MWH

BUILDING A BETTER WORLD

10 June 2015

Statement of Expert Evidence

Re: Central Victorian Livestock Exchange:
Ballarat Planning Scheme Amendment C185:
EPA Works Approval Application Service Order Reference: 1001580

Name and address

Dr Dean Lanyon
Suite 406
147 Pirie Street
Adelaide, 5000
SA

Qualifications and Experience

B. Eng. (Agricultural Hons), University of Melbourne 1992
PhD Soil Physics University of Melbourne 2001

I have over 20 years of professional experience in environmental physics working across different national and international landscapes. I am recognised as an expert in the field of soil and landscape assessments for the irrigation with a range of water sources. A statement of qualifications and experience is included in Appendix A.

Instructions

This statement has been prepared on the instruction of Central Highland Water. I was instructed to:

1. Review the submitted materials as they relate to the works approval application WA1001580: RLX Operating Company Pty Ltd to relocate and re-establish the Central Victoria Livestock Exchange (CVLX, saleyard) from its existing site in central Ballarat to (Part) 22 – 76 Victoria Street, Miners Rest.
2. Peer review the submitted materials as they relate to my discipline;
3. Prepare a statement of expert evidence and appear at a planning panel proposed for the week beginning 22 June 2015

Information used and relied upon

I acknowledge receipt of full copies of the following exhibited materials and submissions from Central Highlands Water.

1. Douglas Partners (2014) On-site effluent disposal assessment, Report prepared for Regional Livestock Exchange (RXL) Investment Company Pty Ltd, 21 August 2014
2. Geolyse (2014) Water cycle management, Report prepared for Regional Livestock Exchange (RXL) Investment Company Pty Ltd, August 2014
3. Spiire (2014) DRAFT Environmental improvement plan, Prepared for Regional Livestock Exchange (RXL) Investment Company Pty Ltd, August 2014

4. Geolyse (2015) Letter of response to Central Highlands Water, dated 3rd June 2015

The review also considers the requirements outlined in the following guidelines:

1. ANZECC (2000) Australian New Zealand Guidelines for Fresh and Marine Water Quality. Volume 3: Primary industries – Water quality for irrigation and general use section 9.2. Australian and New Zealand Environment Conservation Council.
2. EPA Victoria (2003) Guidelines for Environmental Management: Use of reclaimed water, Publication 464.2, ISBN 0 7306 7622 6.
3. EPA Victoria (1991) Guidelines for Wastewater Irrigation, Publication 168.

Peer Review Outcomes

Whilst the exhibited materials cover a number of the assessments required there remains a number of shortcomings that need to be addressed before the potential environmental risk associated with on-site effluent disposal is adequately addressed and meets guideline requirements. These additional assessments specifically address the risks associated with soil profile degradation through salinisation and sodicity, nutrient balance and deep drainage to the groundwater system. These are outlined as follows.

- Full soil profile chemistry is not reported in the documents. Subsoil properties are an important parameter in assessing site suitability for effluent disposal. Whilst the soil bore logs give an indication of the soil profile characteristics more detail is required with respect to the subsoil conditions. This would include soil profile drainage potential (permeability and ability to leach), profile texture and horizons, clay %, CEC, ESP, pH, nutrient status and effective root depth. The permeability numbers presented are conducted across soil horizons and, therefore, are not a reliable indication of subsoil permeability. Further, phosphorus sorption in the soil profile relies on the analysis of surface soil samples and potential root restrictions in the soil profile have not been assessed.
- Limited water quality numbers are presented. Irrigation water quality should be assessed against the ANZECC guidelines which considers the clay to CEC ratio and the risk of sodicity development due to the SAR level of the water applied. Whilst sodium adsorption ratio (SAR) is stated as low this value should be included in the water quality table along with other expected water quality parameters.
- The interaction between water quality and soil conditions has not been presented. The ANZECC guidelines offer a method of assessment for both potential soil salinisation and the potential development of sodicity. An assessment of salinity and sodicity risk needs to be included with consideration of the surface and subsoil conditions and expected irrigation volumes. The management of salinity and sodicity also needs to be included in the Environmental Improvement Plan (EIP) along with associated trigger values.
- Although compliant with the EPA 168 guidelines, the water balance should consider both drainage rate through the soil profile and plant stress reduction in evapotranspiration. The current water balance method assumes the soil profile drains rapidly (i.e. water contents above field capacity drains within a day) and water use by the crop meets environmental demand through to wilting point. The drainage assumption is not

supported by soil profile observations. Soil profiles that drain rapidly are not suitable for use for effluent disposal according to EPA 168. The water balance model should include a drainage rate reflective of the soil profile condition and compare the annual volume of drainage with and without effluent disposal to the site in order to define the potential risk to the groundwater.

