



Sino Iron Case Study: Changing from Composite PE liner system to BGM liner system

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GEOANZ #1

ADVANCES IN GEOSYNTHETICS
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Structure

- Introduction
- Background
- Design
- Embankment cross section
- GCL / LLDPE Liner Installation
- Transition from GCL/LLDPE to BGM
- Construction of GCL/LLDPE - BGM transition
- BGM Liner Installation
- Summary

Introduction

- Sino Iron - Largest magnetite mining and processing operation, Australia
- Approximately 80 km south-west of Karratha



Background

- Downstream embankment construction using ROM waste rock from pit excavation.
- ROM materials generally coarse and angular in nature containing some fines from Yandi shales.
- Low permeability highly weathered overburden material used as secondary embankment material along upstream slopes (C2).



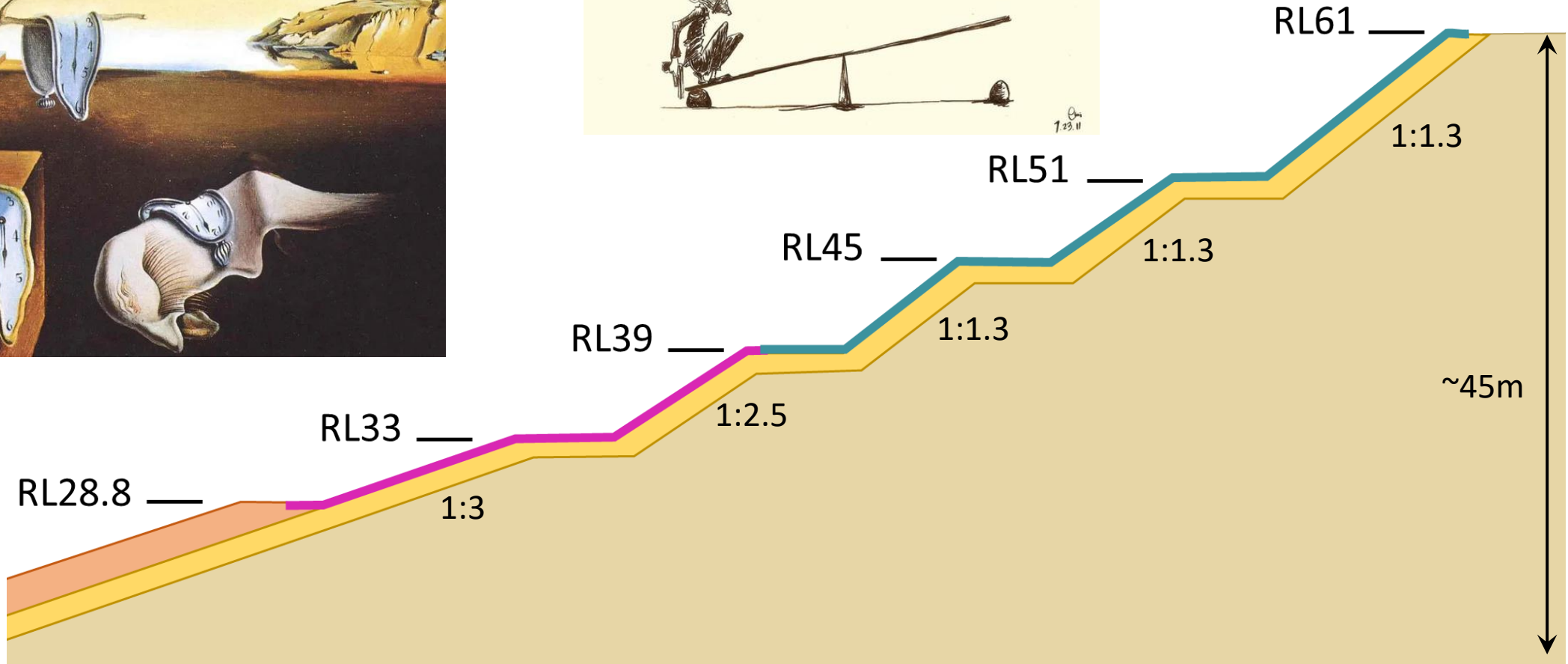
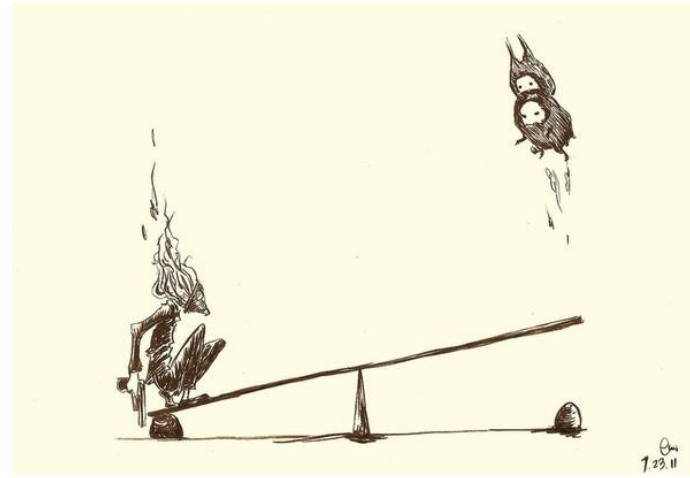
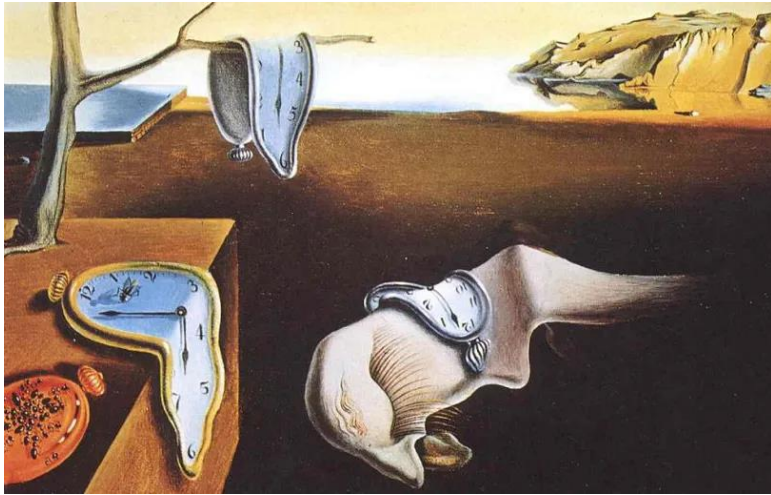
Design

