Pamela Morales

From: Wayne Jones <wayne.jones@dpi.nsw.gov.au>
Sent: Friday, 22 August 2014 10:32 AM
To: Pamela Morales
Subject: Bindaree Beef Rendering and Bio Digester Plant (SSD_6093) EIS

Hi Pamela

Please see following draft DPI comment on the above project. The Office of Water is the only relevant agency of DPI in this matter. Formal response should follow shortly.

Regards
Wayne

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OUT14/27572

Ms Pamela Morales
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Dear Ms Morales,

Bindaree Beef Rendering and Bio Digester Plant (SSD_6093)
Response to exhibition of Environmental Impact Statement

I refer to your email dated 15 July 2014 requesting advice from the Department of Primary Industries (DPI) in respect to the above matter.

Comment by NSW Office of Water
The NSW Office of Water (Office of Water) has reviewed the Environmental Impact Statement (EIS) for the Bindaree Beef Rendering Plant and Bio-digester. The Office of Water's comments are outlined below, with detailed groundwater comments outlined in Attachment A. The office of Water's recommended conditions of approval are outlined in Attachment B, should the project be approved.

Groundwater Management

The groundwater conditions on the site have not been sufficiently reported to provide an understanding of the groundwater flow and baseline groundwater quality on site. Groundwater quality data presented indicates that on site effluent irrigation has recharged the underlying basalt aquifer resulting in groundwater contamination.

Given contamination has occurred, most likely from past effluent management practices, future management of waste water on site should ensure appropriate controls are in place.

These would include a revised groundwater monitoring strategy with management triggers and reporting standards. The strategy should include a review of the spatial distribution of the bores with regard to potential contamination sources as well as other users of the resource.

The potential future risks to groundwater from the proposed on site effluent management cannot be ascertained as the effluent volumes and composition is uncertain. As recommended in Appendix O, an effluent or Digestate Management Plan should be prepared that enables disgestate to be managed to suit soil conditions, weather events and crop requirements.

Detailed groundwater comments are found in Attachment A.

Recommendations

1. Review and revise the groundwater monitoring network to:

   - ensure adequacy of the groundwater monitoring network. This should include the adequacy of the spatial distribution of the network and any need to monitor effluent leakage from the existing holding ponds and irrigation storage dams.

   - ensure all bores are registered with the Office of Water and provided with a unique GW bore identifier that is to be used for all reporting.

2. Develop an early-detection groundwater quality monitoring, trigger levels, reporting and response plan, benchmarked to a suitable definition of baseline conditions, Including a groundwater remediation plan and identification of any make good measures if contamination occurs.

3. Report, with any analytical results, the sampling, handling, storage and analytical methods, and other associated quality assurance and control information, including analytical uncertainties.

4. Consistent with the recommendations of Appendix O which deals with waste water use, a revised digestate management plan should include:

   - Reinstatement of the pilot waste treatment plant to better define the effluent volumes and compositions anticipated for the full-scale proposal.

   - An irrigation control system.

   - Mapping of soil types, nutrient and metal-retention properties, and deep-drainage potential.

   - A contamination risk analyses with respect to the aquifer and potential receptors (groundwater users).

Riparian Management

The EIS outlines the development will be located within 40 metres of a watercourse. As the proposed development is State Significant Development a Controlled Activity Approval under the *Water Management Act 2000* is not required, however all works within 40 metres of a watercourse should be constructed in accordance with the Office of Water's Guidelines for Controlled Activities.

Stormwater Management

The EIS outlines a number of management measures for stormwater on the site including rainwater tanks, swale drains and dams. It is important appropriate stormwater management measures are in place to limit any potential impacts on surface water and groundwater sources in the locality.

Erosion and Sediment Control

The EIS outlines erosion and sediment control measures for the site including a deflection bank to divert clean runoff away from the site, sediment fencing and grassed swale drains. It is important that appropriate measures, including an Erosion and Sedimentation Control Plan are implemented on the site to limit any potential impacts on surface water and groundwater sources.