- Whilst the expected lucerne yields may be correct there needs to be a justification of the lucerne yields presented and the nutrient content of the exported material. The expected nutrient content of the exported materials are provided in the ANZECC guidelines. Further, nitrogen fixation by lucerne is required to be consider under the EPA 168 guidelines which need to be included in the assessment. Expected yields need to be adjusted for season water use and the expected irrigation volumes based on the suitability of the soil for Lucerne. Local irrigated lucerne yields could be used as a guide with consideration of irrigation volumes. Further, drainage rates beyond the expect rootzone before and after the development would assist in comparing potential fluxes to the groundwater.
- It is unclear what irrigation method is used for on-site effluent disposal. The method of irrigation needs to be clearly stated as well as the irrigation scheduling practices to avoid saturation, including adaptation to weather forecasts.
- The EIP must include a set of trigger values for monitored properties (eg. soil salinity, groundwater quality) and an alternative effluent management plan once a trigger value is reached.

Conclusions and Recommendations

From the exhibited materials I am unable to conclude whether the on-site application of effluent will not cause land degradation. This is mainly due to an incomplete assessment of the soil profile conditions and water quality parameters required to understand the potential impacts of the expected effluent volumes that will be applied on soil quality and nutrient dynamics. I recommend the following actions be undertaken to enable a conclusive position to be made with respect to the suitability of the site for on-site effluent disposal.

- Undertake a soil profile assessment to 1.5 metres by a qualified soil scientist to assess the soil physical and chemical properties required to meet the assessments outlined in the ANZECC and EPA 168 guidelines that impact on soil degradation and crop growth.
- Undertake water balance calculations that includes drainage rate and crop water stress before and after the development to derive the expected water irrigation volumes and expected deep drainage changes.
- Provide a defendable position in relation to crop yields and nutrient balances for nitrogen and phosphorus.

Assumptions and limitations

The following are assumptions were made during the peer review.

- The water volumes attributable to each component of the water balance is true and correct.
- The presented water quality used for disposal on site is representative of the treatment process.

Declaration

In preparing this statement I have made all the enquiries that I believe to be desirable and appropriate, and that no matters of significance that I regard as relevant have to my knowledge been withheld from the Panel.

Yours sincerely

Dr Dean Lanyon
MWH Australia Pty Ltd

MWH

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Appendix A

Dr. Dean Lanyon

AGRONOMY, SOILS & ENVIRONMENT TECHNICAL LEAD

dean.lanyon@mwhglobal.com

Dean is an expert in the assessment and management of soil and irrigation systems used for agriculture production and wastewater disposal systems with over 20 years of professional experience. Dean holds an Agricultural Engineering Degree majoring in surface and groundwater hydrology and a PhD in Environmental Physics.

In his present role, Dean is the technical lead for landscape and soil assessments related to the beneficial use of alternative water sources across Australia. He has worked on projects in all states of Australia and water sources that originate from winery waste, municipal wastewater, groundwater and Coal Seam Gas.

Previously, Dean has managed and been the technical lead on projects worth over $25 million involving the complex interaction between irrigation water quality, soil and landscape properties and management dynamics. His experience extends to the assessment of soil properties and modelling soil-water-environmental dynamics within landscape and agricultural production systems.

Additionally, Dean has gained recognition for his application of GIS tools to agricultural production systems and assessment of landscape for agricultural use. These included the application of edaphic, proximal, aerial, satellite and yield monitoring spatial tools used to optimise production and resource use efficiency.

SPECIALISATIONS

- Water quality impacts on soils and landscapes
- Landscape assessment and crop suitability
- Wastewater reuse assessment
- Soil-water dynamics modelling
- Soil and irrigation management
- GIS application to resource management

CAREER SUMMARY

- Principal Agronomist and Agricultural Scientist, MWH Australia Pty Ltd, 2013 to Present
- Director, Arris Pty Ltd, 2010 to 2013
- Senior Research and Technical Consultant, Arris Pty Ltd, 2009 to 2010
- Research Scientist, CSIRO Sustainable Ecosystems, 2004 to 2009
- Post Doctoral Fellow, CSIRO Land and Water, 2001 to 2004
- Soil Physicist, DNRE, 1997 to 2001
- Research Officer/PhD student, CRC for Soil and Land Management, 1992 to 1997

QUALIFICATIONS AND MEMBERSHIPS

- Doctor of Philosophy, Environmental Physics
- BEng (Agricultural)
- Member, Environmental Institute of Australia and New Zealand
- Member, Soil Science Australia
- Member, Irrigation Association of Australia
- Member, Australian Society of Viticulture and Oenology
- Member, Soil Science Society of America
- Member, American Society of Agronomy
- Member, British Soil Science Society

Dean has published over 100 scientific papers in his area of specialisation.

