# INQUIRY INTO WATER AUGMENTATION

Organisation:Spring Hill & Surrounding District Consultative Committee Inc.Date Received:17 May 2017

# **Review of Orange City Council Environmental Assessment for Orange Aerodrome Industrial and Technology Park**

# Water Resources Sections

John Holliday, Holliday Geoscience

For Spring Hill and Surrounding Districts Consultative Committee

22 January, 2017



Map showing Orange Airport (site of proposed OAITP) is centrally located on the Orange Basalt and Aquifer (in pink), and on the Lachlan-Macquarie catchment divide.

#### **Executive Summary**

Orange City Council proposes to rezone land around Orange airport for industrial activity. This would overturn a long-standing policy of quarantining the Orange Basalt Plateau agricultural lands, water catchment and aquifer from such potentially polluting activity.

The Council's Environmental Assessment for the proposed Orange Airport Industrial and Technology Park (OAITP) rezoning is found to be very deficient in addressing the potential impacts on water resources (surface and groundwater). The Assessment:

- Does not describe the hydrogeology of the Orange Basalt Aquifer in the proposed OAITP area and the broad area of any potential contamination outwards from it.
- Does not take account of the risks to groundwater being much greater from an industrial area than they are from the present day spread and intensity of landuse activity within the airport area.
- Does not address the risks to the capture zones of private bores within the Aquifer or to the springs within and around the Aquifer.
- Do not address the risks to the Orange water catchment from the connection of groundwater with surface water
- Does not address the potential risks to the Central Tablelands Regional Water Security Plan from potential contamination of possible managed aquifer recharge areas.
- Does not address the management of the water-logging and drainage issues prevalent in the proposed site area.

The proposed OAITP would be sited on a large groundwater reservoir (Orange Basalt Aquifer) which by groundwater-surface water interaction forms part of the Orange water supply catchment and the broader Macquarie River catchment. The Aquifer is proposed to be a future component of the Central Tablelands Regional Water Security Plan. The greatest environmental risk posed by the proposed OAITP is large uncontained pollution (chemical, biological) into the underlying water resource and surface drainages. The Environmental Assessment is very inadequate in assessing the risk of such pollution. Yet the consequences of such pollution could be major, and even catastrophic if the Aquifer and water catchment were extensively affected. History shows that uncontrolled pollution events do happen despite the best engineered mitigation measures. The risk posed by the proposed OAITP is therefore unacceptable for water security reasons. The risk is also unnecessary as alternative industrial zoned sites in much less sensitive water resource settings are available in the Orange Region.

#### **Introduction**

Orange airport is situated in the centre of the Orange Basalt Plateau. With fertile basalt-derived soil and clean, drinkable groundwater the Plateau is one Australia's best agricultural lands and is also a prime water catchment. Past industrial land use planning has recognised this by quarantining the Plateau from potentially polluting industrial activity.

Orange City Council (OCC) now wishes to overturn this planning policy. It has proceeded with planning approval procedures for the re-zoning of land adjacent to Orange airport from environmental management zonings to industrial and business park zonings for the purposes of selling land as an Orange Industrial and Technology Park (OAITP). The planning approval procedures are supported by an environmental assessment (EA) commissioned from R.W. Corkery & Co. Pty. Limited, dated November, 2015.

The scope of the EA is stated as "to consider the potential impacts of the likely development within the OAITP in order to determine whether the location is appropriate for such development". The Department of Planning (DPE) included impacts on the water catchment and groundwater in the nominated Environmental Assessment Requirements. Further the Department of Primary Industry - Water (DPI-W) provided eight specific points relating to water which were suggested should be considered in the EA (letter from DPI to OCC 14 Sept, 2015).

Holliday Geoscience has been requested by the Spring Hill and Surrounding Districts Consultative Committee to review the water resources sections of the EA and to comment on the risks to the water resources from the proposed OAITP.

Water resources are covered in sections 5.2 and 5.3 of the EA supported by appendix 3. Appendix 3 is a groundwater assessment commissioned by OCC from C.M. Jewell & Associates Pty Ltd, dated 7 August, 2015 (Jewell Report).

