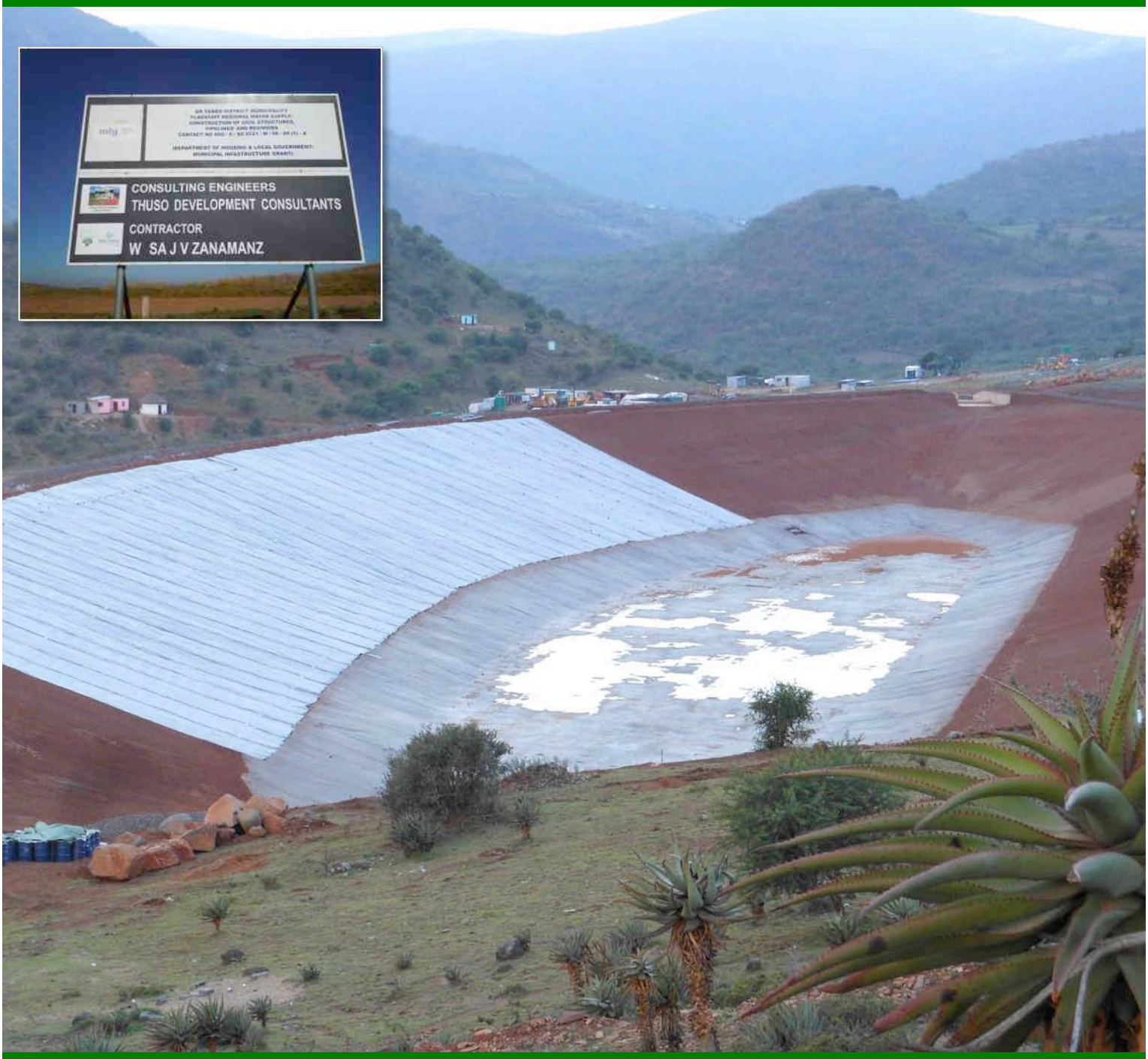
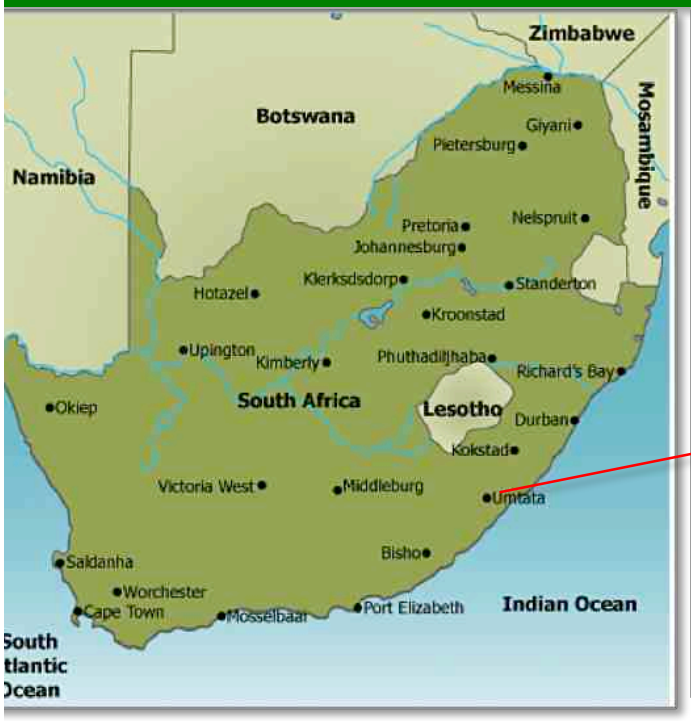
POLYMER PAVEMENTS