For further information please contact Christie Jackson, Water Regulation Officer, (Tamworth office) on (02) 6701 9652 or at christie.jackson@water.nsw.gov.au.

Attachment A

Bindaree Beef Rendering and Bio Digester Plant (SSD_6093)
Response to exhibition of EIS
Additional comments by NSW Office of Water

Detailed Groundwater Comments

The site is underlain by the Inverell Basalt groundwater source, which is managed according to the Water Sharing Plan for the NSW Murray-Darling Basin Fractured Rock Groundwater Sources.

The potential impacts of on-site wastewater-stream product discharge on groundwater are reviewed herein in accordance with the requirements of the *Water Management Act 2000*, associated NSW Aquifer Interference Policy 2012, and relevant Water Sharing Plan.

The main groundwater issues associated with the proposed development are outlined as follows:

1. The coverage of the present groundwater monitoring network is incomplete.

2. The details and adequacy of the present and proposed monitoring program are unclear.

3. The sampling, handling, storage and analytical methods, and associated quality assurance and control information, have not been given.

4. Baseline groundwater levels, flow, qualities (physical and chemical parameters), beneficial-use category, water-quality objectives have not been established and presented.

5. Not all groundwater monitoring bores have been registered with the NSW Office of Water or had their relevant details presented.

6. Relevant baseline soil conditions have not been presented.

7. Maps of soil distribution, nutrient and metal retention and fixation capacity, and risk of deep drainage have not been presented.

8. Field measurements of soil hydraulic parameters, such as infiltration, water characteristic or deep drainage, have not been undertaken.

9. The potential impacts of historic irrigation, rainfall, and other land management activities, on groundwater levels have not been considered.

10. The field-measurable and dissolved-ion water quality parameter values and quality assurance measures have not been verified and presented.

11. Groundwater baseline concentrations of, and locally relevant protection criteria (e.g. trend detection measures and trigger values) for, species of dissolved nitrogen, phosphorous and other aqueous constituents have not been defined.

12. The potential for effluent leakage from the existing holding ponds and irrigation storage dam has not been monitored.

13. Risk analysis is hindered by the uncertainty in effluent volumes and specific compositions.

14. Groundwater level trends and implications for the risk of contamination have not been addressed.

15. The present groundwater monitoring program is inadequate.

16. A risk analysis for groundwater contamination has not been explicitly presented.

17. As stated above, data on the specific composition of the effluent is unavailable to inform any detailed irrigation management requirements and the potential risk of contamination.

18. Bindaree Beef has not presented a ‘Digestate Management Plan’ or Monitoring Program.

19. An irrigation control system has not been presented.

20. The 100m irrigation exclusion buffer may inhibit the early detection of groundwater contamination. Groundwater monitoring must be carried out at the irrigation area, within the buffer zone, and surrounding area outside the Bindaree property.

21. A nutrient budgeting and monitoring program has not been explicitly detailed.

22. As detailed above, several limitations to the existing and proposed groundwater monitoring program have been identified.

23. No groundwater remedial plan or make good measures have been proposed should groundwater contamination be detected.

Water Requirements & Licensing

All water currently used by Bindaree Beef is sourced from the Inverell Council reticulated water supply. No increase in water usage is required for the proposed development. No groundwater or surface water use is required for this proposal; groundwater will not be used for construction or operational activities, or dust suppression.

Bindaree Beef has no irrigation bore licences; but has groundwater Basic Rights licences for stock and domestic use (lic. 90WA823239 – Bore No: GW964949, and 90WA823242 – Bore No: GW964950).

Baseline Conditions

An explicit description of baseline conditions of, and beneficial-use category and water-quality objectives for, the site has not been presented.

The supplied groundwater level and quality data from each bore are incomplete. Two of the monitoring bores have been described as enclosed and, thus, have not provided groundwater level data.

