

IN SITU IMPOUNDMENT CLOSURE METHOD CCP IMPOUNDMENTS NATURAL RESOURCE TECHNOLOGY SILAR SERVICES, INC

The *In situ* Impoundment Closure Method (ISICM) can eliminate leaching and reduce geotechnical instability that contributes to impoundment failures. This method hydraulically isolates ash from the groundwater by constructing a hydraulic barrier at the bottom of the impoundment using engineered *in situ* solidification/stabilization (ISS) applications on the ash and/or underlying natural material. This method will also enhance geotechnical stability by increasing embankment strength, reducing saturated conditions and increasing the overall factor of safety for slope failure.

ISICM allows for engineered in-place closure of ash impoundments while satisfying a broad range of stakeholders. In summary, this approach will:

- Meet regulatory requirements for closure and/or corrective action on impoundments that do not meet location or stability criteria
- Facilitate groundwater corrective action by isolating the saturated ash and providing a barrier to prevent continued contamination of groundwater
- Eliminate the need to remove all ash from impoundments
- Significantly reduce the amount of dewatering, treatment and disposal of ash contact water during impoundment closure
- Eliminate the need to site and permit new landfill space for ash from existing impoundments
- Significantly reduce cost to close impoundments

An illustration of the ISICM is provided in **Figures 1 and 2** and the accompanying brief narrative describes the method for implementing ash impoundment closures.

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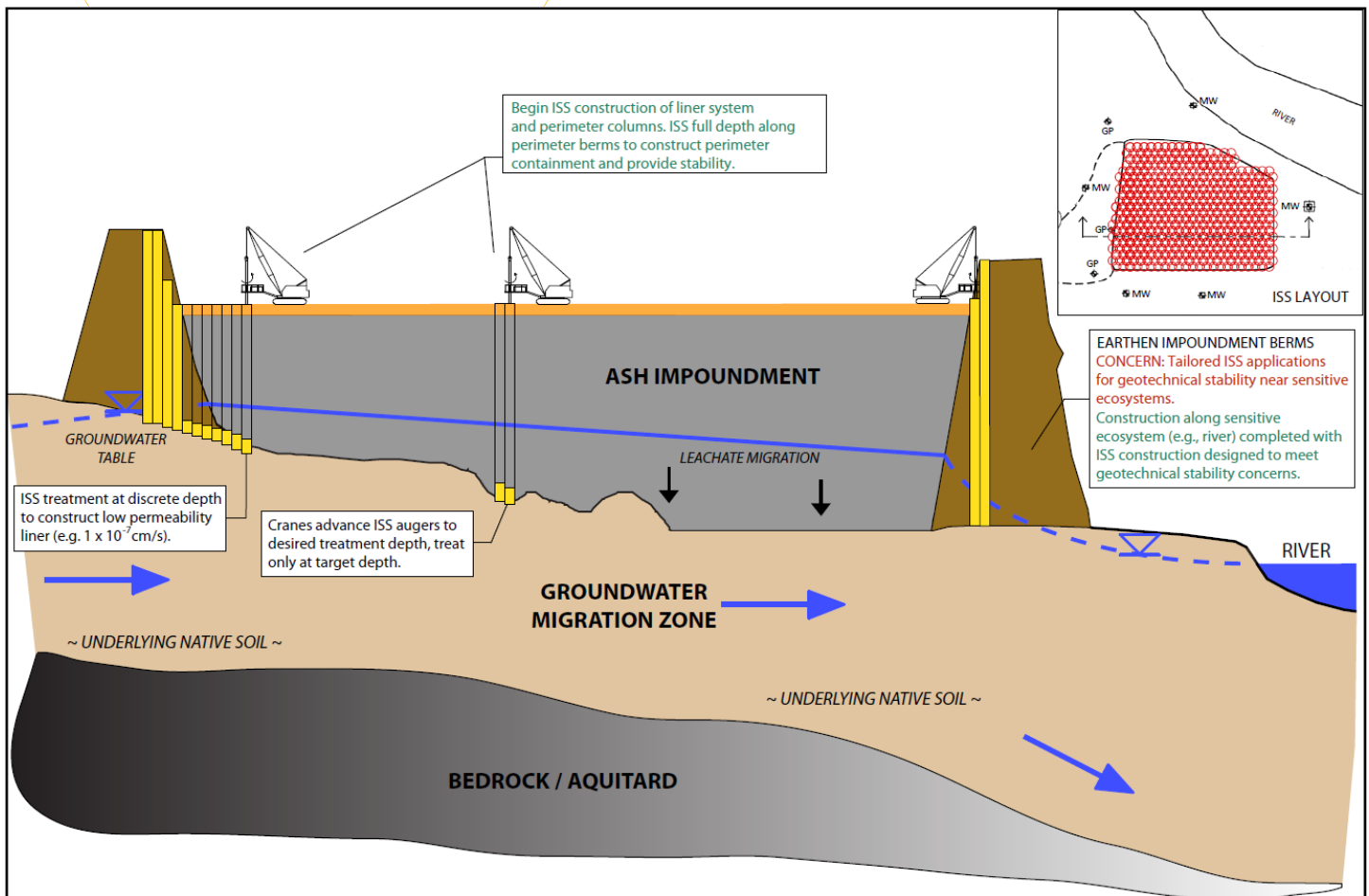


Figure 1: ISS construction of a horizontal liner at the bottom of the impoundment and perimeter vertical barrier wall.

