PERMATHENE Earth Solutions

PROJECTS

Floating Cover

0.75 mm Flexible Polypropylene (Permaliner®) for pig farm

Client: Bindi Ground for Waratah Farms
Design: NIWA. R.Craggs, J.Park & S.Huebeck
Date: 2007

Waratah Farms and the New Zealand Pork Industry Board contracted NIWA (National Institute of Water & Atmospheric Research Ltd) to provide a design for a cover for the first pond of the treatment pond system at the Roto-O-Rangi piggery. Situated in a rural community with a school nearby, Waratah farms had been subjected to numerous complaints regarding odours.

Among the benefits of the creation of the closed anaerobic environment that NIWA outlined is the total elimination of odours, the collection of biogas for energy recovery, the retention of more ammonia in the pond effluent and the potential for greenhouse gas credits from reduced emissions.

High Density Polyethylene (HDPE), Flexible Polypropylene (FPP) and Polyester Scrim Reinforced Polypropylene (XR-5 or similar) membranes were specified as options for the manufacture of the cover. Based on price, availability and suitability of Permaliner .75mm FPP membrane, Permathene Ltd was awarded the contract to supply and install the membrane.

The 96m x 36m cover was factory fabricated at Permathene's Auckland factory in three sections which were shipped to site on pallets ready for installation; the leading edge of the first unit was supplied with a welded sleeve for the containment of tubular polystyrene floatation devices. This unit was floated along the pond with the two following units subsequently joined by hot wedge welding as they were deployed, the finished single unit finally covering the pond completely.

The edges of the liner were then buried in an anchor trench, this method being possible for fixed outlet ponds where it is not necessary to allow for changes in containment levels.

Slotted PVC piping under the cover allows for the collection and storage of biogas by means of exhaust fans and weighted pipes on top of the liner create drainage lines for the channeling and subsequent removal of rainwater by way of a submersible pump located in a 500mm deep sump welded into the cover.

With an allowance of two days for fabrication and one day for installation, the use of Permaliner FPP membrane is a cost effect solution for the covering of anaerobic piggery ponds.

PERMATHENE Earth Solutions

PROJECTS

Landfill Lining

HDPE, Nonwoven Geotextile (Syntex®)
Landfill, Taupo, New Zealand

Client: Taupo District Council
Date: February 2004

The Taupo landfill located off Broadlands Road, 5 minutes out of Taupo, was to have an extension to its existing landfill cell. Taupo District Council wanted to extend this landfill by a further 23,000 m^2, which could take in excess of 250,000 m^3 of refuse. The existing landfill had HDPE liner underneath its refuse from the previous stage. Due to the high permeable sandy soils, Opus International called for the new cell to be fully contained so as to prevent leachates contaminating the ground water. To contain leachates, Opus designed a system involving a Geosynthetic Clay Liner (GCL), overlayed with a 1.5 mm double sided textured HDPE liner, protecting the FML was a Syntex GNP C2 (280 gsm) nonwoven geotextile. A 300 mm thick layer of crushed concrete placed on top of the geotextile to act as a drainage layer allowing leachates to drain to the collector pipes for disposal off the site.

Permathene was contracted to supply and install the whole lining system. The civil contractor prepared the base and Permathene installed the lining system in a four week period. Due to the environmental impacts of landfills, stringent testing regimes were put in place. The GCL was installed before the HDPE sheets were lapped and joined using a twin track, hot wedge-welding machine. The double seam gives extra security against leakage and also provides a sealed tube between the two seams that was finally pressure tested to ensure that the adequate seal was achieved. The fusion welds were tested for peel and shear strength using a field tensiometer. Any minor welding required to fit the lining around structures or repair patches was done using extrusion welding techniques and every weld was spark tested to check their integrity.

As HDPE has a relatively high thermal expansion coefficient, it tends to expand and wrinkle up a little in the middle of the day, contracting to a smoother flatter appearance at night. Due to these characteristics, it is important that the final fixing of the liner is undertaken while the liner is in its coolest state. For this reason, cutting and patch repair work was done very early in the mornings. It is extremely important that the lining should not be smoothed out and fixed during the heat of the day, as it will contract overnight and tear away from its fixings.

This project was completed in the stipulated time. It started in February 2004 which was expected to be the best weather window but unfortunately it turned out to be the worst summer on record, experiencing unseasonably bad weather conditions. Permathene worked closely together with contractor, consultants and council engineers to complete the job on time and within budget.

New and improved lining materials are entering the market all the time and as such it can be a little difficult to keep up with geosynthetic technology. The success of a plastic lining project depends greatly on the correct choice of material and correct installation procedures. It is therefore important that a specialist installation contractor is engaged to install the lining system.

Note: Permathene has just completed Stage 2B as at August 2008.

