



## A COMMERCIAL APPLICATION OF VIROFLOW™ TECHNOLOGY

### CASE STUDY: ROADS AND TRAFFIC AUTHORITY, BALLINA WATER TREATMENT

*“The ViroFlow™ Technology treatment was successful in lowering contaminant metal concentrations to well below regulatory discharge levels and in improving general water quality in the treated leachate holding dams.”*



**Emigrant Creek (left)**

## &gt;&gt;&gt; CASE STUDY: BALLINA WATER TREATMENT

**PROBLEM**

The NSW Roads and Traffic Authority (RTA) is currently completing the Ballina highway bypass in northern New South Wales, Australia. The road works are taking place south of Ballina and will cross Emigrant Creek, which is an area that includes abundant acid sulphate soils (ASS). Soil preparation for the project uses a relatively new method of water extraction called “vacuum consolidation” that involves removing air and water from a vacuum-sealed volume of soil. This method helps to accelerate consolidation of the soil prior to road construction. The water emanating from the ASS areas usually has a low pH and high heavy metal loads, and the vacuum consolidation process can increase the production of acidic metal-contaminated water.



*Figure 1: Emigrant Creek, Ballina, NSW.*

**VIROTEC TOTAL SOLUTION**

The solution involved applying ViroFlow™ Technology using the proprietary ElectroBind™ reagent, and included a custom designed treatment.

Implementation of ViroFlow™ Technology achieved the following outcomes:

- > Elimination of a major environmental hazard, and a potential environmental incident;
- > Contaminated water extracted via the vacuum consolidation process was treated effectively and discharged;
- > Treated water was released with trace metal concentrations (particularly aluminum, iron and manganese), total suspended solids concentrations, and pH that were within EPA guideline limits;
- > Fast mobilisation and short treatment time; and
- > Customer satisfaction.

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ViroFlow™ Technology comprised the following elements:

- > Initial full analysis and characterisation of the water;
- > Chemical treatment of the contaminated water to remove metals and improve water clarity;
- > Validation of treated water quality;
- > Ongoing technical support; and
- > Liaison with regulatory authorities.

**BACKGROUND**

The Roads and Traffic Authority (RTA) in Ballina, NSW, is currently completing the Ballina by-pass as a part of the main national highway around Australia and part of this work requires a bridge to be built over Emigrant Creek. Such lowland coastal areas in many parts of Australia are often characterised by widespread ASS and, in affected areas, development work requires an ASS management plan and in this case initial stabilisation of the underlying soft soil before construction of the bypass can commence.



**Figure 2: Treatment dosing plant used to mix the ElectroBind™ reagent in with the contaminated water so it can be sprayed back over the surface of the dam.**

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Furthermore, because any fluids expelled from ASS in the area are likely to be acidic and metal-contaminated, the ASS management plan included strategies to treat this water to strict environmental standards before discharge. Substantial construction, which is scheduled to begin following the completion of the initial work, will involve:

- > Heavy plant and machinery;
- > Traffic changes;
- > Drainage;
- > Earthworks;
- > Pavement construction; and
- > Bridge construction.



**Figure 3: ElectroBind™ reagent being sprayed over the dam surface.**

### TREATMENT METHODS

ViroFlow™ Technology, which is ideal for treating acidic metal-contaminated water, incorporates the use of ElectroBind™ reagent, a patented environmentally safe reagent. The properties of ElectroBind™ reagent include high acid neutralising capacity, fast settling rate characteristics, reduced sludge volumes, and high metal binding efficiency.

ElectroBind™ reagent is mixed with the wastewater in a specially designed dosing plant and the resulting slurry is sprayed back over the contaminated water holding dam. The ElectroBind™ slurry readily disperses over the surface of the water body and both neutralizes acid and binds metals as it settles to the bottom of the dam where it forms a blanket that further inhibits the escape of any other contaminants from bottom sediments. Once metals have been bound to the ElectroBind™ reagent they are held very tightly and cannot be released back into the water under oxidizing or reducing conditions. After treatment, dam water is discharged into the nearby Emigrant Creek.

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**TREATMENT RESULTS**

The results of the treatment of the contaminated dam water at the RTA site show that Virotec's ElectroBind™ reagent lowered the concentrations of all contaminants to well below the EPA's target limits. Table 1 shows the treatment targets and the concentrations of the major contaminants before and after treatment.

**TABLE 1: RESULTS OF THE DAM WATER BEFORE AND AFTER TREATMENT WITH ELECTROBIND™ REAGENT.**

Analyte	Before Treatment	After Treatment	Treatment Targets
<i>Dissolved Al (mg/L)</i>	5	<0.01	0.055
<i>Dissolved Fe (mg/L)</i>	25	0.02	1.0
<i>Dissolved Mn (mg/L)</i>	10	0.06	1.0
<i>Total Suspended Solids (mg/L)</i>	48	38	50
<i>pH</i>	3.8	8.5	6.5-8.5

From the results in Table 1, it is clear that the addition of ElectroBind™ reagent lowered all contaminant concentrations to well below the treatment targets. The metals have been bound by the ElectroBind™ reagent and cannot be released back into the dam water prior to release. Treatment of the contaminated water using the ElectroBind™ reagent has been successful over several months of repeated treatments, and the treated water has consistently met the regulatory requirements for discharge to the environment.

**CONCLUSION**

ViroFlow™ Technology treatment was successful in lowering contaminant metal concentrations to well below regulatory discharge levels and in improving general water quality in the treated leachate holding dam.

ViroFlow™ Technology has proven to be a highly cost-effective treatment for the contaminated water at this site, and it can be rapidly applied for urgent treatments at other sites.