- Thickened tailings disposal up to RL28.8 - liner consisting of clayey material
- Changed to a paddock dumping system → supernatant pond relocated next to the external embankment
- Construction material up to RL28.8 of a granular nature → excessive seepage
- Requirement for improved liner system identified

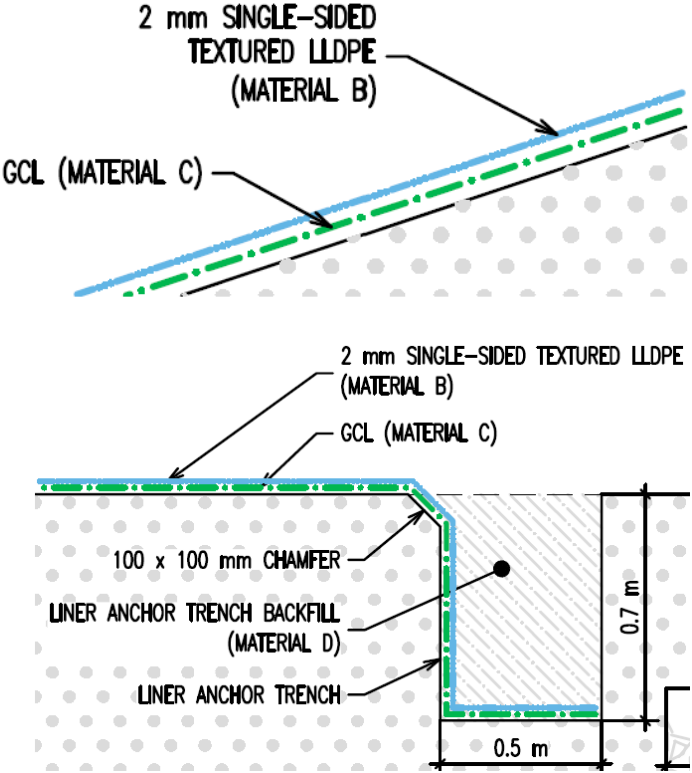
Design – continued

Raise	Slope	Liner System
Up to RL28.8	1V:3H	C2 / Clayey Fill
RL28.8 to RL33	1V:3H	C2 / GCL / LLDPE
RL33 to RL39	1V:2.5H	C2 / GCL / LLDPE
RL39 to RL45	1V:1.3H	C2 / BGM liner system
RL45 to RL51	1V:1.3H	C2 / BGM liner system
RL51 to RL61	1V:1.3H	C2 / BGM liner system