The impacts of historic climate and land management on groundwater levels and quality have not been discussed (e.g. by hydrograph analysis and deconvolution).

The present distribution of monitoring bores, particularly in the McIntyre River Catchment, does not enable a basic groundwater flow direction to be determined.

Details of the groundwater monitoring program are unclear. The sampling, handling, storage and analytical methods, and associated quality assurance and control information, have not been given.

The nature and representativeness of sampling sites is unclear. Not all groundwater monitoring bores, depicted in Fig's. 39 (see a copy of Fig. 39, at the end of this review) and 40, have been listed as existing groundwater monitoring bores in Tables 28 and 29.

The three site monitoring bores in the southern portion of the Copeton Dam Catchment, namely Oat Paddock Bore, 3 Dams Bore GW24, and Gully Windmill Bore GW25 (e.g. Fig. 40, p. 205), are not registered in NOW's Groundwater Database System or listed in Table 28. Thus, their construction details and hence suitability to monitor groundwater impacts is unknown.

Myhill's Bore - EPA Monitoring Point 27, shown in Fig. 39, but not tabulated, coincides spatially with well GW051234, which has been completed as a concrete cylinder with a diameter of 2.4 m and without any additional record of construction details and water-bearing zones. Representative groundwater quality data may be difficult to obtain from such a well. The location of JR's Bore - EPA Monitoring Point 26, shown in Fig. 39, does not exactly match the co-ordinates recorded in the NSW Groundwater Database System.

The description of soil baseline conditions is incomplete and unclear. No soil-type map or soil profile descriptions relating to the soil pits, whose locations are shown on Fig. 38, are provided. The northern portion of the irrigation site is not represented by a soil test pit, and the representativeness of the existing soil test pits for the soils across the irrigation site is not indicated.

Additional soil sampling between the test pits has not been undertaken. Selected properties of two different soil types across the irrigation area are summarised as a single soil type in Table 25. These properties include saturated hydraulic conductivity and available water holding capacity, both of which were not measured but, instead, adopted from a publication on soil analysis, for which no reference is given. Other potentially relevant soil hydraulic properties, required to characterise the role of preferred water flow paths and determine the soil moisture characteristic curve, were not measured.

The very low pH of the topsoils indicates that they have already been impacted by previous irrigation management. The soil's capacity to adsorb phosphorous and, consequently, prevent its loss via deep drainage into the underlying groundwater, has not been measured. The effective cation exchange capacity (CEC) of the 0-40 cm portion of soil profiles was measured to be in the range 14.8-76.3 cmol(+)/kg (Table 3, Appendix P), which is, moderate to very high. However, these results ignore profile differentiation, which may restrict the highest CEC primarily to the topsoil, and cation exchange may be limited to infiltration of the topsoil and the faces of subsoil cracks.

Impacts on Groundwater Levels

Deep drainage and groundwater recharge may be possible in the irrigation area especially where vertic soil, the dominant soil type of the area, is described as self-mulching and ranging from as little as 0.4 m in thickness. The full impacts of existing or, potentially, future site operations on the underlying groundwater are unclear. However, contamination from historic irrigation is evident from the available groundwater quality data and the limited numerical groundwater modelling suggests that additional recharge may occur.

Impacts on Groundwater Quality

The potential for groundwater to be impacted by irrigation is indicated by the groundwater quality data, sampled at five monitoring sites between 2008 and 2013 and presented in Tables 30 to 34 (Section 5.12.3).

Dissolved nitrogen concentrations are typically several times above the expected natural background level in Myhill's Bore - EPA Monitoring Point 27 and especially JKN's Bore - EPA Monitoring Point 28. These sites are located in the upper reaches of a surface subcatchment where soils are likely to be relatively shallow.

Occasional peaks in dissolved nitrogen concentration also occurred in 3 Dams Bore - EPA Monitoring Point 24, JR's Bore - EPA Monitoring Point 26 and, as ammonia along with high phosphorous concentration, in Gully Bore - EPA Monitoring Point 25. This data indicates that previous effluent irrigation on site has recharged the underlying basalt aquifer.

