

Major Infrastructure Assessments
Department of Planning
GPO Box 39
SYDNEY NSW 2001

16 May 2008

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Dear Mr Jeffries

Re: Upper Nepean (Kangaloon) Borefield (Application 06_0331)

The Upper Nepean Groundwater Community Reference Group (the group) has provided a submission to the NSW Department of Planning regarding the above development application.

The group acknowledges the extensive consultation that the Sydney Catchment Authority has provided over the past two years, with 18 formal meetings and a field trip to the affected area. The consultations and information were greatly appreciated by the group and the community at large. The group has provided a much-needed avenue for the public to express their concerns regarding this proposal.

There are many concerns that the group has about the proposal, and the recommendation is that the project is not approved, and that it does not proceed. If, contrary to this submission, the Minister for Planning approves the project, the group is of the view that it is essential that certain safeguards are included to ensure that the resource itself, the immediate and surrounding environment and local landholders are protected from losses of groundwater resources for extended periods.

Please forward confirmation of receipt of this document via email to the Chair of the group.

A signed and printed copy of this submission will be forwarded to the Department of Planning by express mail.

Yours sincerely

Mr Rodney Cavalier

per the Upper Nepean Groundwater Community Reference Group

1. Summary

The Upper Nepean (Kangaloon) Groundwater Community Reference Group (the group) unequivocally opposes the proposed development of a borefield at Kangaloon. The group (Appendix I) includes representatives of peak bodies, local landholders and the general community of the Southern Highlands. Group members have appreciated the opportunity to hear about the proposal and to provide comment on those issues that directly affect the environmental, social and economic interests of the community. Some excellent studies have been conducted in the area and worthwhile science into the groundwater system has been achieved, which will contribute to our understanding of these systems, so they can be better managed and protected into the future.

However, the group is opposed to the proposal for reasons outlined previously in a submission to the Sydney Catchment Authority dated September 2006 (Appendix II). On the basis of the precautionary principle of ecologically sustainable development, the borefield should not proceed until greater certainty exists regarding the impacts of groundwater extraction. This means that concept approval should not be granted when such components as water treatment and discharge to rivers have not been adequately addressed in the environmental assessment. Many problems Australia is now confronting in relation to its water resources result from taking water from one region to supply another, the primary example being the Murray-Darling system. This is not just an equity issue; it suggests that you do not, in light of that experience, embark on a new and untried scheme, without being absolutely certain that it will not have long-term consequences, and to the extent it does, that there is absolutely no alternative.

The group is concerned about many environmental issues that arise from this proposal. The environmental assessment appears to be premature and insufficient, and has been constrained by time, budget and a lack of access for the authors to the site. There is a lack of temporal data on effects of long-term drawdown on the important ecology of the area. There is a lack of certainty regarding vertical layering of old and new water. There are problematic iron levels in the bore water whereby extraction and treatment are likely to have pollution consequences.

If the NSW government does not go ahead with this proposal at Kangaloon the aquifer will maintain its integrity and high water level, supporting farms and important ecosystems. Groundwater will continue to flow into the Nepean Dam via baseflows in creeks and from other discharge locations. Risks to the Special Area including fire, degradation from vehicular access, and the introduction and proliferation of pests and diseases will be reduced. A secure water supply is more likely to be retained by farmers and landholders in Kangaloon if there is no development of the borefield.

Circumstances have changed since project inception, particularly in relation to the role of desalination in the event of severe drought, therefore a review of the

Metropolitan Water Plan (MWP) and particularly the role of the Upper Nepean borefield needs to occur.

2. Overview

This submission highlights outstanding key issues that affect the community and environment of Kangaloon and more broadly the Southern Highlands. Importantly, this submission also makes recommendations on the key environmental and economic planning controls/safeguards that should be considered by the Department of Planning.

From its inaugural meeting on 3rd July 2006 to November, 2007 the group has met formally on 18 occasions. In addition, one technical workshop and a site inspection of the pilot borefield were held.