Flagstaff regional Water Supply

Mzintlava Dam



FLAGSTAFF, TRANSKEI, SOUTH AFRICA – MZINTLAVA DAM

In October 2006, the O.R. Tambo District Municipality held a Water Services Summit, which was aimed at the development of a strategic framework for the delivery of quantitative and sustainable water services, and accelerate water service delivery as a vehicle for Local Economic Development in the District. This summit adopted a Conceptual Water Master Plan, which was a framework with a three-stage approach, which included:

- Continued Schemes to alleviate the immediate need through Standalone
- Integrating the Standalone schemes into Sub-regional Schemes
- Integrate all the latter into Regional Schemes OR Tambo in partnership with DWA thereafter approached/appointed Umgeni Water Board and Amatola Water Board and entered into a collaborative arrangement to assist in identification of an improved bulk water supply system within its area of supply. Four Regional Schemes were then identified and feasibility studies were undertaken to investigate/explore on reliability of the identified schemes:
- Northern Scheme (Mbizana & parts of Flagstaff) – confluence of Ludeke and Ntlavukazi: Feasibility study complete and the project is on implementation
- Thuso Development Consultants were appointed to design the dam and to oversee the project

FLAGSTAFF – MZINTLAVE DAM

Thuso Development Consultants, appointed Eastern Cape Khulanathi for the construction of the Mzintlava dam.

After suffering many months of construction delays, due to heavy unseasonal rains, the Mzintlava fresh water dam is in the final throes of completion.

Polymer Pavements (Pty) Ltd has been appointed to supply and install a synthetic geoliner over 40,000 m². The company will use their unique patented PolySeal geoliner, to line the floor and walls of the clay-clad dam.

The PolySeal liner consists of an underlying geofabric, which is pinned to the base layer. PolySeal is then sprayed over the geofabric in three consecutive layers, with a high-pressure guniting machine. The elastomeric PolySeal emulsion, is applied as a liquid and when cured, will form a strong synthetic geoliner, which is totally UV, acid and alkaline resistant.

The primary benefits of PolySeal, is the fact that there are no seems or joints, that can leak, as the entire construction is totally homogeneous. PolySeal remains flexible and expandable and does not become hard or brittle in the sun.

Construction time is estimated to be 60 days. The project is commenced to begin early September 2013.

