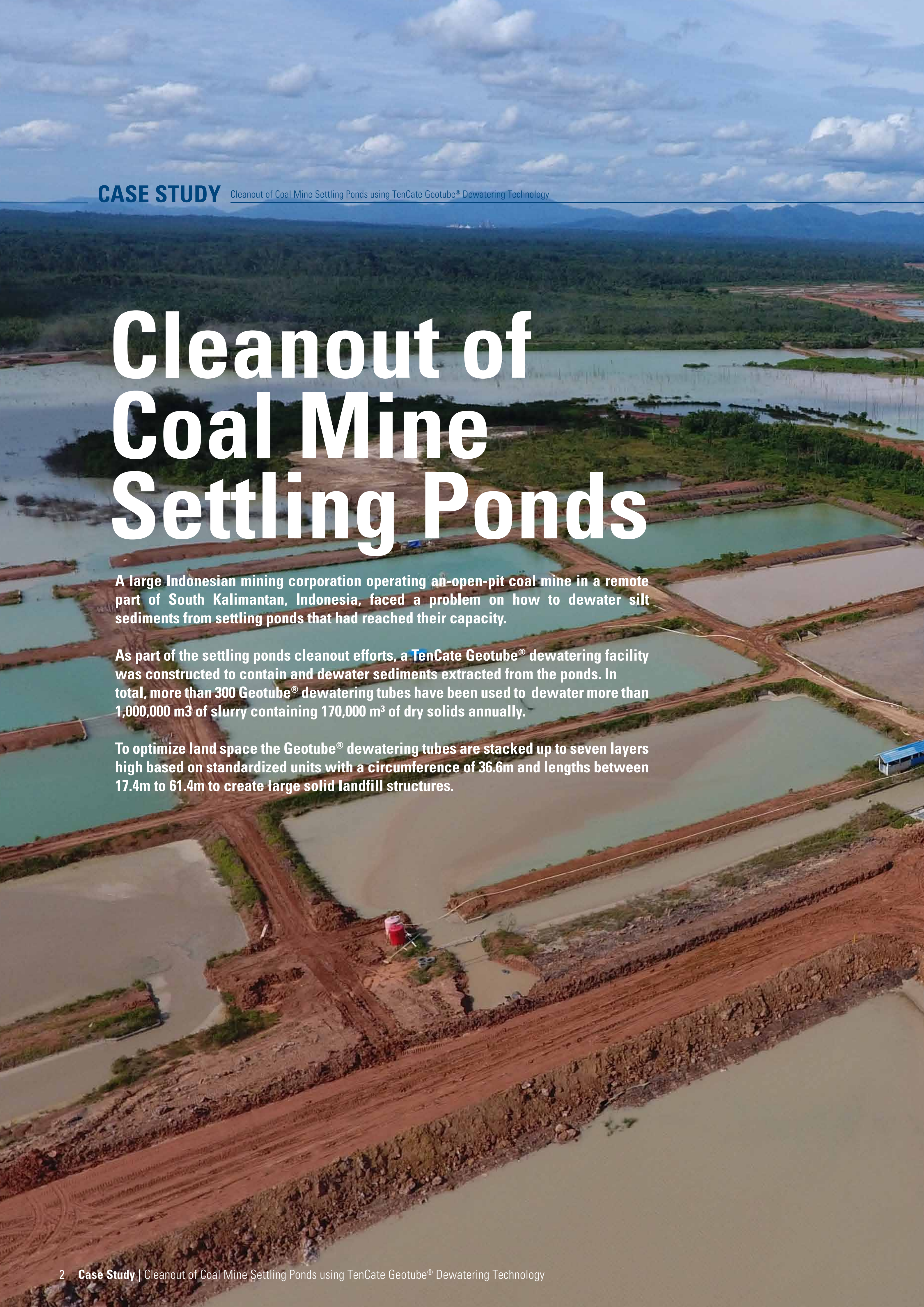
CASE STUDY

Cleanout of Coal Mine Settling Ponds using TenCate Geotube® Dewatering Technology



Cleanout of Coal Mine Settling Ponds

A large Indonesian mining corporation operating an-open-pit coal mine in a remote part of South Kalimantan, Indonesia, faced a problem on how to dewater silt sediments from settling ponds that had reached their capacity.