The group has received presentations on the Metropolitan Water Plan, the development of the groundwater project, technical studies conducted to date, the associated community consultation process and proposals for the next phases of investigation. Members have reviewed final reports from scientific studies.

3. Economic Impacts

The proposed borefield at Kangaloon was conceived and designed to supplement the water supply for Sydney during prolonged drought, with pumping of water from the aquifer to the Nepean River, which flows into the Nepean Dam. The proposal was developed before the decision was taken by the NSW Government to construct a desalination plant for Sydney. It is understood that the desalination plant will cost in the vicinity of \$2 billion, will be operated continuously and will be capable of delivering 90 GL of water annually. By contrast the proposed borefield was intended as an interim measure pending a decision on the desalination plant or an improvement in storage levels. The borefield would be able to operate for a maximum continuous period of three years during which it would deliver a maximum of 15 GL of water a year, and would only operate in conditions of severe drought. The amount delivered would satisfy Sydney's demand for about one week during any year of operation. The lack of a cost/benefit analysis makes it difficult for the group to assess the economic merits of the proposal. Sydney water users benefit from a small amount of water at a significant cost estimated at \$60-\$80 million.

These considerations are relevant to environmental approval because this is not a proposal without environmental impact. To a large extent the long-term environmental impacts are unable to be characterised or quantified. Residents are concerned that construction work and the infrastructure once installed will have a long-term social, environmental and visual impact on the area. Disturbance of the pristine natural environment cannot be undertaken without permanent impacts. This will affect the appeal of the area to residents and tourists alike, particularly along Tourist Rd and Kirkland Rd. It is incumbent on the approving authority to weigh against these impacts, and the uncertainty surrounding them, the arguments advanced

in justification of such an extreme proposal, given the existence of alternatives, such as the desalination plant, which is now being constructed.

When assessing the detail of the arguments concerning the likely environmental impact, it is important that the approving authority bear in mind the vast area of land potentially affected, both in direct physical, as well as economic and social, terms by the proposal. Whereas the desalination plant has the potential to affect only the area of construction as well as any necessary additional pipeline corridor, the borefield proposal will affect, directly and indirectly, in a variety of ways, as outlined below, many hectares of both public and private land. The private land is productive and quite intensively developed and populated; the public land is largely in a pristine state and has been, for many decades until now, dedicated to the protection of the environment in the widest sense. Once this proposal is permitted to go ahead, even if it is never used for pumping, it will have had irreversible effects by virtue of the development of the infrastructure and the intrusion necessary for its ongoing maintenance and protection.

4. The Local and Catchment Context

Locally, this farming, tourist and catchment area will be depleted of a natural resource with the proposed sustained lowering of the regional water table. This will disconnect base flows to streams, (which already drain to the Nepean Reservoir) and will affect flows to some groundwater-associated landscapes north of the borefield.

For years farmers have been told to conserve the groundwater and to become involved with catchment management, which has led to improvements in water quality. This proposal negates the goodwill previously generated. The local and broader community is still opposed to this proposal. Major local concerns include the interference with local farming bores and the added cost of pumping from lower levels. When the groundwater is lowered in the vicinity of upstream creeks, the creek levels will be lower, particularly in drought when baseflows from groundwater make up a larger proportion of the total flow. This may also affect local springs, despite assurances that the water in the springs is disconnected from the aquifer being pumped. The introduction of powerlines and pumps in the catchment increases the risk of bushfires in the area. During construction (and destruction of trees) there is likely to be considerable soil and vegetation disturbance, and there is a greater risk of introduced weed species becoming established in the pristine environment from workers and vehicles. There will be considerable noise during construction and there will be decreased visual amenity of one of the most picturesque areas in the shire.

Of recent concern is the offer by the SCA to buy some of this highly productive farming land to create settling ponds. These will accumulate high level of minerals found in the extracted groundwater, effectively reducing land productivity and visual amenity as well as increasing truck movements for waste removal.

