA. Since 1993, I have had no involvement with any aspects of water resources in Jersey until April 2004. …. I believe (and hope) that I have been consistent in saying that there is a body of physical evidence presented to the Scrutiny Panel which is not compatible with the resource assessment presented by E&PSC. Consequently, should the Scrutiny Panel believe that this impacts on the draft Water Resources Law, some scientific investigation of this evidence should be initiated.*[125]

The Committee acknowledged that Dr. Sutton Technical Assessment was fair and reasonable.[126] However, the President criticised one particular section of Dr. Sutton assessment. Referring to a report carried out by CES, Environmental Management Consultants[127], he said that Dr. Sutton had -

> '*failed to state that the Consultants had in fact supported many of the findings of BGS; with respect, hardly a 'neutral approach by Dr. Sutton*. *This is particularly disconcerting bearing in mind that the EMC report was specifically commissioned by Deputy Baudains on behalf of the WDEA*[128]*.'*

It should, however, be noted that the findings of BGS which were supported by the EMC report were in relation specifically to the issue of groundwater flow from France. The President does not acknowledge that the principal section of the CES report concerned the Water Balance and the BGS assertion that there was stress on the groundwater levels of the Island. In this respect, the CES report states -

> *As a result of the significant uncertainties in the controlling factors, it is considered that there is little firm evidence to support this [BGS] conclusion*.[129]

In the Panel's view, a fair reading of the EMC report reveals that Dr. Sutton accurately summarises the essential conclusion of the document.

Following the criticisms made by the President of the Environment and Public Services Committee a Senior Technical Director at EntecUK formally reviewed Dr. Sutton's original technical report to the Panel. This review provided confidence that the criticisms had no basis in fact.

Comment:

The Panel is satisfied that Dr. Sutton has provided a thoroughly professional and impartial service in advising the Panel on technical issues. It has been completely open about Dr. Sutton's role in the scrutiny process and made his technical assessment, summaries of the hearings and proposals for a testing programme for investigating deep groundwater resources publicly available on its website.

In relation to Deputy G. Baudains, the Panel acknowledges that he has been a long-term critic of the scientific investigative work carried out by the BGS on behalf of the Public Services (later the Environment and Public Services) Committee, together with the regulatory and licensing scheme proposed in the draft legislation. In May 2000, Deputy Baudains, then a member of the Public Services Committee, made a presentation that Committee on the WDEA position regarding water resources in Jersey, calling for an independent assessment of the BGS groundwater reports. He stated that his opposition to the proposed legislation arose solely from his concern that the conclusions of the BGS studies did not match the situation in the field, as experienced by well drillers. He therefore perceived a risk that legislation might be constructed on a base of information that was either incorrect or incomplete.

Deputy Baudains made it clear to the Panel at the beginning of the scrutiny process that his views had not altered in the interim. The Panel considered that Deputy Baudains previous publicly stated position did not constitute a conflict of interest to bar him from involvement in the Scrutiny review. It found his knowledge and expertise invaluable throughout the course of the review. The Panel is confident that all the available evidence has been considered in a fair and balanced way throughout the process.

The Panel also noted that, in addition to Deputy Baudains two other members of the Panel, Deputy R. Duhamel and Deputy P. Rondel had previously been members of the Public Services Committee during the period when the proposed law had been considered by the Public Services Committee.

7.2 Water Scarcity Table

At the end of the second public hearing in July, the President of the Environment and Public Services Committee submitted a document purporting to demonstrate that Jersey is in a position of absolute 'water scarcity'. This document contained a table showing the Annual Renewable Fresh Water per Person, with an indication that Jersey ranked 11th in terms of water scarcity in a list of 149 countries. The President told the Panel -

> *This figure isn't necessarily new information in terms of the quantity of water available. It does, however, perhaps for the first time, in a fairly stark and simple way - in an internationally acceptable way - show how Jersey's water situation does compare to other places …… In offering you this statistic as a comparable figure, we hope that that does actually summarise and clarify the fact that we do believe that there is an absolutely overwhelming case for water management legislation in Jersey.*[130]

The Panel's adviser subsequently pointed out in a critique of this table that the document came from a website operated by a group called Population Action International which was lobbying for population control on the basis that resources were running out[131]. In a critique of this document, dated 29th July 2004, he disputed the water use figures on which the Jersey ranking was based -