#### **Groundwater**

## <u>General</u>

The proposed OAITP site is centrally located within the Orange Basalt Aquifer (Aquifer) as shown by the front page map. The Aquifer is described by the DPI-W as having "high groundwater vulnerability due to the local groundwater being of good quality with potential for contamination from surface activities". The vulnerability of aquifers to contamination is well demonstrated by recent cases of extensive, uncontrollable contamination by industrial chemicals (e.g. around Williamstown RAAF by fire-fighting chemicals; across a broad area in the Darling Downs, Qld by Linc Energy).

The Aquifer is estimated to have an annual average recharge capacity of 32,415 megalitres (MI). There is insufficient reliable water bore data to enable estimation of the total capacity of the Aquifer. By comparison the Suma Park Reservoir with the newly raised dam wall has a maximum capacity of 18,970MI. The Aquifer is an underground water resource that is significantly larger than the OCC surface storage capacity. The importance of the Aquifer as a water reservoir has been recognised in the Central Tablelands Regional Water Security Project, which OCC is a partner in. The Project proposes the future utilisation of the Aquifer through a system of water harvesting and re-injection borefields, a system termed Managed Aquifer Recharge (MAR).

The Aquifer is utilised extensively (the EA states 244 bores within 6km of the proposed OAITP) for agricultural, domestic and town water supply purposes. It is a shallow aquifer and therefore very susceptible to surface contamination. Drillers logs record water depths to within 5m of the surface and it is well known locally that in wet years the groundwater table comes right to the surface (such as in 2010 and 2016).

The Aquifer acts as a buffer water supply feed into the surface water system of the Orange water catchment, thereby maintaining flow in surface streams from springs and seeps when all upper catchment surface flow into these streams has ceased. Major springs on the edge of the Aquifer include those at Huntley and adjacent to Beasley Road, Spring Hill (see photos). The extent of the connection between the Aquifer and surface water is poorly understood and there appears to be no past technical studies about this aspect.



**Huntley Spring** 



Beasley Road Spring Dam

The total technical knowledge of the Aquifer is very low considering its importance. (Note: this is common for aquifers in NSW because most drilling for groundwater is conducted by drillers and there is rarely any detailed hydrogeological follow-up by geologists.) Hydraulic conductivity directions, and bore capture and drawdown cones in the Aquifer can only be made as "best estimates" rather than be based on reliable bore hole measurement data.

Considering the above, in the event of a significant contamination of the Aquifer there would be little knowledge of the likely pathways of the contaminant and where it might appear in the surrounding surface drainage system. Very thorough hydrogeological studies would be required to enable proper emergency plans to be developed to cope with such a contamination.

## Groundwater in the EA

The EA utilises the Jewell Report as a main reference regarding groundwater hydrology and the risks to it. However, the Jewell Report does not actually address the OAITP but was in fact commissioned for a different purpose, that being "to assess the risks to the quality of water within the groundwater system that supplies the villages of Spring Hill and Lucknow with drinking water". The risks considered in the Jewell Report are those "that occur upstream of the borehole pump intakes" (i.e. within the bores' capture zone). However, the proposed OAITP lies 3km west of the Spring Hill bores and largely outside the estimated capture zone of those bores.

The Jewell report was not written for the purposes of the OAITP EA, and is thus almost totally deficient for that purpose. This means that the Jewell Report and therefore the EA:

- Do not describe the hydrogeology of the OAITP area and the area of any potential contamination outwards from it. This total area is many times larger than the estimated capture zone of the Spring Hill bores described in the Jewell Report.
- Do not take account of the risks to groundwater being much greater from an industrial area than they are from the present day spread and intensity of landuse activity within the Spring Hill bores capture zone.
- Do not address the risks to the capture zones of all the other bores within the Aquifer, or to springs.
- Do not address the risks to the Orange water catchment from the connection of groundwater with surface water.