5. Environmental Issues

The Metropolitan Catchment Area, where most of the infrastructure is proposed, has remained in an almost pristine condition due to, restricted access, a high water table and previous management for conservation. The area has become a refuge for

significant numbers of endangered plants and animals and supports extensive tracts of intact Endangered Ecological Communities including Southern Highland Shale Woodland and Montane Peatlands and Swamps. The monitoring of the natural environment (groundwater, surface water and nearby ecosystems) has occurred only relatively recently and can be considered preliminary findings. This reveals a lack of research in this area during decades of management of the Special Areas. The flora and fauna surveys, carried out in spring and autumn have been very useful in highlighting the large number of endangered species and communities in this area. This is a rich ecological region and should be left undisturbed.

The regional groundwater level here is generally 5 to 20 metres below the surface although, at a few sites, the regional water table is close to the surface (EA p15). Vegetation could depend on this groundwater with canopy trees being the most obvious example, especially in times of drought when pumping is proposed.

The environmental assessment states that this is a new source of water and is part of a readiness strategy. This is not a new source of water. The documentation and research shows that this aquifer water drains slowly and naturally to the Nepean Reservoir. This happens as the naturally high level of the aquifer water feeds the lower creek levels. The Nepean River and other streams are 'gaining streams' due to the baseflows from groundwater and this flow is especially important in times of severe drought. The aquifer is intact (pre-pumping) and is not subject to evaporation or contamination.

This is not a strategic development of groundwater sources. If the proposed bores were situated below the catchment dams then this would have some strategic merit and may be new available water. The development of this groundwater will lead to more interference, degradation and potential pollution of the aquifers and the catchment area.

The potential deferral of an increase in capacity of the desalination plant seems an invalid argument, considering that the plant is now being constructed and it has a much greater capacity to deliver water than the groundwater option. With estimates of \$2 billion for the desalination plant, such capital expenditure should warrant maximum capacity. The desalination plant will feed water directly into Sydney Water pipes for consumption. It will also buy wind power and will promote this as an alternative energy. The Commonwealth Government gave an election promise to augment the state desalination plants if requested. The desalination plant should take the pressure off creeks, rivers and aquifers.

With regard to the borefield, this proposal uses ordinary mains power with new infrastructure to be installed. The extracted water must travel over 100 kilometres to Sydney via the Upper Canal to Prospect with losses from evaporation at the reservoirs and losses via the old open canal. The lower cost assumption needs to be properly determined with a cost/benefit analysis.

The potential degradation of the aquifers in this area from this project may reduce supply security and certainty in the Illawarra, which is potentially vulnerable in severe drought as Warragamba Dam does not supply this region. During severe drought and / or when overall dam storages drop to around 40% then large-scale and continuous pumping of the aquifer is proposed for 2 to 3 years. Then the aquifer system needs 5

years or more to recover. At this stage water that would normally flow naturally to the reservoir from the aquifer will not, due to the lower water table. Some upstream natural flows will go into the depleted aquifer, rather than into the reservoir (becoming a 'losing stream'). A percentage of rainfall will also go to the aquifer and not the reservoir.

Iron concentrations are sufficient to cause problems with production bores, pumps, and pipes. The water treatment facilities for iron removal are extensive, including aeration and sand filtration. Backwashing of the sand filter will be required every few days, and this backwash then needs treatment using Aluminium sulphate to settle the solids. The use of this chemical adjacent to the Nepean River (previously a class 'S' specially protected waterway) is of concern.

The projected iron concentrations in one borefield area of 20,250 kg/month are substantial and could lead to operational problems with this proposal. The iron and associated sludge water has the potential to pollute streams in its oxygenated form, with associated bacteria forming oily-looking scums in slow flowing rivers or pools.

6. The Investigations

6.1 Ecological studies

The findings of the *Autumn Baseline Ecosystem Study – Upper Nepean Groundwater Pilot Studies Final Report (2007)* provide adequate support for our position on the proposed borefield stated earlier. Five upland swamps are part of an endangered ecological community under NSW and Commonwealth legislation including Butlers and Stockyard Swamps containing peat soils that meet the substrate criteria for endangered communities. Threatened species were identified to exist in or around the upland swamps. The research showed some significant differences in aquatic habitat that were due to changes in flow levels and changes in in-stream habitat from the pumping trial discharge. An increase in physical deformities in Mountain Galaxias was noted in both frequency and number of sites. The Nepean River has significant platypus habitat, which was impacted by some earth bank erosion and the presence of iron flocculation. An increase in dense mats of iron was present at three study sites following the pumping trial.