Design — continued



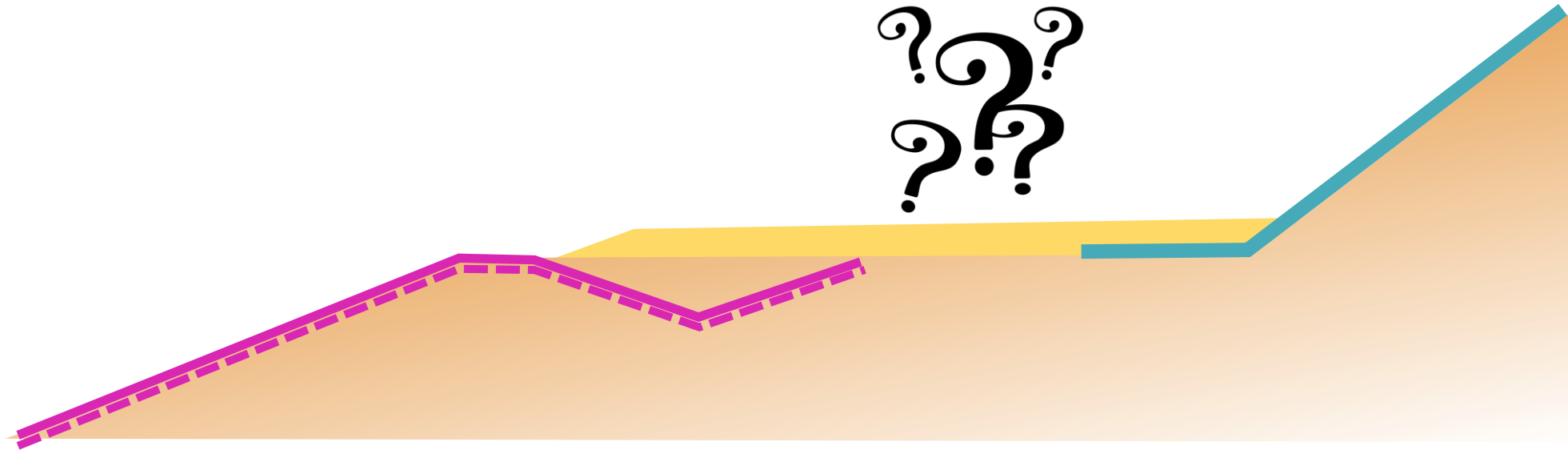
GCL / LLDPE Liner Installation



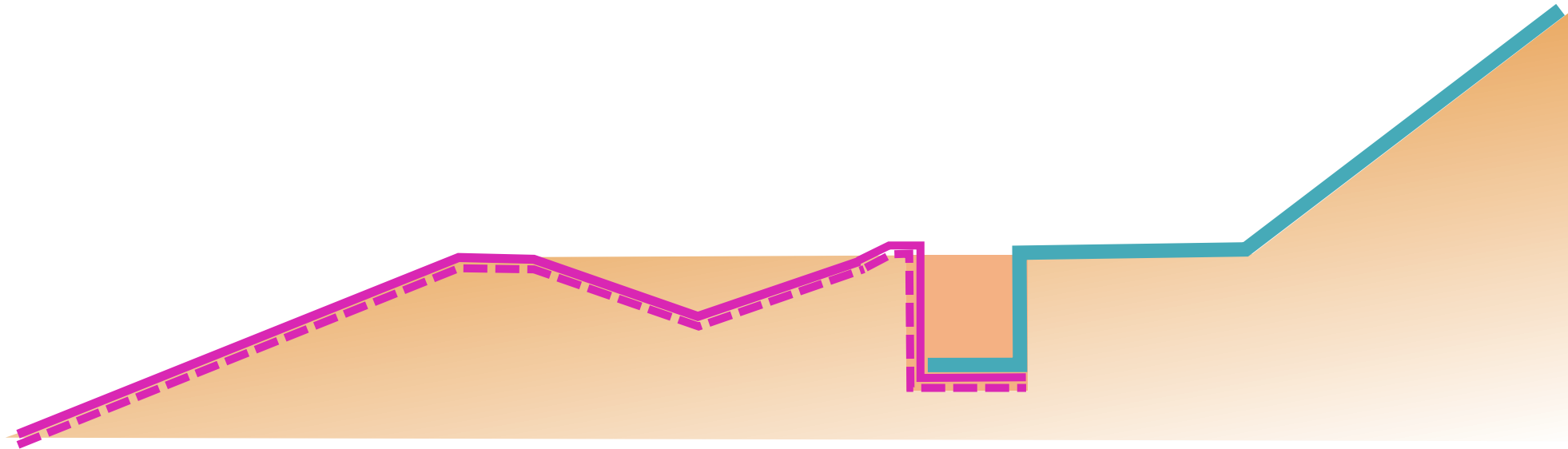
GCL / LLDPE Liner Installation