CONTACT PERSONS

i. **Thuso Development Consultants – Gareth Mullin, email: tech3@conlteng.co.za**

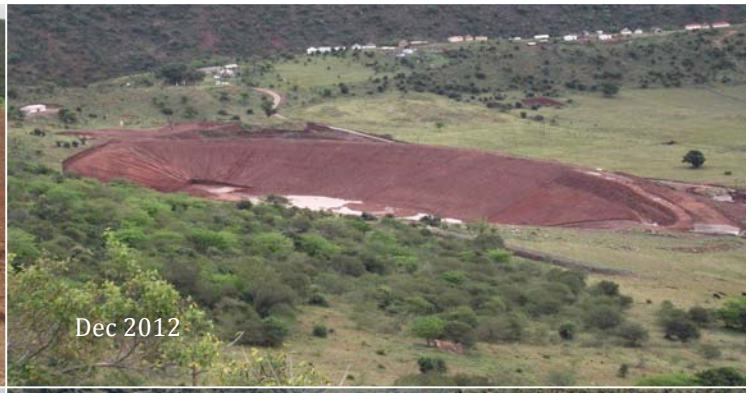
ii. **Polymer Pavements – Nick Muller, email: nmuller@polyroads.com**

iii. **O.R Thambo District Municipality, Director Water Services – Eric Mzayiya**