The report confirms that the Metropolitan Special Areas show an amazing diversity and abundance of flora and fauna. As part of Sydney's drinking water catchment the Special Areas have been quarantined from development and have therefore remained pristine. Few similar areas remain which is a sufficient reason for the Metropolitan Special Areas remaining intact.

6.2 Pumping Trials

The final reports from the pumping trial showed that there was no connectivity with the surficial aquifer and the regional aquifer at Butlers and Stockyard swamps. However, the pumping trial in 2007 was impacted by the rainfall event in February 2007, which allowed the aquifer to recharge and the impact of the pumping to be difficult to ascertain. The premature conclusion of the six-month pumping test at just less than 4 months is of concern. The operational borefield trial was compromised by

the un-seasonal break in the drought patterns, therefore the impacts of continuous pumping could not be established with any certainty.

It is possible that the groundwater is not mixing in a vertical plane, because the rock fractures are not as prevalent or as open as reported. If the fractures do not allow vertical mixing of water from the various aquifers, water could be extracted only from the lower or from other selected aquifers. That would be less likely to have consequences for existing users. There could be a separation of old, “iron-free” water in the lower aquifers from the younger, “iron-rich” water in the upper aquifers. However, the SCA have failed to prove the total variation of water quality or age within separate aquifers as the bores have taken mixed water, due to the design of the bores themselves. The assessment of water quality was based on cumulative water samples down the boreholes and iron content, for example, was determined only for the total cumulative sample from the completed bore.

Other risks to sustainable management of the resource have not been resolved, and therefore if, contrary to this submission, the proposal is permitted to proceed, further studies over a range of seasons should be conducted.

Butlers Swamp Trial

There is a vast mixture of ages of water that came from three bores in the trial. A comparison of groundwater ages at the start of pumping with groundwater ages after recovery for three bores ranged from 320 years to 5754 years and ages varied before and after pumping. By comparing groundwater ages before and after pumping the report showed that the contribution of new recharge water (rainfall) was minor and that the water level recovery was primarily due to the inflow of water from aquifer zones unaffected by pumping into the zones affected by pumping. This is of concern for the group as we have been repeatedly told that recharge comes from direct rainfall on the sandstone area. It shows that the area of effect may be far greater than the anticipated drawdown area and that rainfall may have a minor influence on aquifer recovery. This may mean a lowering of groundwater levels over a greater distance than that predicted.

The URS Water Level and Drawdown Assessment contradicts these findings, “*These recovery rates ... are no doubt associated with the June rainfall recharge events. The speed of the recovery provides additional evidence that the aquifer system will recover quickly after substantial rainfall recharge events*” (URS 2007).

Water quality samples were collected after six weeks of groundwater recovery. The ANZECC (2000) guidelines and threshold criteria for pH, dissolved oxygen, iron, manganese and nitrogen and phosphorus nutrients were exceeded in groundwater, surface water and discharge water. Apart from iron and manganese there were no significant differences with the upstream water.

There is no shale layer at Butlers Swamp, so although the results suggest that the Swamp is protected from drawdown during pumping, the long-term effect is unknown, and the risks from these impacts may be substantial.

A third concern is the potential upstream drawdown on the Nepean River, which was

not monitored during the pumping test. Any drawdown upstream will impede water entering the reservoir and affect the ecology of the area.

Stockyard Swamp Trial

A pool downstream of Molly Morgans Crossing displayed a 10 cm drop in water level from the commencement of the pumping trial until approximately day 10. After this time drawdown was masked by significant local rainfall from early November until the end of the one month trial. Iron floc was also around this pool indicating a connection between the groundwater and Dudewaugh Creek.