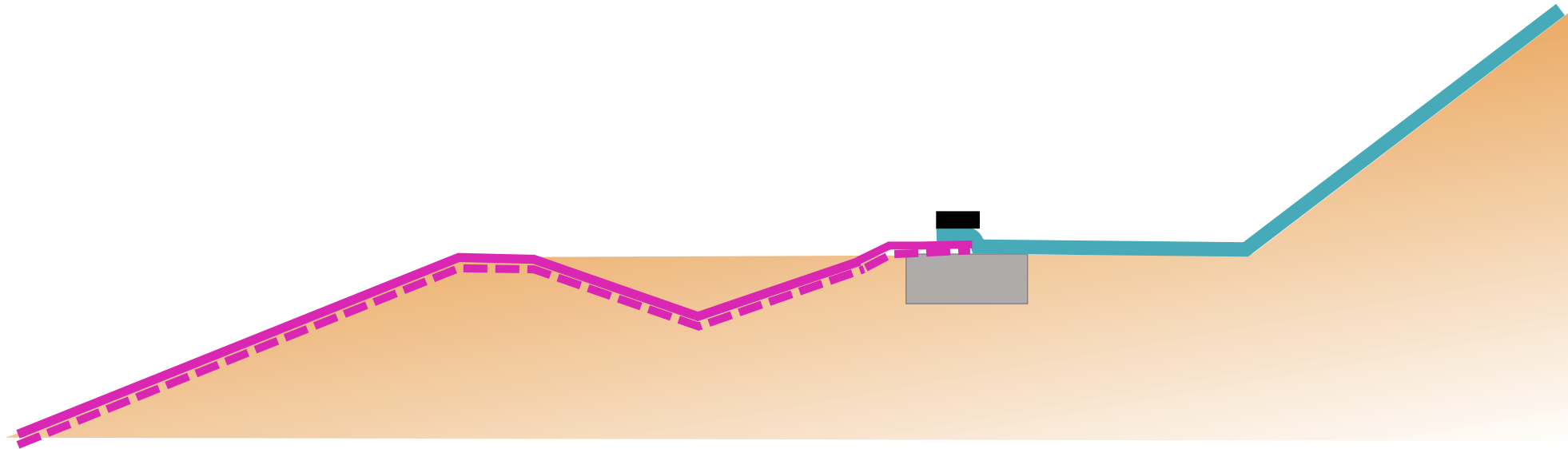
Transition from GCL/LLDPE to BGM



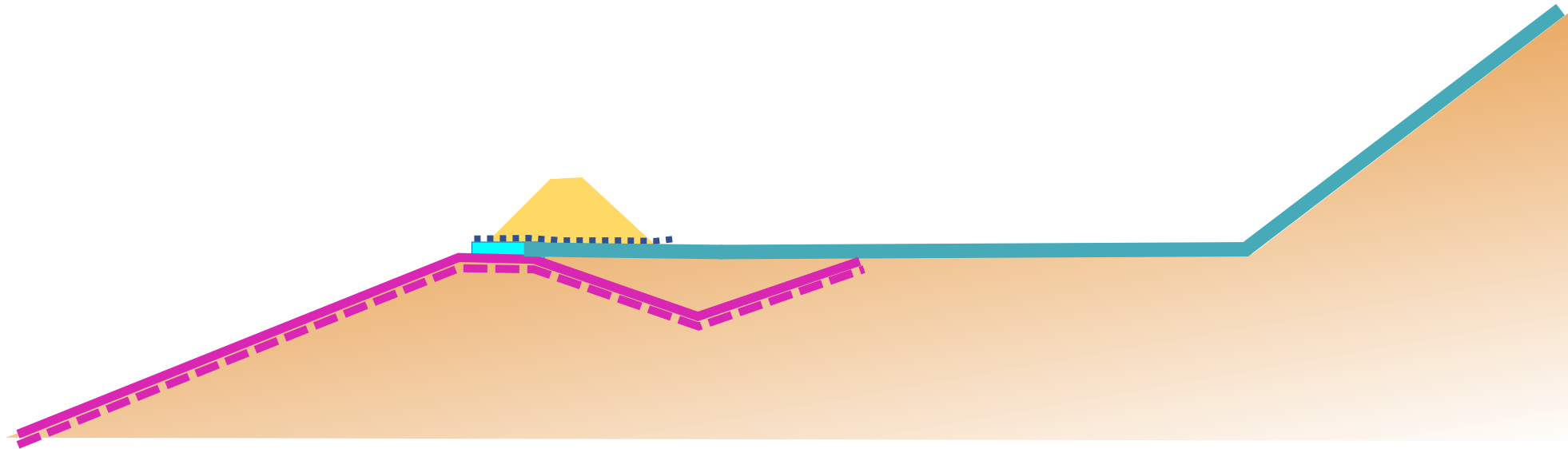
Transition from GCL/LLDPE to BGM