> *The table is based on the assumption that the present level of water use in Jersey is four times greater than the calculated rate of water use. … The number quoted by Environment and Public Services [i.e. the figure of 444 cubic metres for renewable annual fresh water availability for Jersey] makes no allowance for the relatively uniform distribution of Jersey's population and rainfall, both positive contributions to availability. However, more importantly there is no allowance given to the pattern of water usage in Jersey. …. The overall effect of this in the context of the data categories defined by Population Action International is to move Jersey from a position of 'absolute scarcity' to one of 'occasional or local water problems'.*

The Environment and Public Services Committee subsequently commissioned its own 'independent' advice from Mr. D. Evans, Water Resources Consultant[132]. He pointed out a number of factors exacerbating Jersey's water resource position, which he said was '*already potentially serious*'. However, in a further comment Dr. Sutton pointed out that neither the Committee nor Mr. Evans had discussed or rebutted the figures for water use he had used in arriving at his less alarming conclusion.

Comment
The Panel does not believe that it was appropriate to submit such a document at a late stage in a public hearing, without adequate explanation of the context and assumptions on which the table was based. The Panel considers that this was an ill-conceived headline figure and was not helpful towards a reasoned consideration of the Island's water resources.

7.3 Request for Dr N. Robins, BGS, to attend as a witness

Following the two public hearings in July, the Panel came to the view that it was vital to its enquiry to hear evidence from Dr. N. Robins who had led the BGS investigations of the Island's water resources since the inception in 1989. The Panel heard a number of criticisms of BGS methodology and the conclusions reached in their technical reports. The Panel found that Dr. Peach, who had not previously been part of the research team in Jersey, was unclear on specific aspects of the BGS studies of Jersey. The Panel accordingly felt that it was essential to discuss the issues directly with the author of the BGS report before coming to its conclusions in this review.

The Environment and Public Services Committee, however, indicated that it did not propose to ask Dr. Robins to give additional evidence on its behalf, as it had been working with Dr. Peach for the previous few months in preparation for the scrutiny inquiry.

The Panel instructed the Scrutiny officer therefore to write to Dr. Peach directly to extend this invitation to Dr. Robins. In view of the fact that the Panel was making a specific request for a witness, it offered as a matter of exception to pay any reasonable expenses for Dr. Robins to attend.

Dr. Peach, in his response on 17th September 2004, stated that he believed he was able to deal fully with any queries that the Panel might have in relation to the BGS reports. Nevertheless, he offered to arrange for Dr. Robins to attend, '*along with myself and as my advisor, a hearing of the Panel …. We would expect the normal fees and expenses of both D.r Robins and myself to be fully would be reimbursed*. *We would require to make a further presentation to the Panel, briefly outlining the important and relevant science regarding the water resources of Jersey'*.

The Panel found such conditions unacceptable. It replied that it did not require a further presentation but only to question Dr. Robins as a witness. Consequently, the offer from Dr. Peach for himself and Dr. Robins to attend a hearing of the Panel was withdrawn (See **Appendix Seven** for copies of this correspondence).

Comment

The Panel was disappointed that Dr. Robins was not part of the instructing Team in the first instance. It believes that the Committee should have insisted that BGS be represented at the public hearing by the leader of the BGS monitoring team in the Island.

7.4 Value for money of BGS contract

In its letter of 10th August 2004, the Panel requested information on the total cost to date of the work carried out by BGS since the commencement of its contract with the former Public Services Committee.

The Panel was surprised that this information was refused initially on the grounds that this request was outside its terms of reference. Subsequently, the Panel discovered that the figures were already, in part, in the public domain, following questions in the States by Senator J. Rothwell on 12th October 1993 and by Deputy G. Baudains on 9th September 2003[133].

