



CASE STUDY

In-situ Water Treatment of Acid Sulfate Soil Affected Irrigation Drains

Earth Systems was engaged by the Environment Protection Authority (EPA) South Australia to conduct an in-situ water treatment of acidic irrigation drain waters affected by acid sulfate soils (ASS) in the Lower Murray River Irrigation Area (LMRIA), South Australia.

With the onset of a drought, river and groundwater levels dropped and irrigation was ceased. This led to acidity generation associated with the oxidation of iron sulfide minerals within ASS materials. When irrigation recommenced, the stored acidity in the soil entered the groundwater and was flushed into the drainage network where excess runoff was pumped to the Murray River.

An initial environmental baseline survey indicated that the drain waters were acidic (acid and latent metal acidity), with pH values of ~3.5 and acidity values of up to 800mg/L CaCO₃. The key environmental risks include consumption of natural alkalinity in river, acid and metalliferous drainage discharge to the river and the potential implications for treatment of abstracted water for potable use for the City of Adelaide.

IDENTIFICATION OF TREATMENT PARAMETERS

Earth Systems set up an onsite laboratory and performed titration and precipitate settling-rate testwork to determine the optimum target pH for treatment. It was identified that treatment to pH 9.0–9.5 was critical to remove the majority of latent metal acidity in the water.

IN-SITU TREATMENT

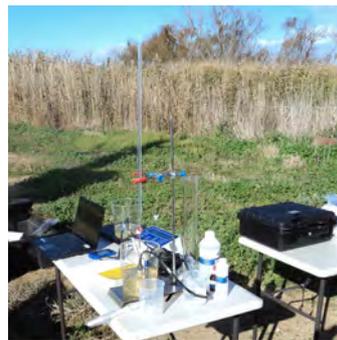
In-situ treatment involved applying calcium hydroxide (hydrated lime) in a slurry form to the drains by hose or cannon using a truck-mounted portable mixing and dosing plant. Using the identified optimum treatment parameters, successful treatment was easily achieved in the main channel both by batch treatment of the entire channel length and by fixed-point treatment at the head of the main channel.

Laboratory analyses of drain water following both in-situ treatment options to the target pH indicated that dissolved metal and sulfate concentrations were lowered to levels not expected to be of environmental concern.

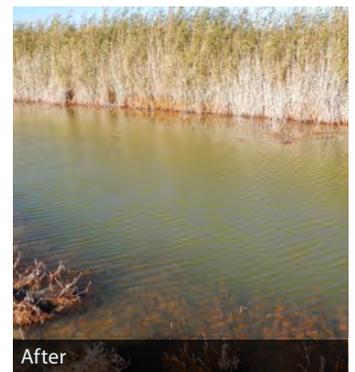
The success of the in-situ water treatment conducted by Earth Systems provided the EPA South Australia a pathway to improve the water quality of the discharges from drain waters to the river.



Real time water quality monitoring



Before



After