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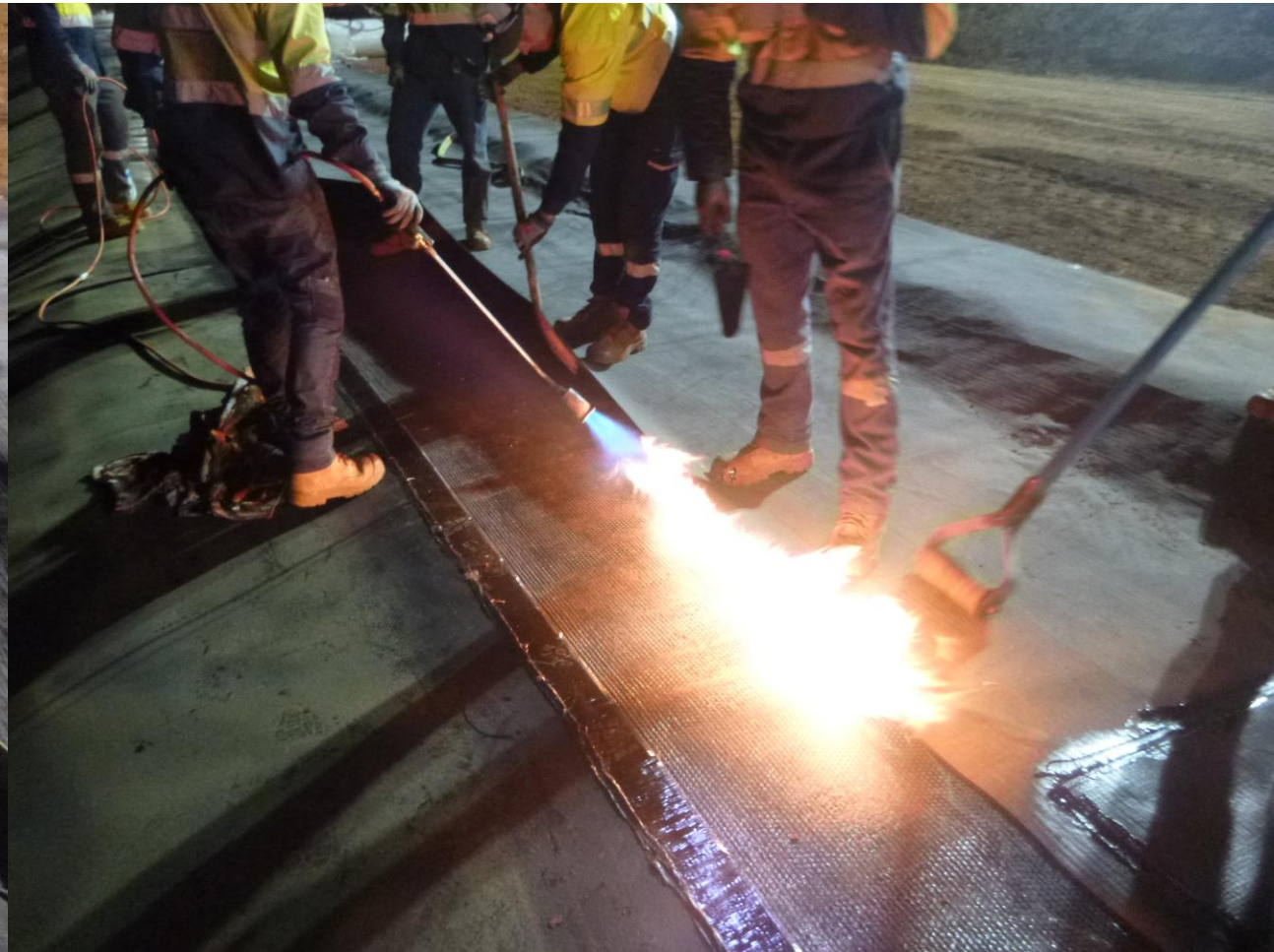
Construction of GCL/LLDPE - BGM transition