The information was subsequently supplied by the President, Environment and Public Services Committee. He informed the Panel that the total cost of fees paid to BGS amounted to £257,457 for the period from 1989 to 2003. After initial costs of £171,161 up to 1993 in developing the hydrogeological survey, payment to BGS over the last ten years had been at a rate of around £8,600 per annum. In the view of the Environment and Public Services Committee, this represented *very good value for money, being a quarter of the cost of the States employing a dedicated professional'*.[134]

The Panel noted that the Vice President of the Public Services Committee, in his statement to the States on 12th October 1993, had indicated that the time span for the BGS work was '*not expected to be less than two years'*. The Panel asked why it had been necessary to continue the BGS contract for eleven more years. It was informed that the Environment and Public Services Committee had found

> *an ongoing need for their advice on matters of hydrogeology, groundwater chemistry and groundwater pollution. This would of course diminish should we recruit as proposed, our own hydrogeologist to assist in administrating the Water Resources Law. There is ongoing work to do in further quantifying the deeper geology and groundwater resources so that we can better determine licence conditions under the proposed law. I anticipate that this will require the continued involvement of BGS*

along with the Jersey geologists, Jersey Water and the well drillers and water diviners. As the provisions of the Law to register boreholes and share information take effect our knowledge base will again improve – this is an ongoing and continuous process.[135]

Comment

The Panel questions whether the Island has received good value for money from BGS. Despite the expenditure of £257,457 in payments to this organisation since 1989, a good understanding of the deeper geology and groundwater resources of the Island has not been achieved.

7.5 Well Drillers and Diviners

In the course of its hearing with Messrs G. Langlois and L. de la Haye on 26th July 20004, the Panel heard that BGS and the Public Services Department appeared to have consistently discounted the knowledge and experience of local well drillers and water diviners.

The Environment and Public Services Committee made clear in its Final Submission that it did not accept the assertion that the Well Drillers and Water Diviners had been ignored over the years. It pointed out that BGS, in its 2000 Overview Report, had referred to the 1999 WDEA report and had stated '*there has been little tangible evidence presented by the water diviners over the years to support the claim for deep seated groundwater sourced off the Island'.*[136]

The Panel noted that, notwithstanding the previous doubts about the '*unsubstantiated assertions*' of the WDEA, the Environment and Public Services Committee had proposed a programme to investigate the existence of any additional substantive exploitable supplies at depth[137]. Subsequent to the public hearing a meeting was arranged on 31st August 2004 with Messrs Langlois and De la Haye in order to

open a dialogue for an exchange of views with the Drillers and Diviners (D&D);
gain an understanding of the 'model' of water resources on the island as understood by the D&D;
establish the evidence base for the views held by the D&D; and
determine experimental investigations that would add to our knowledge about the

nature and extent of deep groundwater on the Island.
(extract from Minutes of meeting - see **Appendix Nine**)

As a result of this meeting, it was agreed that the Environment and Public Services Committee would consider options including detailed measurements and test pumping of existing deep boreholes; drilling new boreholes into the deep aquifer and drilling a deep borehole on the Ecréhous.

Comment
The Panel was pleased to note the positive initiative on the part of the Environment Department in seeking, in advance of the conclusion to its enquiry, to investigate the claims of the Water Diviners and Engineers Association. The Panel will monitor this development as it progresses.

7.6 Groundwater Review Group

In the course of considering the evidence presented to it, the Panel became aware of the role played a group of local geologists, headed by Dr. J. C. Sharp of Geo-Engineering. This Group, known as the Groundwater Review Group, was established in 1989 to advise the Public Services Committee on groundwater resources and had monitored the studies carried out by BGS until February 1994. One member of this Group, Dr. R. Nichols, attended the hearing held on 26th July 2004 as a member of the public.

The Panel was surprised to note that the knowledge and expertise of this Group appeared to have been ignored by the Public Services Committee since February 1994. The Group had been given only a passing reference in the closing remarks of the President of the Environment and Public Services Committee at the hearing of 26th July 2004 and in its Final Submission, which simply referred to "*highly qualified Jersey based geologists supporting the conclusions reached by BGS*"[138].

In its letter of 10th August 2004, the Panel requested copies of the reports submitted by this Group to the Public Services Committee together with copies of any correspondence relating to this Group and records of meetings with other interested parties. The Environment Department was unable to find any such documents in its files. The Scrutiny Office, however, made contact with members of this Group and so obtained copies of two papers, which had been prepared for

the Public Services Committee in 1994. (See **Appendix Ten**)

The Panel believes that an opportunity has been lost in not involving this Group further in monitoring the studies undertaken by BGS.