The pH tabulated for groundwater from JR's Bore EPA Monitoring Point 26 is typically extremely high for natural groundwater. Whilst such high pH values are possible they are likely to have been caused by CO_2 degassing during sampling, storage and handling prior to the pH measurement. The accuracy of these pH values is unknown as the sampling and analytical methodologies, many other constituent concentrations/values, and related quality assurance measures have not been presented. High groundwater pH, if real, has a strong control on the fate of nutrients and other groundwater constituents and can lead to aquifer clogging via mineralisation.

No monitoring has been undertaken and presented to demonstrate the integrity of the existing effluent holding ponds and irrigation storage dam.

Effluent Management

Risks to the soils, surface water, groundwater, aquifer, and potential receptors are uncertain because the effluent (digestate) volumes and compositions are uncertain; and compositions of effluent from the pilot plant have not been presented. It is acknowledged that all of these details may not become available until full production is underway.

Crop irrigation requirements, and surface runoff and subsurface drainage control, will be managed according to accurate details of effluent volumes and compositions, and water and nutrient balance calculations (Appendix O). However, according to Appendix O (p. 2, para. 6 & 7) further analysis is required to characterise the digestate, and balance calculations are yet to be finalised. Potential risks to aquifer interference and water receptors cannot be determined until these aspects are clarified.

Utilitas (Appendix O) recommends that the pilot plant be reinstated to better ascertain the anticipated effluent volumes and compositions. NSW Office of Water supports this recommendation.

Impacts on Nearby Users

Areas at risk of groundwater recharge and contamination, the receptors at greatest risk of contamination, and the adequacy of the current groundwater bore field to monitor these potential impacts have not been presented and discussed. Groundwater level temporal trends, aerially contoured groundwater elevation (AHD) data, inferred groundwater flow, and consequent hazards and potential risks to receptors, have not been explicitly presented and discussed.

A basic groundwater rights domestic bore, GW901075, is located within the area of Bindaree Beef ownership and down-gradient from the effluent irrigation areas of the McIntyre River Catchment. This bore has not reportedly been monitored and is in a prime location to detect groundwater contamination derived from the irrigation areas; although it is not screened in the shallowest of the water-bearing zones through which the lateral flow of contaminants offsite could occur.

All bores listed in Tables 28 and 29 (Section 5.12.2, pp. 211-212) are within the Bindaree Beef meat processing and effluent irrigation areas only (land ownership shown on Fig. 2). The water quality of a domestic and stock bore (GW969520) to the south west and, potentially, several bores immediately to the east of the irrigation site may be at risk if groundwater contamination occurs on site. These bores need to be monitored for water quality.

Impacts on Groundwater Dependent Ecosystems and Culturally Significant Sites

No high priority groundwater dependent ecosystems or culturally significant sites are known to exist in the proposed activity areas or within sufficient proximity to enable their potential exposure to any groundwater-related hazards associated with the proposal.

Hydraulic and Nutrient Balance Model

FSA Consulting (Appendix P) applied the Model for Effluent Disposal Using Land Irrigation (MEDLI), a modelling tool jointly developed by the CRC for Waste Management and Pollution Control, and the Queensland Departments of Natural Resources and Primary Industries, to predict the fate of water, nitrogen, phosphorous, and total dissolved solids following land irrigation with effluent. The MEDLI modelling results have not been presented with any estimate of uncertainty; quantified uncertainty is necessary to determine whether the modelling is fit-for-purpose.