A SELECTION OF PROJECTS

Salinity risk assessment of tailings co-disposal with overburden, Iluka Resourses, 2014

Dean undertook a risk assessment of co-disposal of hypersaline tailings with overburden on re-vegetation viability compared to using a capillary break. This work used Hydrus modelling software, input data derived from field survey data, existing functioning mine closure activities, and monitoring activities at active Iluka mineral sands mining operations. The outcome of this showed that the risk of re-vegetation being impacted on by c-o-disposing tailings with overburden was increased compared to an effective capillary break. Requirement for an effective capillary break were also defined.

Maryborough Brine options analysis and system capacity assessment, Central Highland Water, 2014

Dean undertook an options assessment and risk analysis of brine management options for a salt reduction used as part of the water treatment process for town water supply for the Maryborough township. This included the development of a source to reuse water and salt balance model adaptable to test different operating and brine management options. Dean was able to demonstrate a management option for 100% brine disposal to sewer that included an assessment of key risks and associated control measures and costs.

Wamuran wastewater reuse scheme: Concept design and feasibility study, Unitywater, 2014

Dean led the environmental and water demand assessment for the use of recycled water in the Wamuran agricultural area covering 65 km^2. This required consideration of crop suitability, impacts of water quality on soil and landscape health, water demand, scheme design and capital and operating costs. The study also looked at a triple bottom line analysis comparing other forms of wastewater management to reduce nutrient and sediment loading on the Caboolture River.

Water balance modeling for land application of treated effluent at Ballan and Daylesford, Central Highland Water, 2013

Dean undertook a review of current and future requirements for water treatment storage capacities and land irrigation area requirements for the Ballan and Daylesford treatment plants. The review also considered state compliance requirements, operational conditions and daily water balance modeling for 90^{th} percentile discharge compliance. The results were able to be integrated into a financial analysis for future planning requirements for a financially considered expansion of storage lagoons and irrigation areas.

Nutrient and Irrigation Management Plan for the Irrigation with Treated effluent at Toodyay and Beverley, Water Corporation, 2013 to present

Dean developed a nutrient and irrigation management plan compliant to state requirements that would minimize the risk of off-site and on-site environment impacts. This included the selection of appropriate irrigation methodologies and balances associated with the importation of water and nutrients through treated effluent application. Recommendations were also made to additional treatment requirements for compliance and environmental risk minimization.

Irrigation Feasibility using Treated CS Water, Santos, 2012 to present

Dean undertook the review of landscape feasibility reports for the CSG industry. This led to a more specific appraisal of landscape and soil systems for the beneficial use of the treated CS water for three feasibility projects. This included the suitability assessment of specific crops for the irrigation with treated CS water across a variable landscape and longer term impacts on land resources.

Land Assessment for Agricultural Use with Treated CSG Water, Westside Corporation, 2012

Dean undertook a broad based assessment of the capability of land resources for agricultural use with treated CSG water in central Queensland. This included land and irrigation feasibility assessment identifying the potential risks and providing high level advice on land acquisition.

Recycled Water Demand Assessment, Cardinia Shire, 2012

Dean assisted in a desktop study to identify suitable land area for irrigation with recycled water in the Bunyip Food Belt region. The desktop study included an assessment of irrigation demand across the region. This was followed by a detailed water demand assessment through a completed Expression of Interest forms by potential recycled water customers in the region.

Position Paper – Beneficial Use of Reclaimed Water for Agriculture, ActewAGL, 2009

As part of a team, Dean undertook a detailed investigation on the potential use of reclaimed water for agriculture, including quality review, risk assessment, identification of water quality constraints, site constraints, soils and landscape analysis and landscape cropping potential.

Salinity Management Interpretation Guide, GWRDC, 2009

Dean authored a book titled ‘Salinity management interpretation guide’. This book, aimed particularly at vineyards, covers the assessment, monitoring and management of salinity for the sustained production of wine grapes. It is aimed to help operators assess whether their vineyard is impacted by salinity and interpret the results of a monitoring program. It also provides an array of management options and outlines the benefits and shortcomings of each management practice.