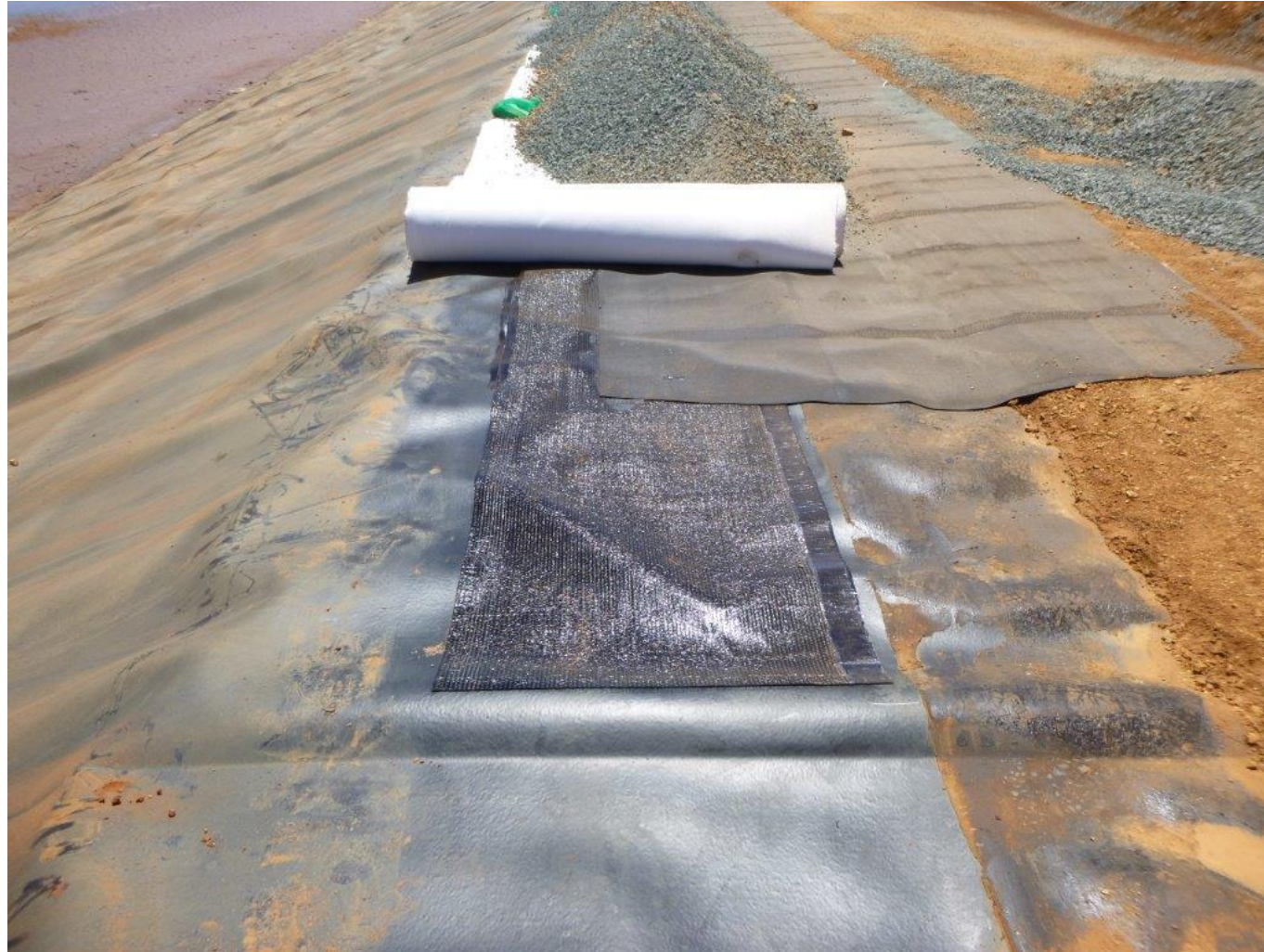
Construction of GCL/LLDPE - BGM transition



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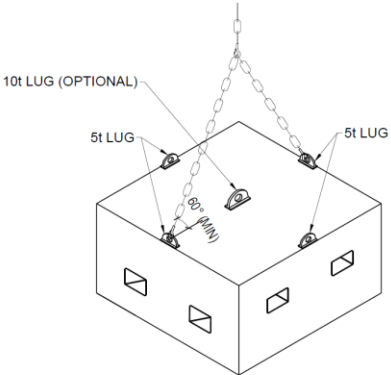
Construction of GCL/LLDPE - BGM transition



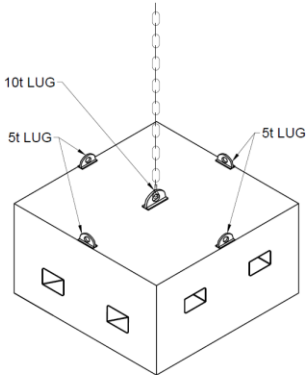
Construction of GCL/LLDPE - BGM transition



