Veolia Environmental Services (Australia) Pty Ltd.

Re: EPL– Annual Assessment of Woodlawn Bioreactor & Intermodal Facility Monitoring Data.

Report – 8 December 2010. **(Ref: E2W-083 R001)**

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Project: EPL - Annual Assessment of Woodlawn Bioreactor and Intermodal Facility Monitoring Data

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1.0 INTRODUCTION

Earth2Water Pty Ltd (E2W) was engaged by Veolia Environmental Services Pty Ltd (Veolia) to review and assess monitoring data for the 2009/2010 reporting period for the Woodlawn Bioreactor and Intermodal Facility sites in relation to Environmental Protection Licence (EPL) requirements.

Veolia operates the Woodlawn Bioreactor site (WB) under EPL number 11436, while the Intermodal Facility (IMF) is separate and under EPL number 11455. These EPLs are combined in this annual report (2009-10), which documents the results of the fourth annual monitoring period for the WB and IMF EPL's.

The WB site occupies approximately 3,000 hectares (ha) and encompasses the Woodlawn Mine Lease, which is governed and reported separately by E2W for the Site Mine Lease (SML 20, Figures 1 and 2).

This EPL report provides a review and assessment of the air (dust, landfill gas), leachate, surface and groundwater monitoring data obtained from Veolia's Bioreactor and IMF from 6 September 2009 to 5 September 2010[1]. The report includes historic and recent monitoring data, conceptual models, data assessment, conclusions and where required, recommendations to improve future monitoring.

2.0 BACKGROUND

The NSW Department of Environment, Climate Change and Water (DECCW) regulates numerous waste management and disposal facilities in NSW. The DECCW issues licenses which both permit and regulate waste disposal activities. Licence conditions typically include requirements to monitor air, leachate, surface and groundwater quality in and around landfill sites. Licence conditions also place controls on the licence holder with respect to noise generation.

This report provides Veolia with an independent technical review of the monitoring data and results obtained to date (2004 to 2010).

E2W's scope of work included the review of available technical reports, historic and current monitoring data (air and water), well monitoring networks, surface water storages, hydrogeology and other related environmental information. This scope of work has enabled an assessment of the monitoring data from both the Woodlawn Bioreactor and IMF.

In November 2007, E2W provided Veolia with a comprehensive assessment of the site's water monitoring systems, entitled *Status of Water Monitoring Systems at the Woodlawn Bioreactor Site*. This report sub-divided the site into ten 'systems' or sub-sites to simplify the large and complex site (e.g. mine void, South, North and West Tailing Dams, Evaporation Dams 1, 2 and 3, Waste Rock Dump, Plant Area and IMF) based on local landform aspects (Figure 1).

[1] Note EPL 11436 and 11455 require noise monitoring in the event of noise impacts for residential but no noise monitoring has been undertaken during operation of the WB as there have been no noise complaints.

3.0 LANDFILL DESIGN, OPERATIONS AND HISTORY

The Woodlawn Mine was a typical large-scale open cut and underground mine operation. The mine infrastructure included the construction, operation and maintenance of the following:

- Waste Rock Dump (WRD)
- Tailings Dams
- On-site ore processing facilities (Plant Area)
- Evaporation Dams (ED1, 2 and 3)
- Underground operations
- Open-pit operations

The former mining components at Woodlawn still exist and are illustrated on Figures 1 and 2. A summary of the site history is outlined in Table 3.1.

The Woodlawn Bioreactor occupies the mine void (to 200 metres below ground level (mbgl)) and comprises approximately 25 million cubic metres of landfill space. Landfilling and gas collection commenced in late 2004.