The Panel noted that, subsequent to the hearing on 14th October 2004, the Environment Department, was seeking to arrange a meeting with representatives of the Review Group.

Comment
The Panel is surprised that the Groundwater Review Group has been sidelined since 1994. In its view, the Groundwater Review Group could play an important role in developing a better understanding of the Island's groundwater resources. **The Panel believes that the proposed meeting with officers of the Environment Department is a further positive outcome of the scrutiny process. The Panel will monitor the outcome of this meeting with interest.**

8. CONCLUSION

The Panel does not disagree with the conclusion reached by Major John Riley in his Report to the States in 1992 on the 'Safeguarding of the Water Resources of Jersey':

> *In an Island such as Jersey, it is essential to have a good understanding of the water resources in order for them to be protected and managed for the long-term security of supply.*

It does disagree, however, with the assumption that comprehensive, reliable data on those resources can only be achieved through a compulsory licensing and registration scheme. The draft Water Resources (Jersey) Law 200- would introduce an unnecessary, expensive and bureaucratic burden on those who depend on borehole abstraction for their water supply.

In the Panel's view, the threat to the Island's water resources through over-extraction has been over-stated in the technical studies presented by the British Geological Survey since 1989. The Panel has not received convincing evidence of anything over the last decade to resemble the *'catastrophic consequence on the economy, ecology and environment'* predicted by Major Riley, if nothing were done to introduce protective measures.

The Panel extends it gratitude to all witnesses who gave evidence both in writing at public hearings.

The Panel presents the recommendations arising from its review for consideration and comment by the Environment and Public Services Committee.

It requests a response within a period of three months of presentation of this report to the States in accordance with the guidelines for Shadow Scrutiny, as set out in the Appendix to P.186/2003.

9. APPENDICES

Copies of the following documents are available on the Scrutiny Website at www.statesassembly.gov.je or by request from the Scrutiny Office.

1. Correspondence with EPSC

Call for evidence, dated 15th April 2004
Panel letters of 28th July and 10th August 2004
EPSC letter of 7th October 2004
Panel response of 26th October 2004
EPSC letter of 24th November 2004

2. Written submissions

Jersey Farmers Union
Jersey Hospitality Association
Concern
De la Haye Well Drilling Limited
The Jersey New Waterworks Company Limited
Mr. and Mrs R.J. & M. Ison
Mr. N. Renouf
Mr. J.K. Dobbs
Dr. R. Nichols, formerly a member of the Groundwater Review Group
Mr. L. Carter, formerly a member of the Jersey Farmers Union Water Resources Committee.
WDEA report, dated 8th July 1999
Assessment of BGS reports by Dr S. Sutton, May 1993
Water Resources Review of Jersey: CES, the Environmental Management Consultancy, January 2001

3. EPSC Submissions

First submission, dated 3rd June 2004
Non-technical summary of the BGS reports on Jersey Groundwater between 1989 and 2003, dated 5th July 2004, prepared by Dr D. Peach, Groundwater Systems and Water Quality Programme Manager, BGS,
Supplemental Evidence, dated 30th June 2004, prepared by Mr. T. Williams, Environmental Law Consultant Information relating to other jurisdictions,
Powerpoint presentation on the draft Water Resources (Jersey) Law 200- from Mr. G. Jackson, Assistant Director - Environmental Protection,
The Water Resources of Jersey: An Overview, prepared by BGS, dated October 2000
Table: Annual Renewable Fresh Water Per Person
Final submission, dated 7th October 2004, including Note by Mr. D. Evans, Water Resources Consultant on Annual Renewable Fresh Water per person Table

4. Dr. Sutton, Entec: Technical Assessment of Evidence, dated 30th June 2004

Addendum to report, dated 12th July 2004
Comment on Annual Renewable Fresh Water per person Table, dated 29th July 2004
Comment on 'Final Submission' on behalf of EPSC, dated 8th October 2004, including Note by Mr. D. Evans

Discussion document Possible Approach to investigation of 'Deep Groundwater' resource on the Island of Jersey, dated 8th October 2004
Comments on use of desalination plant and BGS Hydrogeological Map, dated 26th November 2004.