This is of concern as pumping may affect this highly pristine creek, also, further down the creek there are two waterfalls with 7 and 11 metres drops (CMA map), which were not monitored but could be sites of groundwater discharge due to their lower elevation and may be affected due to pumping. This creek already drains to the Nepean Reservoir so if the creek is affected by pumping then less than the extracted water is gained.

The pumping trial produced large amounts of iron sludge, which spilled over the retention pond with the extracted water towards Dudewaugh Creek approximately 100 metres away. This aerated iron can cause pollution of the creek as associated bacteria breaks it down and forms an oily substance especially in pools and slow flowing streams.

This spill needed to be independently assessed and is an indication of a lack of safeguards with pumping and a general lack of independent monitoring.

7. Final Recommendations

1. That the borefield be not approved and that the project is abandoned at this stage and that no further infrastructure is placed in the Tourist Road vicinity.
2. That the SCA abides by the REP and Plan of Management for the Special Areas, and the Department of Environment and Climate Change groundwater embargoes, to protect the groundwater resource.
3. That the Metropolitan Water Plan is updated to reflect the new role in water provision from the desalination plant, and that the flows from groundwater from the Upper Nepean be removed to reflect the new conditions.

If the Minister for Planning approves the development, the following safeguards are recommended.

4. That limits on annual extraction of 15 GL are retained and never exceeded to avoid over-exploitation of the resource.
5. That the duration of pumping cycles are clearly stated and effectively protected from alteration over time by shifting state policy directions and decisions.
6. That Stockyard Swamp and Butlers Swamp are protected.

7. That the SCA investigate the extraction of only the water within the basal aquifers of the Hawkesbury Sandstone. Our interpretation of their data is that it is the oldest and the most pure and may not require any treatment for iron.
8. That full recovery of the regional groundwater level is obtained and left for at least 6 months with no pumping before appropriately triggered subsequent pumping cycles commence.
9. That ongoing community consultation is undertaken by government agencies to allow ongoing impacts and other issues to be publicly debated. The proponent, if approval is gained, needs to inform the community of the Southern Highlands about ongoing construction and operation of the groundwater project. A peak body should be retained and informed at annual or biannual meetings to retain community input.
10. That public announcements of proposed pumping, duration of pumping, cease-to-pump, and additional studies and research are made through media outlets and peak representative groups.
11. That independent inspections are carried out by appropriately qualified Environment Protection Authority and National Parks and Wildlife staff with local representatives, due to the restricted access that applies to the area.
12. That the decommissioning requirements for the borefield are to be clearly stated in the approval to ensure that when the borefield is no longer operational, that there is minimal visual and environmental impact.

8. References

Parsons Brinckerhoff (2008) *Water Quality Monitoring During Pumping Trial Upper Nepean Trial Borefield - Final Report* February, 2008 Sydney Catchment Authority.

URS (2007) *Final Report. Kangaloon Borefield Trial. End of Trial Pumping Test - Water Level and Drawdown Assessment*, 13 July 2007 Sydney Catchment Authority.

APPENDIX I

Participants (Representing a range of community perspectives)

Mr Rodney Cavalier	Chair
Councillor Larry Whipper	Representative, Wingecarribee Shire Council
Councillor Jim Mauger	Representative, Wingecarribee Shire Council
Ms Jenny Smith	Representative, Hawkesbury-Nepean Catchment Management Authority
Mr Jonathan Bell	Representative, NSW Farmers Association
Ms Mim Merrick	Community Representative, Burrawang
Mr Ian Tonking	Community Representative, Robertson
Mr Ray Nolan	Community Representative, Bowral
Dr Kerrie Eyding	Community Representative, Robertson
Mrs Beverly Clayton	Community Representative, Robertson
Mr Leon Hall	Community Representative, Kangaloon
Dr Barry O'Neill	Community Representative, Exeter
Dr Karen Guymer	Community Representative, Robertson

The qualifications and experience of these representatives can be found on the SCA website www.sca.nsw.gov.au