Table 3.1 Milestones and History

Date	Event
1978	Woodlawn open cut mine activities commence.
22.12.1982 (aerial)	Plant Area and dams present. North and South Tailings are constructed and used for tailings/water storage. West Tailings Dam is under construction, together with the Waste Rock Dump. Plant Collection Dam/Lagoon is full of water - irregular area.
9.06.1987 (aerial)	North, South Tailings Dams full of water, tailings comprising ~20% of avail. area. ED1 under construction, with Waste Rock Dam being raised (several benches visible) and includes leachate sump. Dolerite stockpile is visible on west side of mine void. Bunding structure visible at Plant Collection Dam with minor water. Raw Water Dam has been constructed and is full of water. The ED3 area comprises a series of small dams.
1989	Expansion and development of plant infrastructure. Open cut mine workings reach ~ 200 m depth, underground mining commenced.
15.07.1989 (aerial)	ED1 construction complete and full of water. Construction of ED3 South is a work in progress. Dolerite stockpile is increasing in size. West Tailings Dam has been constructed and is full of water. Plant Collection Dam is full of water.
11.09.1990 (aerial)	West Tailings Dam larger, full of water, tailings occupy approx. 10% of avail. area. ED2 has been constructed and now full of water. ED3 construction practically completed (dry). Plant Collection Dam is enlarged and full of water.
30.09.1991	Tailings in the North and South Tailings Dams cover approx. 50% of the available surface area. A new section is being added to the SW corner of the West Tailings Dam. Lower benches of Waste Rock Dam appear revegetated. ED3 North is being constructed and nearly completed (dry).
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Date	Event
11.09.1994 (aerial)	ED3 North and South are complete and full of water. New SW addition to West Tailings Dam is complete and full of water. North Tailings Dam is subdivided in smaller cells on west side and through centre. ED2 has a defined internal bund on the NW corner (visible from 1990). Waste Rock Dump is being rehabilitated and revegetated. Water visible at the bottom of the mine void.
5.10.1995 (aerial)	Rehabilitation/revegetation of Waste Rock Dump is nearing completion.
11.11.1996 (aerial)	ED1 and 2 have high water levels. ED3 is also full.
March 1998	Administrators appointed to Denehurst Ltd.
17.09.2004 (aerial)	Water in ED1, 2 and 3 at low levels. Tailings in North, South and West Tailings Dams have consolidated.
October 1999	Commission of Inquiry - Woodlawn Waste Management Facility.
November 2000	Minister grants consent for Woodlawn.
February 2002	Revised EIS prepared.
August 2002	Minister grants Development Approval for Clyde Transfer Terminal.
February 2003	Land and Environment Court Hearing into Clyde Transfer Terminal.
September 2003	Construction of Bioreactor and Intermodal Facility complete.
December 2003	Clyde Waste Transfer Terminal (Special Provisions) Act (2003) passed by State Government.
Jan - June 2004	Construction of the Clyde Transfer Terminal.
October 2004	Wind Farm DA and EIS lodged.
September 2004	**Landfill gas collection system installed at base of void.** **First waste load delivered to site.**
February 2005	Mining operations plan (MOP) approved.
May 2005	Planning focus meeting held on the Alternative Waste Technology proposal.
June 2005	First stage of gas extraction system and flaring initiated.
October 2005	Wind Farm DA approved.
November 2005	Mixing of acid mine drainage and landfill leachate in the void sump, discharged to ED3 North and South.
January 2006	Construction of first power generator hub commenced.
April 2006	Environment, Safety and Quality accreditation gained.
August 2006	Power generator hub completed.
July 2007	Application for temporary storage of leachate in ED3 from void. Construction of segregated dams (ED3 lagoons) within ED3 for temporary storage. Bioreactor has received 970,000 tonnes of waste since commencement.
September 2007	Approximately 40 m of waste placed in landfill since commencement. (pit base from 200 to 160 m below perimeter). Leachate level of approximately 10 - 15 m below waste level.
November 2007	Comprehensive assessment of water monitoring programs submitted by E2W. AWT DA Approved. Gold medal - WMAA National Landfill Excellence Awards.
February 2008	Commissioning of first landfill gas generator - power generation commenced.
April 2008	Woodlawn Bioreactor Energy official opening.
November 2008	Commissioning of second landfill gas generator.
June 2009	Sealing of the northern portal.
August 2009	Woodlawn Bioreactor presented the Society of Chemical Industry Australia 2009 Plant of the Year.
March 2010	Commissioning of the Third Landfill Gas Generator

Note: aerial = historical information sourced from an aerial photograph.