5. Public hearings, dated 19th & 26th July and 14th October 2004

Verbatim transcripts
Summaries provided by Dr Sutton

6. Jersey Customary Law

Correspondence, dated 8th July 2003, from Mr. R. Whitehead, Principal Legal Adviser, Law Officers Department.

7. British Geological Survey

Questions in the States dated 12th October 1993 and 9th September 2003
Correspondence with Dr. Peach

8. Public Services Committee papers

Acts and JEP articles re cancelled meeting in 1993
Public Services Committee: Information Paper on Jersey's Water Resources, dated 14th January 1994
Comment on PSC Information Paper on Jersey Water Resources dated 2nd September 2004

9. Well Drillers and Diviners

G. Langlois, various JEP articles and related papers
Notes of visit to artesian wells and deep bores on 3rd August 2004
Minutes of meeting of 31st August 2004
Correspondence between Director of Environment and Deputy Baudains on an evidence for an experiment carried out to demonstrate a freshwater connexion between Jersey and France

10 Groundwater Review Group

Position Paper, dated February 1994
Critique of reports: Assessment of BGS Survey reports, by Dr. Sutton and WDEA
Marjolet: Les Périmètres de protection dans le contexte du socle armorican, October 2001

11. EU Water Framework Directive

Research Paper 03/053, dated April 2003, Members' Research Service, National Assembly for Wales

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[1] Water Resources in Jersey P.78/1992 of the Public Services Committee

[2] Hydrogeological and Hydrochemical Survey of Jersey WD/91/15, Section 6.1 to 6.4

[3] Water Resources in Jersey P.78/1992 of the Public Services Committee
[4] Report of the Working Party on the Safeguarding of the Water Resources of Jersey, 1992, Paragraphs 23 & 26
[5] Report of the Working Party on the Safeguarding of the Water Resources of Jersey, 1992, Paragraphs 42-43
[6] Groundwater Review Group: Position Paper, February 1994, sections 6 & 7
[7] Act 4, dated 13th September 1993, of the Public Services Committee
[8] Sections C&D: EPSC Submission, dated 3rd June 2004
[9] Transcript of Public Hearing, dated 19th July 2004, sections 10, 58 and 61.
[10] Section 3 - Written Submission on behalf of the JNWC, 10th June 2004
[11] Section 2, Transcript of public hearing of 19th July 2004
[12] Letter dated 17th August 2004, from Managing Director, JNWC
[13] Section 74 Transcript of public hearing of 14th October 2004
[14] Letter dated 7th October 2004 from the President of EPSC
[15] Letter dated 20th May 2004, from Chairman, Concern
[16] Summary Notes: Scrutiny Hearing of Monday 19th July 2004
[17] Section E: EPSC Submission, dated 3rd June 2004
[18] Section E: Final Submission on behalf of EPSC, dated 7th October 2004
[19] Jersey Groundwater: Assessment of BGS Reports, May 1993
[20] Groundwater Review Group: Comment No 1
[21] Section 6: Groundwater Review Group Position Paper, dated February 1994
[22] Section 7: Groundwater Review Group Position Paper, dated February 1994
[23] Act No.2, dated 13th September 1993, of the Public Services Committee
[24] Article entitled ‘Senator dismayed as water resources meeting is cancelled’, dated ….., Jersey Evening Post
[25] Public Services Committee Information Paper on Jersey’s Water resources, dated 14th January 1994
[26] Comment on PSC Information Paper on Jersey Water Resources, dated 2nd September 2004
[27] Section 2(k) Transcript of Public hearing dated 14th October 2004
[28] Act No.11, dated 1st August 1994, of the Public Services Committee
[29] Act No.5, dated 28th November 1994, of the Public Services Committee
[30] Act No.17, dated 6th March 1995, of the Public Services Committee
[31] Act No 2, dated 20th March 1995 , of the Public Services Committee
[32] Act Nos. 17, dated 23rd January 1995 and 2, dated 20th March 1995, of the Public Services Committee
[33] Summary Notes: Public Hearing of 26th July 2004
[34] Groundwater Resources Degradation in Jersey: socio-economic impacts and their mitigation (WD/96/8)
[35] Technical Assessment of Evidence, 30 June 2004, Entec United Kingdom Limited, section 2.1
[36] Technical Assessment of Evidence presented, 30 June 2004, Entec United Kingdom Limited, section 2.3
[37] Jersey Groundwater 2002 - Groundwater Systems and Quality (CR/03/102H)
[38] Technical Assessment of Evidence, 30 June 2004, Entec United Kingdom Limited, section 5.1
[39] Public Services Committee Paper, dated 16th March 1999
[40] Public Services Committee Paper, dated 16th March 1999
[41] Act No.9, dated 22nd March 1999, of the Public Services Committee