As part of the settling ponds cleanout efforts, a TenCate Geotube® dewatering facility was constructed to contain and dewater sediments extracted from the ponds. In total, more than 300 Geotube® dewatering tubes have been used to dewater more than 1,000,000 m3 of slurry containing 170,000 m^3 of dry solids annually.

To optimize land space the Geotube® dewatering tubes are stacked up to seven layers high based on standardized units with a circumference of 36.6m and lengths between 17.4m to 61.4m to create large solid landfill structures.

TenCate Geotube®

Project :
Cleanout of coal mine settling ponds

Year of Construction :
2014

Project Location :
South Kalimantan, Indonesia

Material :
TenCate Geotube® GT 500D

Lengths :
17.4m to 61.4m

Circumference :
36.6m

Number of stacks :
7 layers of Geotube® Dewatering Tubes

Quantity of tubes :
> 300 tubes

Quantity of slurry :
> 1,000,000m³

Quantity of dry solids :
170,000m³

THE CHALLENGE

The problem facing the mine was how to deal with high volumes of silt in evaporation ponds. The silt, originating from a mix of wastewater from the mines open pits as well as eroded silty rainwater runoff from within the mine catchment area, discharged into the ponds rapidly filling the header ponds before overflowing and clogging adjacent ponds.

Initially, the problem was solved by constructing new ponds until there was a shortage of free land space. Cleaning the ponds required a constant combination of silt dredging and truck relocation in a constant cycle to prevent runoff with high levels of suspended solids (TSS) discharging into and polluting adjacent river channels.

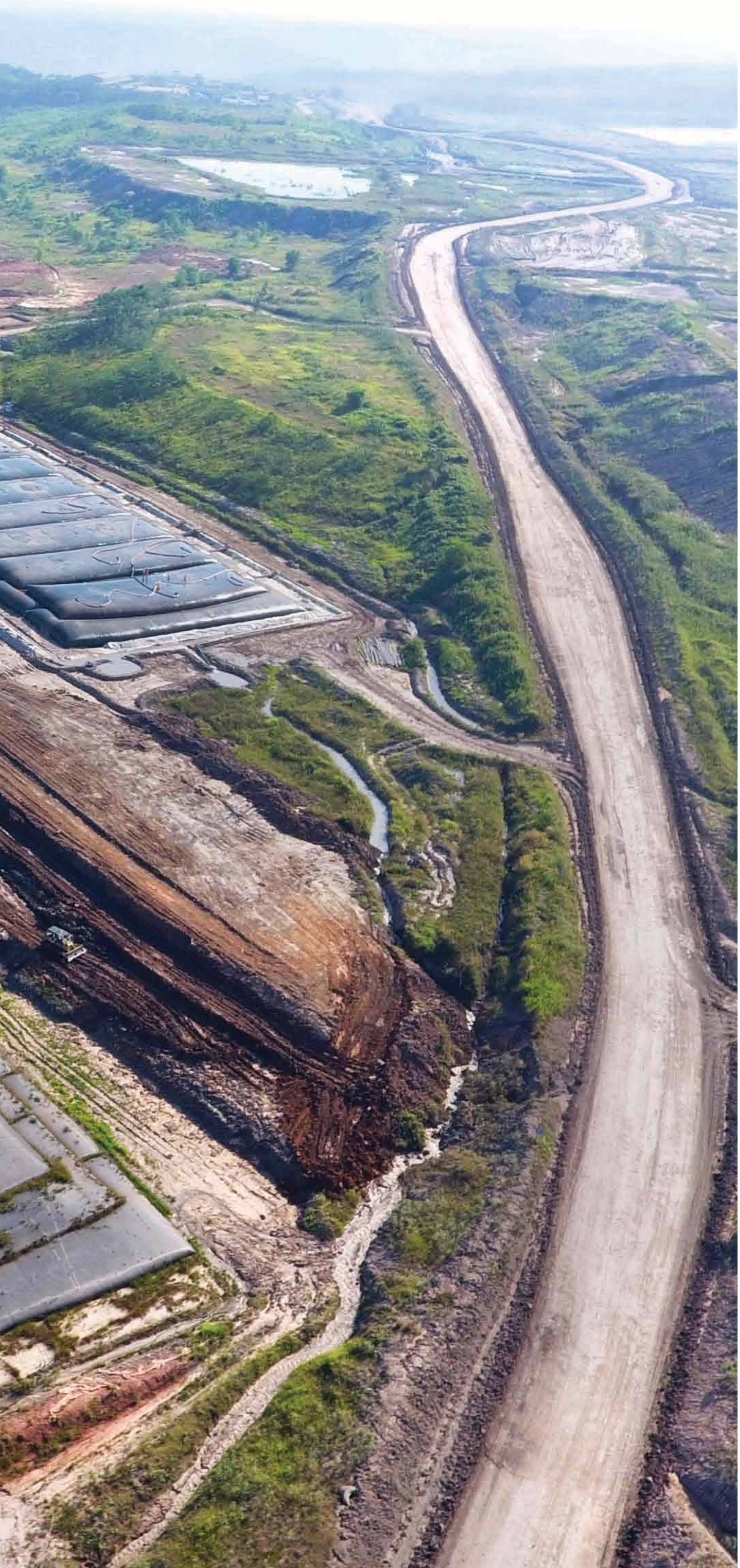
As silt levels in the ponds increased, the cost of dewatering ponds became prohibitive, requiring a more proactive and cost effective permanent Geotube® dewatering solution.

