Remedial Risk Study: Glebe Mines Tailings Dam Incident Executive Summary FINAL

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EXECUTIVE SUMMARY

ENVIRON was commissioned by Glebe Mines to undertake a chemical risk assessment and remedial risk assessment associated with the sudden release of tailings from a ruptured tailings dam. The incident occurred in January 2007. The purpose of this study was in broad terms to determine whether or not the residual mine tailings sediment in Stoney Brook, The River Derwent and their associated riparian lands and floodplain represented an unacceptable risk of harm to the ecosystems therein and humans who may frequent these areas. A secondary purpose of the assessment, if such a risk was determined to be present, was to determine if the environmental harm caused by attempting to remediate the tailings sediment would be likely to cause more environmental damage than if the material was left to assimilate and be dispersed naturally.

The principal conclusions of this study, which involved a comprehensive sampling and analysis programme, are:

- The tailings sediment is relatively homogenous in physical characteristics and is unlikely to have separated into different particle size fractions in the river systems, which would display different chemical behaviours.

- The tailings sediment is characterised by the presence of heavy metals and fluoride which could be potentially harmful to human health and ecosystems under certain conditions and exposure scenarios.

- Although the tailings sediment present at the mine contains a wide range of heavy metals and other potential contaminants, leaching tests on these tailings show that in the majority of cases these substances are either not leachable at all or where they are leachable are not capable of causing significant deterioration in water quality, when compared to Drinking Water Standards or Environmental Quality Standards (EQS). The notable exceptions to this are Manganese, Fluoride and Lead, which the leaching tests imply could be released from the sediment at environmentally significant concentrations.

- The leaching tests referred to above are more aggressive than would occur in the natural environment where dilution would also be a factor and as such the tests

should be seen as a cautious and conservative assessment of the pollution potential of the tailings sediment. The fact that the leaching tests suggest that, for example, lead is leachable at potentially harmful concentrations does not necessarily mean that harm is being caused.

- The aged tailings sediment that has been in the river system for some 14 months now has considerably less leaching potential with fluoride and manganese no longer being present in significantly leachable concentrations (presumably having already leached into the river water and been dispersed throughout the system). There is, however, some residual leachability of lead, but at a significantly reduced level from that in the source material. This could in theory leach at levels that could breach the EQS for freshwater aquatic species, but such effects are likely to be localised. The overall future pollution potential of the in-river tailings sediment is considerably less than the original source sediment that was first introduced to the river system during the release incident.

- The chemical water quality in the Brook and River has been assessed and does not appear to be adversely impacted by the tailings (or other sources of similar contaminants). With the exception of one sample from Stoke Brook (where the EQS for lead was exceeded but immediately downstream of a drainage input (from the Coombsdale former lead mine system and thus unconnected with the tailings incident), none of the respective EQS's have been breached and the water quality would meet potable drinking water standards for the chemicals of concern. This contrasts with the water quality identified by the EA at the time of the incident which was significantly affected by the tailings sediment and suggests that considerable improvement has occurred since the initial incident.

- The assessment of background chemical conditions, undertaken by analysing samples from areas that have not been affected by the tailings dam incident, has shown that there are similar levels of heavy metal contaminants in the unaffected environment. Consequently, even if all of the tailings material is removed from the river system, the chemical stressors on the system will not necessarily change or be improved as background levels are capable of similar impacts.

- Whilst the chemical potency of the tailings sediment that remains in the river system is considerably less than that of the "raw" tailings at the time of the initial incident and is similar to that which seems to prevail in the general environment anyway, there is nonetheless a potential risk of harm to humans and ecosystems associated with the

residual tailings. Whilst the likelihood of harm actually arising is very low due to the limited exposure and large dilution factors involved, the possibility exists and in that regard the material is potentially problematic.

- Given, however, that the background concentrations that would prevail in the environment are similarly problematic (although again probably not actually causing significant harm), then there is little to be gained from a chemical risk perspective in removing the material from the environment as the chemical risk to the environment remains largely unchanged. There may, however, be good reasons to remove the material from a physical impact perspective such as smothered gravel redds, etc. There is thus no imperative on chemical risk grounds to remove these sediments. The net benefit would be outweighed by the physical impacts of the removal process.

- Assuming, however, that the physical presence of the material is unacceptable and requires remediation on ecological risk grounds, the most effective remedial strategy will be physical removal of the accessible and recoverable sediments. It must be accepted from the outset, however, that the remedial exercise will not be able to remove all of the material. There is no effective in –situ treatment that can be applied to negate the risks of the residual materials, but in ENVIRON's opinion the risks of chemical harm are low and do not in themselves warrant full scale remedial efforts. The unrecoverable residual material will eventually assimilate into the river system under natural hydrological processes and does not represent a long-term risk to the water environment. The remedial priority is thus restoration of the physical environment.

- Given that the most obvious and practical remedial strategy that can be applied is to physically remove the readily accessible sediment from the floodplain, river banks and river bed, there seems little opportunity or likelihood of this increasing the chemical risks to the environment. Provided the suspended sediment created by the removal exercise is controlled and removed from the system as much as possible, transport of the chemicals downstream should be minimised.

This study has shown that whilst there are clearly chemical contaminants in the tailings sediment that was released into the Stoke Brook and River Derwent, the chemical risks associated with this are not considered sufficient in their own right to warrant full scale removal and complete remediation. It would be prudent, however, from a physical impact perspective to remove as much material as possible where it can be readily accessed and transported from the site without damaging the sensitive ecosystems in those areas. Where

there is a strong possibility that accessing and recovering the material using plant and machinery will cause damage to riparian and meadow habitat, we would recommend that the material in question is either left to assimilate, covered up with other suitable material or attempt to recover it manually. The chemical risks do not in themselves warrant remediation.