Environmental Protection Report

ARTIFICIAL RECHARGE TO GROUNDWATER IN THE OTTER VALLEY

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ARTIFICIAL RECHARGE TO GROUND WATER IN THE OTTER VALLEY

1. Definition.

Artificial recharge is the name given to the process by which natural recharge to an aquifer is augmented. (Natural recharge occurs by percolation of effective rainfall and from river flows where appropriate hydraulic conditions exist.)

A variety of artificial recharge methods have been developed. These include spreading of water (eg. via lagoons), recharging through pits and boreholes, and pumping to induce recharge from surface water bodies. The methods most commonly used involve water spreading.

2. Purposes of schemes.

Such projects can be designed to serve a number of purposes:

a) to maintain or augment the natural ground water resources for subsequent abstraction for public supply;

b) to provide subsurface storage for local or imported surface waters;

c) to combat progressive lowering of ground water levels or saline water intrusion, and/or mitigate impacts of abstractions on river flows;

d) to provide a subsurface distribution system for established boreholes;

e) to provide treatment and storage for reclaimed effluent for subsequent reuse;

f) to provide a means of mitigating against reductions in natural recharge as a result of climatic change or urban development.

The purposes described in a), b) and c) are likely to be the most relevant in the Otter Valley. Item c) is already an issue which has relevance to the consideration of any company schemes to take-up the full Licensed quantities from their Otter Valley boreholes.

3. The main considerations.

a) Source of water.

An ample source of surface water must exist - possibilities might be winter flows in the Otter, or water imported from another catchment.

As always, it would need to be demonstrated that this water could be abstracted in sufficient quantities without causing unacceptable environmental damage or derogating existing water rights.

b) Recharge method.

Selection of the recharge method is governed by local ground conditions, subsurface geology and the quantities needing to be recharged. Environmental and social considerations will ultimately decide the acceptability of any technically viable scheme.

Any proposal to construct large lagoons or basins is unlikely to be looked upon favourably by the local population or the planners that they influence. There could be conservation or general ecological considerations which militate against any chosen site. The feasibility of any proposal based on such an approach would need careful assessment.

Recharge through boreholes would be less visually obtrusive, but the quantities that could be recharged may be limited, and the associated costs will depend on the operational efficiency of the scheme. In general, recharge rates are consistently lower than potential abstraction rates at the same site. Schemes can be designed to use the same borehole installation for both recharge and abstraction, but sophisticated designs are required for this to be viable, since they need to incorporate back flushing arrangements.

c) Water quality.

Water quality is an important factor. Too much silt will block up water spreading devices and boreholes alike. Attempting to recharge water with a significantly different chemistry compared with the natural ground water can lead to the aquifer material becoming blocked due to flocculation or other chemical processes. Similarly, bacterial growth in the pore spaces will also lead to a recharge scheme becoming inefficient/inoperable. For these reasons, it is likely that pre-treatment would be necessary before a raw surface water feed could be used for recharge.

d) Geological controls.

For a scheme to be viable favourable geological controls and hydrogeological characteristics must exist. An important factor is the retentive nature of the aquifer in the vicinity of the recharge site. Excessive system losses would make a scheme unviable.

5. Conclusions.

Scale of work.

The preceding brief discussion of recharge concepts and mechanisms has been ample to demonstrate that a considerable amount of investigative work is required to establish the necessity for, and viability of, ground water resource augmentation schemes. The Authority would require detailed EIAs to be carried out, and the collection of relevant background hydrometric and technical data prior to assessing any particular scheme.

Timing.

It is not possible that such investigations, scheme appraisals and negotiations as would be necessary, could be conducted quickly. Artificial recharge in any form is unlikely to be a short-term option for increasing the amount of water in supply.

Relevance to the current deficit in the Axe supply zone.

For the reasons stated above, a scheme involving artificial recharge of the Otter Valley Triassic Aquifer is not considered an option which could be evaluated as an alternative to the other development options being given consideration for meeting immediate needs.

A separate statement exists covering redevelopment of the Otter boreholes.