The use of the Jewell Report for an incorrect purpose is unprofessional, and potentially deceptive. However, the Report does contain some still relevant observations:

- 1. It highlights through certain statements just how poorly the hydrology of the Aquifer is understood; for example:
  - a. "the hydraulic characteristics of the aquifer are not known" (pA3-3);
  - b. "Unfortunately, it has proved difficult to define the capture zone for the Spring Hill bores because neither the direction nor the magnitude of the hydraulic gradient are well defined." (pA3-24)
  - c. "It was not possible to define a groundwater flow direction from information in the DPI Water database".
- 2. It notes that within the Aquifer "there are thus likely to be numerous abandoned water bores that may form conduits that allow pollutants direct entry into the aquifer". (pA3-22).
- 3. It recommends extensive further investigations to enable a better understanding of the Aquifer characteristics (pA3-62).

The risk assessments of likelihood and consequences in the Jewell Report, which are relied upon in the EA, are totally focused on the risk to the water in the Spring Hill bores. The risk assessed that is closest equivalent to the risk of chemical pollution from an OAITP is the risk to the Spring Hill bores from a hydrocarbon spill at Orange airport (see p A3-46). It is notable that this risk is rated to have a rank 4 (major) uncontrolled consequence ("the bores would have to be taken out of service" it is stated). The uncontrolled likelihood of this is left unassigned because the airport is outside the capture zone of the bores. *However, for an OAITP the uncontrolled consequence would be major, in fact probably higher, as all of Orange's water supply and bores into the Aquifer (including proposed MAR bore fields) would be at risk.* 

The EA concludes that "the risk of impact on local groundwater resources, both to the Orange Basalt aquifer generally, and the Spring Hill water supply (Spring Hill bores) specifically, is considered to be very low....". However, this conclusion is clearly based on inadequate knowledge of the groundwater hydrology and assessment of the risks and potential consequences because it relies on a report that was written for a different purpose and thus does not address the much broader issues related to the proposed OAITP.

## Surface Water

The proposed OAITP would be located on the Orange Basalt Plateau at the headwaters of the Orange water catchment and on the boundary of the Macquarie and Lachlan River catchments. The front page map shows the proposed location in relations to surface drainages.

The Orange Basalt Plateau is mostly a flat-lying lava plain that has not been eroded to any major degree by surface drainage in its central area around Orange airport. There are many small to large internal drainage centres with depths of only one to a few metres, which are important recharge sites for the Orange Basalt Aquifer. The Plateau is very subject to water-logging over extensive areas, particularly in winter when evaporation is very low and, also during severe summer thunderstorms.



Minor flooding and water logging at site of proposed OAITP, August 2016. This view is immediately opposite Orange airport



Minor flooding and water logging at site of proposed OAITP, August 2016

The EA is very deficient in addressing the water-logging and drainage issues that would occur at the proposed OAITP. Reference is made to a Structure Plan for surface water management but the Plan figures provided are only conceptual and do not demonstrate a detailed knowledge of the proposed site.

#### **Conclusion**

The proposed OAITP would be sited on a large groundwater reservoir (Orange Basalt Aquifer) which by groundwater-surface water interaction forms part of the Orange water supply catchment and the broader Macquarie River catchment. The Aquifer is proposed to be a future component of the Central Tablelands Regional Water Security Plan. The greatest environmental risk posed by the proposed OAITP is large uncontained pollution (chemical, biological) into the underlying water resource and surface drainages. The Environmental Assessment is very inadequate in assessing the risk of such pollution. Yet the consequences of such pollution could be major, and even catastrophic if the Aquifer and water catchment were extensively affected. Unfortunately history shows that uncontrolled pollution events do happen despite mitigation measures. The risk posed by the proposed OAITP is therefore unacceptable for water security reasons. The risk is also unnecessary as alternative industrial zoned sites in much less sensitive water resource settings are available in the Orange Region.



Holliday Geoscience is a consultancy operated by John Holliday, B.Ec., B.Sc(Hons), based at Huntley, NSW, 2800. John has 39 years of experience as a geoscientist, including working for BHP and Newcrest Mining. He has lived in the Orange Region and worked on the Region's geology since 1987. He was the main discoverer of the modern Cadia gold-copper deposits. He was the Cadia site manager for the environmental assessment and community consultation during the Cadia Mine exploration phase. Cadia is now Australia's largest underground metalliferous mine and a major employer in the Orange Region. John has also farmed at several locations on the Orange Basalt plateau since 1990 and thus has long experience of its hydrological characteristics.