- A horizontal liner is constructed by solidifying ash/native material in a discrete depth interval at the bottom of the impoundment creating a low permeability liner (e.g. 1×10^{-7} cm/sec).
- A vertical barrier is constructed along the impoundment perimeter by solidifying ash/native material continuously from ground surface to the constructed liner to prevent potential horizontal migration of groundwater through the impoundment and to provide structural stability.
- The result prevents both the vertical and horizontal migration of groundwater through the ash impoundment, effectively isolating the ash.

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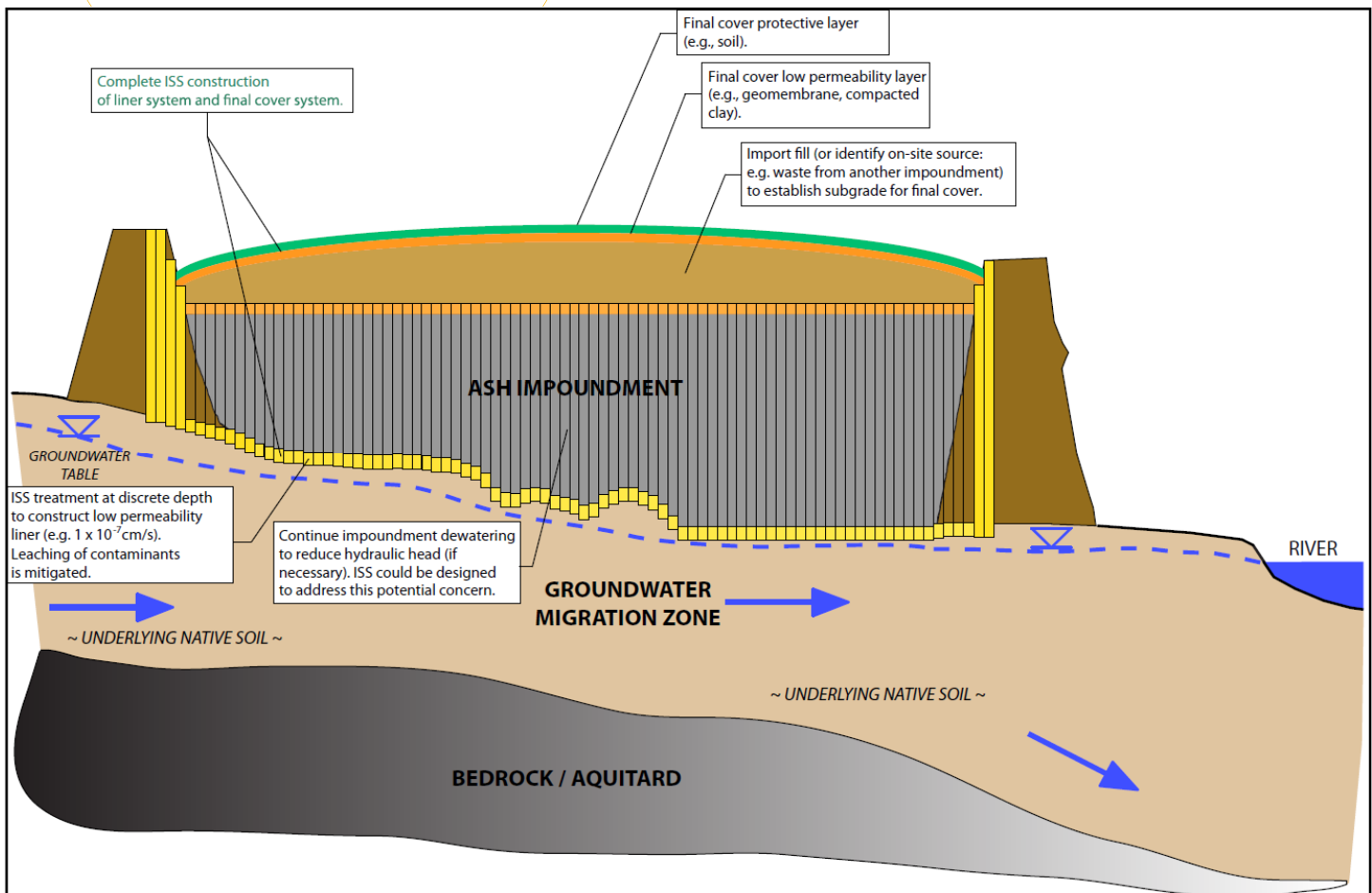


Figure 2: Construction of a final cover designed to cap the impoundment

- The cover system is constructed with imported fill and/or on-site borrow materials covered with low permeability materials (e.g., geomembrane, compacted clay), and a soil layer designed to protect the low permeability layer.
- The low permeability cover could also be constructed by applying ISS techniques to solidify available surficial ash.
- The final cover permeability is less than or equal to the liner and results in reduced surface water infiltration to the encapsulated ash.