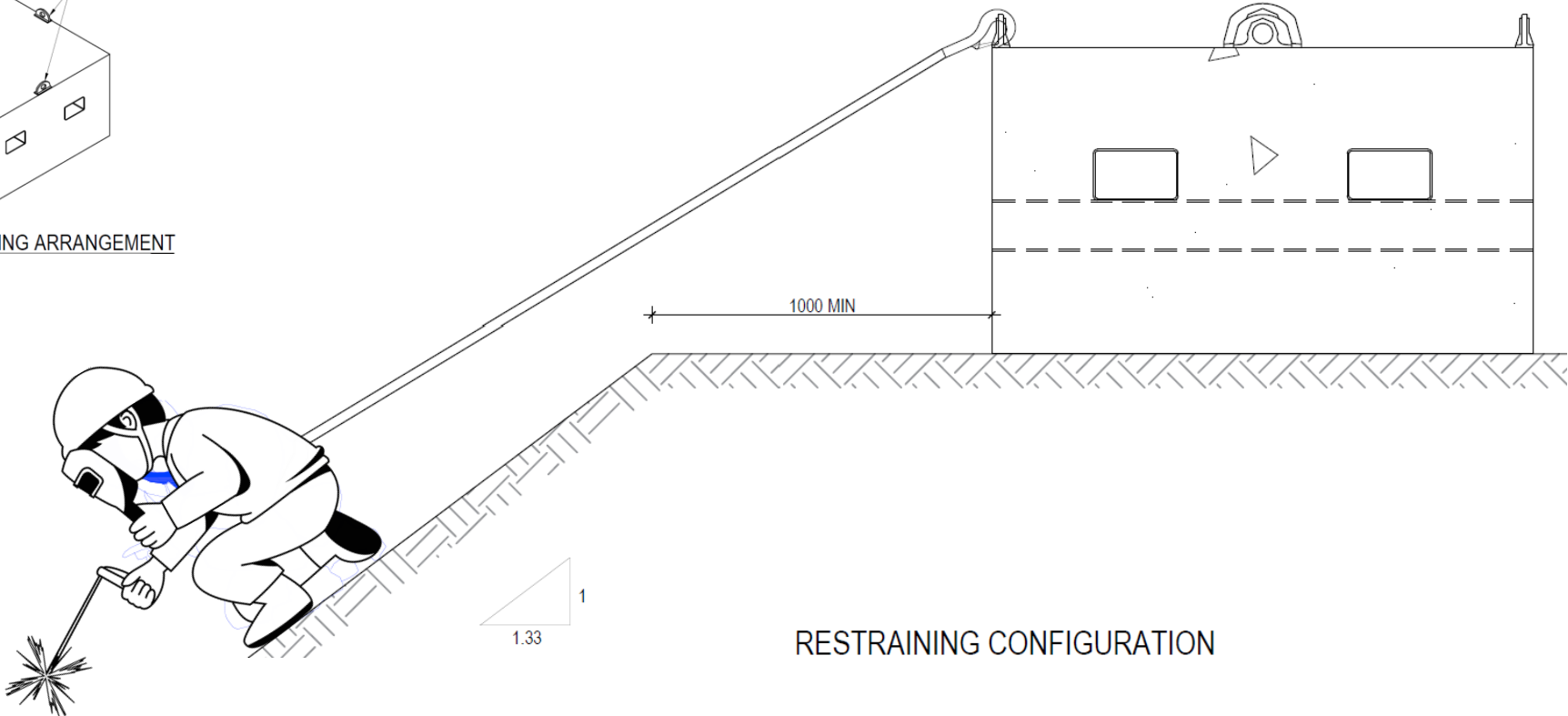
BGM Liner Installation



2 (4) POINTS LIFTING ARRANGEMENT



SINGLE POINT LIFTING ARRANGEMENT



RESTRAINING CONFIGURATION

BGM Liner Installation



Summary

- GCL/LLDPE suitable for flatter slopes
- BGM has worked well on steep slopes despite the H&S challenges
- Transition between LLDPE and BGM is tricky and the installation method is difficult to get right
- Experienced contractors required