THE DESIGN

To prove the effectiveness and viability of TenCate Geotube® dewatering tubes, a series of on-site evaluation tests was undertaken. Firstly, a series of Rapid Dewatering Tests (RDT) was conducted to determine the most suitable polymer, the optimum polymer dosage and estimate the final end-of-dewatering solids concentration. Figure 1 and 2 shows the RDT test being undertaken and the effluent and dewatered solids captured.

Secondly, a pilot tube trial was conducted using a few scaled-down Geotube® units that would simulate actual process conditions. The pilot trial validated the results of the RDT evaluation and was used to quantify information and operational implications that was then used in the final project design. Figure 3 shows the pilot trial set-up which utilized a Geotube® GT 500D fabric with a circumference of 13.7m and length of 30.6m.

The pilot trial Geotube® units was laid out over a membrane lined platform to reduce ground infiltration of the effluent. The slurry pumped into the Geotube® units was dosed with polymer at the rate determined earlier by the RDT test. Figure 4 shows the final dewatered cake achieved in the pilot trial Geotube® units.



Geotube® Pilot Trial

Figure 1. RDT Dewatering test conducted at site

Figure 2. Sludge sample, effluent and dewatered solid of RDT

Figure 3. Pilot trial tube set-up

Figure 4. Pilot trial tube dewatered cake

THE CONSTRUCTION

A Geotube® dewatering facility was constructed to contain and dewater slurry extracted from the ponds. Construction of the dewatering pad started in August 2015.

Prior to placement of the Geotube® dewatering tubes, the surface area of the land was levelled and cleared of sharp objects such as rocks, roots etc as shown in Figure 5a. The pad preparation included the placement of a LDPE liner, drainage trenches, HDPE piping, manifolds and flexible hoses. A working space of about 5m was also allocated between the edge of the tubes and drainage for the operators as shown in Figure 5b.

The first layer of Geotube® GT500D with a circumference of 36.6m and length of 61.4m was installed. Slurry was then pumped into the Geotube® dewatering tubes from a floating dredger in the ponds at a flow rate of 350-500 m^3/hour in a 10-hour operation daily. The polymer used was a cationic flocculant injected at a dosage of 1.5 to 3.0 kg/MTds that was into the slurry prior to delivery into the Geotube® dewatering tubes.

The maximum filled height was 2.65m and the final height after consolidation was 1.8m. After the initial Geotube® dewatering tubes have been consolidated, the following layer was then installed (Figure 5c). This process continued until seven layers of Geotube® dewatering tubes was installed. Effluent discharged from the Geotube® dewatering tubes was pumped back into the settling ponds.