The MEDLI model comprises a set of modules, some employing empirical relationships, and each of which has its own set of assumptions and limitations. With the limited availability of locally measured input data, the following model parameters were assumed:

1) the default Black Vertosol soil characteristics in MEDLI, assuming low permeability, and ignoring shallow soil profiles and the existing Ferrosols;

2) the default Black Vertosol phosphorous sorption capacity in MEDLI; the site's soils were not analysed for this parameter;

3) a theoretical irrigation schedule;

4) future climatic information based on historic data;

5) an estimated annual volume of generated effluent; and,

6) calibration to have nitrogen, phosphorous and salinity (total dissolved solids) concentrations in the irrigated effluent at the maximum concentrations allowable for low strength effluent according to DEC (2004); the local relevance of which has not been ascertained.

Appendix P does not state whether MEDLI has adopted the soil-crack (preferred water flow path) infiltration algorithm from the PERFECT modelling code.

FSA Consulting (Appendix P, p. 16) infers that the MEDLI modelling results are subjective due to the assumptions made for the lack of appropriate data in parameterising the model. FSA Consulting states that "Monitoring is the only way to ensure that the performance predicted by the modelling is achieved", highlighting the requirement for and dependence on stringent digestate and groundwater monitoring programs and an irrigation control system.

For the irrigation scenario modelled using MEDLI, the results suggest that deep drainage would double compared to the modelled dryland scenario.

Mitigation

Potential effluent impacts on the irrigated soils include excesses of nutrients, salinity and sodicity; these hazards can, in turn, result in impacts on surface water and groundwater quality and aquifer integrity. Bindaree Beef proposed to mitigate these impacts via digestate irrigation management, but acknowledges that "management practices will be refined once specific information has been obtained relating to the properties of the resulting digestate solution" (Section 5.8.5, p. 190).

To define the optimal control over the dispersal and use of the digestate, Utilitas (Appendix O) recommends that Bindaree Beef prepare:

1) an effluent or Digestate Management Plan; and, as part of that plan,

2) a Digestate Monitoring Program to tailor digestate management to suit soil conditions, weather events and crop requirements.

An irrigation control system, including soil-water monitoring and soil and plant-tissue chemical analyses, has not been defined.

Mitigation measures proposed to prevent the recharge of digestate matter into the groundwater system include (Section 5.12.5, p. 220):

1) 100 m irrigation exclusion buffer around existing bores;

2) ongoing nutrient budgeting to prevent excessive effluent application to the site; and,

3) continued monitoring of onsite groundwater.

End Attachment A

Attachment B

Bindaree Beef Rendering and Bio Digester Plant (SSD_6093)
Response to exhibition of EIS
NSW Office of Water Recommended Conditions of Approval

- The proponent must develop a revised groundwater monitoring network to ensure adequacy of the groundwater monitoring network in consultation with the Office of Water. This should include the

adequacy of the spatial distribution of the network and any need to monitor effluent leakage from the existing holding ponds and irrigation storage dams.

- The proponent must register all groundwater bores with the Office of Water and obtain a unique GW bore identifier that is to be used for all reporting.

- The proponent is to develop an early-detection groundwater quality monitoring, trigger levels, reporting and response plan, benchmarked to a suitable definition of baseline conditions. This shall include a groundwater remediation plan and identification of any make good measures if contamination occurs.

- The proponent to report, with any analytical results, the sampling, handling, storage and analytical methods, and other associated quality assurance and control information, including analytical uncertainties.

- The proponent should revise the digestate management plan to include the following:

  (i) Reinstatement of the pilot waste treatment plant to better define the effluent volumes and compositions anticipated for the full-scale proposal.

  (ii) An irrigation control system.

  (iii) Mapping of soil types, nutrient- and metal-retention properties, and deep-drainage potential.

  (iv) A contamination risk analyses with respect to the aquifer and potential receptors (groundwater users).

- To aid in the protection of receiving water source quality, all stormwater runoff must be adequately treated at its source and/ or diverted through the stormwater treatment process designed for the site, prior to the stormwater being discharged to surface water and groundwater sources.

- All works within or adjacent to riparian lands should be consistent with the NSW Office of Water's Guidelines for Controlled Activities.

End Attachment B

Regards
Wayne

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