[42] Transcript of public hearing, dated 19th July 2004, section 28
[43] Section 4: Conclusions: Water Resources Review of Jersey: Final Report, January 2001, CES
[44] Section 4: Conclusions: Water Resources Review of Jersey: Final Report, January 2001, CES
[45] Hydrogeological and Hydrochemical Survey of Jersey WD/91/15, Section 2.1
[46] Hydrogeological and Hydrochemical Survey of Jersey WD/91/15,
[47] Hydrogeological and Hydrochemical Survey of Jersey WD/91/15, Section 2.1
[48] Section 4.1 BGS Technical Report year Four WD/94/53
[49] Jersey Groundwater: Report and Findings, WDEA, 8th July 1999, Conclusion, page 16
[50] Jersey Groundwater: Report and Findings, WDEA, 8th July 1999, Comment on Riley report, page 10
[51] Groundwater Review Group: Comment No 26
[52] Notes of visit dated 3rd August 2004
[53] WDEA Water Reports July 1999, Note 4
[54] Summary Notes: Scrutiny Hearing of 26th July 2004
[55] Hydrogeological and Hydrochemical Survey of Jersey WD/91/15, Section 2.1
[56] The Water Resources of Jersey: An Overview, October 2000, page 10
[57] Section 3.4: Conclusions: Water Resources Review of Jersey: Final Report, January 2001, CES
[58] Transcript of Public Hearing of 14th October 2004
[59] Summary Notes: Scrutiny Hearing of 14th October 2004
[60] The Boundaries of Protection in the context of the Armorican Block, G. Marjolet, Côtes d'Armor Regional Council, October 2001, translated by P.Vessey
[61] Section 14 transcript of public hearing of 19th July 2004
[62] Discussion document Possible Approach to investigation of 'Deep Groundwater' resource on the Island of Jersey, dated 8th October 2004
[63] Summary Notes: Scrutiny Hearing of 26th July 2004
[64] Paragraph 11.3: EPSC Final Submission, dated 7th October 2004
[65] Paragraph 42, report of the Working Party on Safeguarding the Water Resources of Jersey, March 1992
[66] Act No 2, dated 20th March 1995 , of the Public Services Committee
[67] Section C(e), EPSC Submission, dated 3rd June 2004
[68] Section 64, transcript of public hearing of 19th July 2004, EPSC
[69] Sections 11&12, transcript of public hearing of 26th July 2004, EPSC
[70] Section 4, transcript of public hearing of 26th July 2004, JFU and RJA&HS
[71] Section 30, transcript of public hearing of 26th July 2004, Messrs Langlois and de la Haye
[72] Written submission, dated 20th May 2004, from Chairman of Concern
[73] Sections 3 - 5, transcript of public hearing, dated 26th July 2004, Concern
[74] Section 6, transcript of public hearing, dated 26th July 2004, Concern
[75] Section 19, transcript of public hearing, dated 19th July 2004, EPSC
[76] Section 19, transcript of public hearing, dated 19th July 2004, EPSC
[77] Section 2.1.1 Hydrogeological and Hydrochemical Survey of Jersey WD/91/15,
[78] Section 50 transcript of public hearing, dated 19th July 2004, EPSC
[79] Section 40, transcript of public hearing, dated 19th July 2004, EPSC

[80] Sections 37 - 39, transcript of public hearing, dated 19th July 2004, EPSC

[81] Section 17 transcript of public hearing, dated 19th July 2004, EPSC

[82] Section 41 transcript of public hearing, dated 19th July 2004, EPSC

[83] Section C(j), EPSC Submission, dated 3rd June 2004

[84] Environment and Public Services Committee: Supplemental Evidence, dated 30th June 2004

[85] Section 51, transcript of public hearing, dated 19th July 2004, EPSC

[86] Section 58, transcript of public hearing, dated 19th July 2004, EPSC

[87] The EU Water Framework Directive (WFD), Research paper 03/053, April 2003, Members Research Service

[88] http://europa.eu.int/comm/environment/water/water-framework/overview.html

[89] House of Commons Environment, Food and Rural Affairs Committee, (2003), The Water Framework Directive, Fourth report of session 2002-03.