water affairs
Department:
Water Affairs
REPUBLIC OF SOUTH AFRICA

Progress at Flagstaff

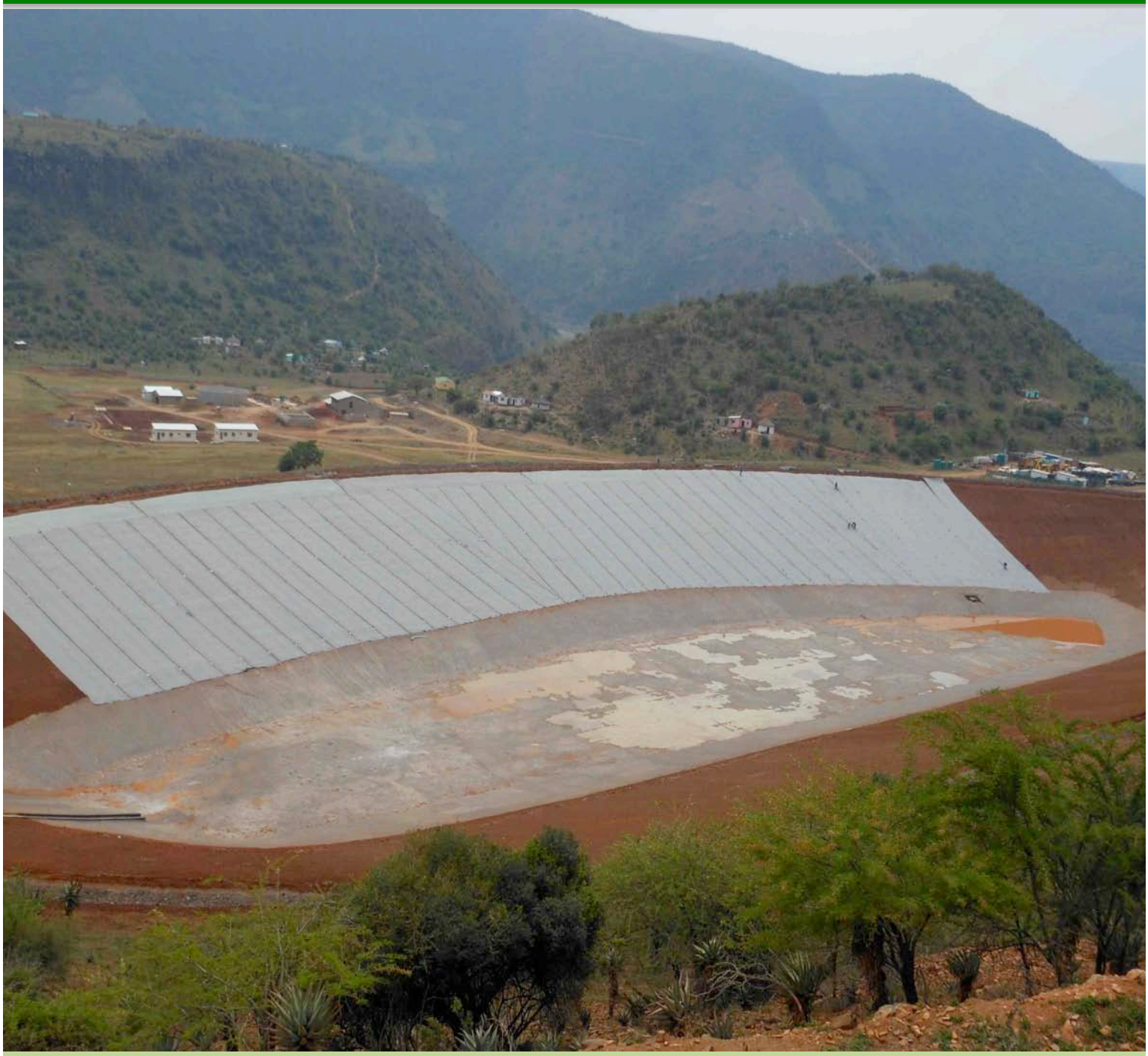

Feb 2012


Dec 2012


16 Sept 2013


18 Sept 2013


4 Oct 2013 – milestone 1 reached – base layer of dam is completely sealed and ready to accept rain water.



25 October 2013

Anchor trenches midway up the dam slope has been filled, stabilized with SoilTech polymer and compacted. Anchor trenches on top of the dam wall has been excavated and geotextiles are secured with overlaps having been sealed with PolySeal. Geoliners are ready for PolySeal spray-on coatings.

The dam shows puddles of rain-water.

POLYMER PAVEMENTS

TECHNICAL COMPARISONS BETWEEN HDPE LINERS & POLYSEAL

Properties	HDPE	PolySeal Geoliner (Patent App. No 2013/03534)
Composition	Low or High Density Polyethylene (polymer thermoplastic).	Polymer elastomer
[1]Brittleness	Yes	No
[2]Stress Cracking	Yes	No
Flexibility	No	Yes
Expandability (stretch)	No	Yes
Puncturing	Yes – HDPE is fairly rigid and hard and does not conform to underlying terrain and will puncture from any underlying sharp objects (see footnote 1)	PolySeal is a spray –on liner and will conform to the shape of the underlying surface and is therefore less susceptible top stress and puncturing
Welding Required	Yes	No
[4]Leaking Seems	Yes	No
[3] Separation in Pane (SIP)	Yes	No
Easy Repairable	No	Yes
UV Resistant	Limited (see footnote 1)	Yes
Acid Resistant	Yes	Yes
Alkaline Resistant	Yes	Yes
Warranty	5- 10 years	10 years
Market Exposure	30 Years	New technology

HDPE

High Density Polyethylene**.** HDPE is known for its large strength to density ratio.

A linear polymer, High Density Polyethylene (HDPE) is prepared from ethylene by a catalytic process.

[4]Statistics show that the number of leaks in a geomembrane lining system is a function of the area, or complexity of the liner. Larger areas imply a lower proportion of detailed liner work and therefore a fewer defects per unit area. Typically a liner with an area of 2.5 acres will have about 12 leaks while larger area liners have 1 leak per acre.

POLYSEAL

Polyseal geoliner is a polymer elastomer that is mixed with a filler material and cement and sprayed on as an emulsion. After evaporation occurs, an elastomeric cementitious and flexible liner is formed. PolySeal is applied onto a geotextile, which is fixed to the dam wall. The elastomer penetrates through the geotextile into the dam wall, thereby becoming part of the dam's wall and floor – it does not lie on top of the dam wall or floor as would a conventional HDPE liner. The crosslinking of polymer chains is a critical structural factor, which contributes to impart high elastic properties of Polyseal. There are no seams in a PolySeal geoliner as the spray-on emulsions become homogeneous when dry. Elastomers have been added to concrete structures, to prevent cracking and to improve performance, for more than 50 years.

[1] *Geosynthetics Society*
http://www.geosyntheticssociety.org/resources/archive/gi/src/v2i1/gi-v2-n1-paper3.pdf (Ian D. Pegs & MF Kanninen)
[2] http://geosynthetica.net/Uploads/IDPigsUKpaper.pdf
[3] http://www.ausenco.com/uploads/papers/64075_SIP_in_Geomembrane_Liners__An_Acceptable_Condition.pdf
[4] *http://www.landandwater.com/features/vol50no4/vol50no4_1.html (Ian D. Peggs)*