XYPEX® ECOLOGICAL RESILIENCE SUPPORTS LONG-LASTING CONCRETE INFRASTRUCTURE

Wastewater Concrete Deterioration

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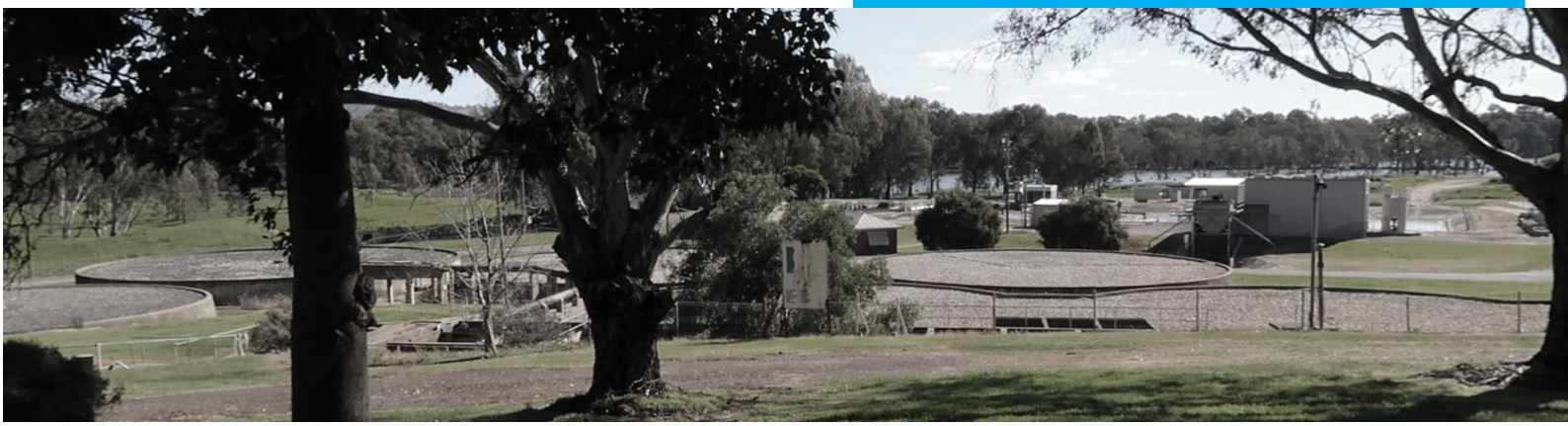

Concrete deterioration in Wastewater and Sewer Treatment facilities is under constant attack from the acidic environment which is created due to bacteria formations and enhanced due to the porous nature of untreated concrete. When selecting and reviewing concrete treatments and protection measures for wastewater environments, it is important to consider:

1. **How aggressive is the proposed environment?**
2. **What technology will assist in all the phases of concrete deterioration?**

When looking at the aggressiveness of the environment, there are many factors which lead to Microbial Induced Corrosion (MIC). The key measurables applied to assess the level of aggressiveness can be the pH, H_2S (hydrogen sulphide), sulphate levels and bacteria type/formations within the system. It is not uncommon for these levels to be unknown and therefore Xypex Australia can work with assumptions, provide cost effective solutions, provide long-term information around products, and help the ultimate performance for these environments.

When considering the phases of the concrete deterioration, it is important to understand each. A useful reference is the document **"FACTORS INVOLVED IN THE LONG-TERM CORROSION OF CONCRETE SEWERS"** by the University of Queensland and University of Newcastle representatives, Tony Wells, Robert Melchers and Phil Bond. A link to this document is as per the following:
https://nova.newcastle.edu.au/vital/access/services/Download/uon:9061/ATTACHMENT01

And a key image from that paper is as per the following:

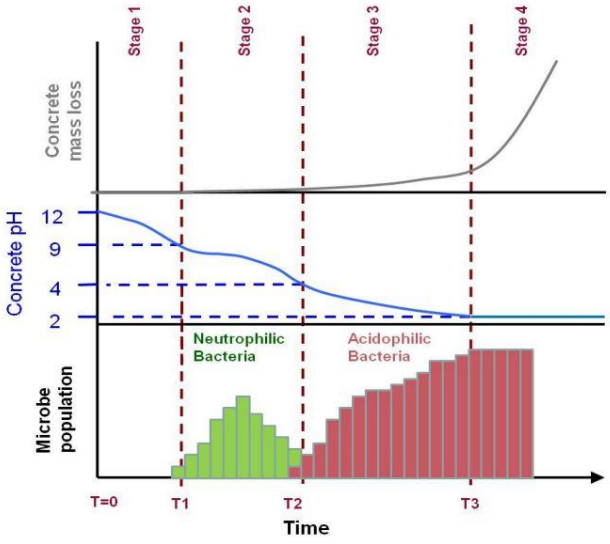

Figure 1. Progression of microbial corrosion of sewer pipe.

As noted in the above graph, the initial phases of concrete deterioration and the ability for technologies to resists pH change, ingress and egress of substances into the concrete, and the mitigation of the development of bacteria, is all highly advantageous to resist wastewater deterioration and in turn, vastly prolong the service life of the asset.

This form of MIC deterioration is not only limited to wastewater such as sewage systems but can also develop in stormwater drainage systems such as stormwater treatment facilities or water holding/reuse infrastructure.

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Xypex Bio-San C500 has been developed to resist all stages of concrete wastewater deterioration by employing two technologies within the one product: Xypex (high performance Crystalline Technology) and Bio-San antimicrobial technology.

Initially, Xypex Crystalline Technology resists the ingress and egress of the wastewater and significantly slows the reduction of the pH of the concrete structure. Once the pH of the concrete surface has dropped below 9, bacteria can develop on the surface. The Bio-San technology then assists in the bacteria development stages 2 and 3, by killing the bacteria and mitigating its development of H_2S, which ultimately forms sulphuric acid.

Long term live sewer trials of up to twelve years have been conducted and the Xypex Bio-San product has remained effective with little, to no, mass loss and no evidence of microbial growth on the treated concrete in an average 50 ppm H_2S environment.

Additionally, in the final acidic environment phases, the Xypex high performance Crystalline Technology resists the acidic mechanism for deterioration by blocking pores and capillaries and activating into cracks through its crystalline formation.

Due to the properties of the technology, any performance testing of this product needs to model, and check, all stages of concrete deterioration in wastewater in which Xypex Bio-San C500 technology assists.

Depending on the environmental parameters and type of asset for the concrete, Xypex Australia has potential testing methods or can utilise historical performance testing to confirm the level of performance Xypex Bio-San C500 can provide.

Xypex Australia is here to assist and develop a methodology which will address MIC deterioration and concrete durability that can save future maintenance and renewal costs.