[90] Page 8, The Water Resources of Jersey: An Overview, October 2000

[91] Article 26, Water Resources (Jersey) Law Draft No 12, dated 27th April 2004

[92] Scenarios of climate change for islands within the BIC region, British-Irish Council, Hadley Centre, July 2003

[93] Section 22 transcript of public hearing, dated 19th July 2004, EPSC

[94] Section 4 Technical Assessment of Evidence, Entec, June 2004

[95] Section 2.1 Technical Assessment of Evidence, Entec, June 2004

[96] The BGS Report IR/01/26 (Report of the Year 2000)

[97] Paragraph 11.3: EPSC Final Submission, dated 7th October 2004

[98] Section 12, transcript of public hearing of 19th July 2004, EPSC

[99] Section 5: recommendations: Water Resources Review of Jersey, Final Report, January 2001, CES,

[100] terms of original verbatim brief for BGS, provided in 1989

[101] Section 69, transcript of public hearing of 14th October 2004

[102] Section 69, transcript of public hearing of 14th October 2004

[103] Section 52 transcript of public hearing of 26th July 2004

[104] Notes 36 and 41, Groundwater Review Group comments on Water and Diviners Group Report on Water Supplies in Jersey July 1993

[105] Section 59, transcript of public hearing of 14th October 2004

[106] Section 59, transcript of public hearing of 14th October 2004

[107] Section 13 Transcript of public hearing of 26th July 2004, Messrs Langlois and de la Haye; section 58, transcript of public hearing of 14th October 2004

[108] Summary Notes of public hearing of 26th July 2004

[109] Managing Water Abstraction, Environment Agency, July 2002

[110] Letter, dated 27th April 2004, President Jersey Farmers' Union

[111] Letter, dated 8th July 2003, from Principal Legal Adviser, Law Officers' Department; and Summary Notes of scrutiny hearing of 19th July 2004

[112] Page 26 The Water Resources of Jersey: An Overview, October 2000

[113] Section B: EPSC Submission, dated 3rd June 2004

[114] Section 29 transcript of public hearing of 26th July 2004

[115] Section 33 transcript of public hearing of 26th July 2004

[116] Paragraph 15.3 EPSC Final Submission, dated 7th October 2004

[117] Letter, dated 28th July 2004, to President EPSC
[118] EPSC Final Submission, dated 7th October 2004
[119] Section 33: Transcript of public hearing of 26th July 2004
[120] Section 17: Transcript of public hearing of 26th July 2004
[121] Letter to EPSC dated 1oth August 2004
[122] Part G, EPSC Submission, dated 3rd June 2004
[123] Summary Notes of public hearing of 26th July 2004
[124] Letter to the Chairman of the Scrutiny Panel, dated 7th October 2004
[125] Letter dated 8th October 2004
[126] Section E: Final Submission on behalf of EPSC, dated 7th October 2004
[127] Water Resources Review of Jersey: Final Report, January 2001, CES
[128] Letter to the Chairman of the Scrutiny Panel, dated 8th October 2004
[129] Section 3.3 Water Resources Review of Jersey: Final Report, January 2001, CES
[130] Section 68 - Transcript of public hearing of 26th July 2004
[131] Comment on 'Final Submission' on behalf of EPSC, dated 8th October 2004,
[132] Final Submission on behalf of EPSC, dated 7th October 2004, Appendix I
[133] Letter to President of EPSC, dated 26th October 2004
[134] EPSC Letter, dated 24th November 2004
[135] Letter from President of EPSC, dated 24th November 2004
[136] Paragraph 9.1.1 Final Submission, Environment and Public Services Committee
[137] Pg 11 Deep-seated waters: Water Resources of Jersey: An Overview, October 2000
[138] Paragraph 14(1) Final Submission, Environment and Public Services Committee