Construction Stages of Dewatering Facilities

Figure 5(a). Surface area levelled and cleared of sharp objects prior to placement of Geotube® dewatering tubes

Figure 5(b). Pad preparation - LDPE liners, drainage trenches, HDPE piping, manifolds and flexible hoses

Figure 5(c). Subsequent layers of Geotube® dewatering tubes was laid

Figure 5(d). Dry solids captured can be reused as backfill material

THE PERFORMANCE

The Geotube® dewatering technology installed in this large-scaled project has proven to be a highly effective and efficient solution with significant benefits in cost savings and environmental sustainability. The design of stacking seven layers of Geotube® dewatering tubes enabled land space to be well optimized while harnessing the performance of Geotube® technology.

Geotube® dewatering technology improved the water discharge quality by substantially reducing the total suspended solids (TSS) being discharged back into the ponds with its ability of achieving high rates of solids retention and effluent discharge as compared to the previous dewatering methods used.

The solids contained in the Geotube® dewatering tubes also eliminated the risk of rainfall erosion and silt runoff. Presently, the solids in the Geotube® dewatering tubes are being reclaimed as infrastructure earthworks fill, reducing carbon footprint while returning a revenue contribution to the mine operations.

This project has the distinction of being one of the biggest Geotube® dewatering projects ever undertaken in the world providing a wealth of knowledge on the economics of extreme large scale Geotube® dewatering.

Further information on this and other large scale Geotube® dewatering projects can be obtained by contacting Tencate Geosynthetics Asia.

www.tencategeo.asia **info.asia@tencategeo.com**

TenCate develops and produces quality products that increase performance, reduce cost, and deliver measurable results by working with our customers to provide advanced solutions.

Malaysia
TenCate Geosynthetics Asia Sdn Bhd
(264232-U)
14, Jalan Sementa 27/91
Seksyen 27, 40400 Shah Alam,
Selangor, Malaysia
Tel : +60 3 5192 8568
Fax : +60 3 5192 8573

Thailand
TenCate Geosynthetics (Thailand) Ltd
169/98 Serm Srap Bldg, 3rd Floor,
Ratchadapisek Road Dindaeng,
Bangkok 10400, Thailand
Tel : +662 692 6680
Fax : +662 692 6679

Singapore
TenCate Geosynthetics Singapore Pte Ltd
67B, Tuas South Ave 1,
Singapore 637581
Tel : +65 6266 0188
Fax : +65 6266 0182

Philippines
TenCate Geosynthetics Asia Sdn Bhd
Philippines Representative Office
Unit 1803 West Avenue Suites
124 West Avenue Barangay Philam
Quezon City, Philippines 1104
Tel : +63 426 8834 / 426 8835
Fax : +63 518 9028

Indonesia
TenCate Geosynthetics Asia Sdn Bhd
Indonesia Trade Representative Office
Graha Simatupang Tower ID 4th Floor,
Jl Letjen TB Simatupang Kav 38
Jakarta 12540, Indonesia
Tel : +62 21782 8963
Fax : +62 21782 8664

Myanmar
TenCate Geosynthetics Asia Sdn Bhd
Myanmar Representative Office
No. L-108 Ground Floor,
Manaw Hari Avenue Baho Road,
Ahlone Township, Yangon, Myanmar.
Tel : +951 1122 4551

India
Tencate Geosynthetics India Pvt Ltd
Vishwasri GL, Plot No 5, IInd floor,
Vijay Nagar Colony,
Behind Secunderabad Club, Picket,
Secunderabad – 500003 Telangana,
India
Tel : +91 40 2770 1271 / 1273
Fax : +91 40 2770 1276

Australia
TenCate Geosynthetics Asia Sdn Bhd
Australia and New Zealand Representative Office
14/328 Handford Road,
Taigum,Qld 4018
Australia
Tel : +61 43255 9266

info.asia@tencategeo.com

www.tencategeo.asia

TENCATE GEOSYNTHETICS