PERMATHENE Earth Solutions

PROJECTS

Anaerobic Lagoon Liner & Cover

HDPE

Meat processing plant, Invercargill, New Zealand

Client: South Pacific Meats
Date: November 2004

In November of 2004, Permathene Ltd was contracted to supply and install a geomembrane liner and floating cover at the newly commissioned South Pacific Meats Lamb Plant at Awaroa, just outside of Invercargill. Due to the nature of its operation the plant needed a containment pond with a floating cover for the processing of effluent.

The principal design was supplied by Peter Swan Consulting in conjunction with MWH Dunedin, Permathene Ltd being the successful bidder for the supply and installation of the specified geomembrane.

In addition to the fact that no excavating was allowed, the wetland terrain made this project exceptionally challenging, During preparation of the site, underground drains pumped water from the area to be lined and bund walls were formed. This made the site inaccessible to vehicles and a road had to be built to allow access to the area and enable installation of the liner to commence.

A total of 20,000m^2 of HDPE 1.5 mm smooth membrane was used for the liner and cover. The design called for effluent to be pumped into the lagoon through 16 inlet pipes. In order to seal these penetrations the pipes were encased in concrete and the lining membrane was then welded to HDPE profiles that had been pre-cast into the concrete. Due to the extreme length of the slope, HDPE sleeves were also manufactured and fitted to each pipe in order to ensure that each penetration would remain completely moisture proof.

Once installation of the liner was completed construction of the floating cover began. The cover was fabricated with gas collection pipes attached and 200 m of 160 mm drainage coil to direct rainwater for removal into a sump.

All on-site panel seams were lapped and joined using twin track, hot wedge welding machines, all seams being pressure tested as well as peel and shear tested with a field tensiometer, as per international GRI installation specifications. Any patching or detail work was extrusion welded, every extrusion weld being spark tested to ensure its integrity.

PERMATHENE Earth Solutions

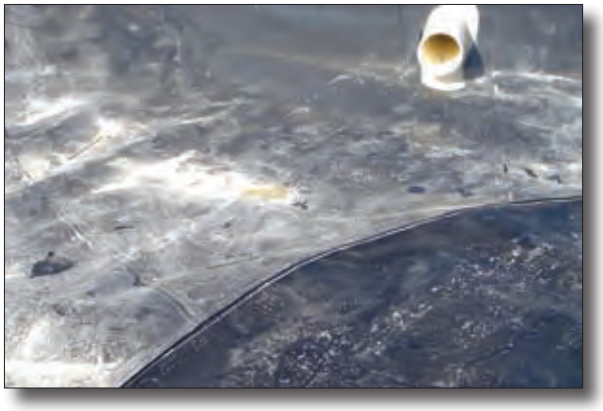
PROJECTS

Irrigation Pond

HDPE
Waitoa, New Zealand

Client: Badge Consultants
Date: April 2004

As part of the upgrade of the Inghams Chicken Plant in Waitoa, Badge Constructions (the head contractor) commissioned the excavation of an irrigation pond for the storage of 6400m^3 of water.



Permathene Ltd was awarded the lining contract for this project and commenced installation mid-April.

The material specified for the lining of this pond was 1.5mm Smooth HDPE membrane.

A total of 4,446m^2 was used on the job and the work was completed in 6 days.

The 7m wide panels were fusion welded together on site and all welds and seams were subjected to rigorous testing as per international specifications.

The pipe penetrations had been poorly designed and could not be sealed as specified without the risk of leaking. Permathene Ltd's crew spent considerable time extrusion welding special sleeves to seal these penetrations.

PERMATHENE Earth Solutions

PROJECTS

Storage Pond Liner

Flexible Polypropylene (Permaliner®), Nonwoven Geotextile (Syntex®)
Timber treatment plant, Marsden Point, New Zealand

Client: CHH Ltd
Date: September 2001

Carter Holt Harvey LVL facility in Marsden Point wanted to line a storm water pond to hold approximately 2.5 million gallons of storm water. Tonkin and Taylor designed the pond and selected Permaliner FPP (Flexible Polypropylene) 1 mm liner. By virtue of its chemical composition, molecular structure and thermodynamic properties, polypropylene is one of the most resistant materials available.

A proper drainage system was designed which comprised of rows of 150 mm diameter perforated PVC pipes on sandy subgrade, covered with 200 mm of loose 40/16 aggregate and Syntex GNP B1 (Strength Class B) nonwoven geotextile to cushion the lining from aggregate.

Rolls of Permaliner 6 m x 100 m x 1 mm were shipped to site and was fabricated to fit the existing pond profile. Proper panel placement was facilitated by cross referencing each numerically identified panel with a layout plan approved by the consultant and client. All the site tests were conducted to comply with the QA/QC requirements.

The correct installation and welding of the Permaliner liner is of paramount importance since the integrity and long term performance is dependent upon it. The welding of the liner was executed by using various methods including dual track fusion welding and extrusion fillet welding methods. Polypropylene fusion welding is an exact process which requires a high degree of supervision. Done in accordance with good Code of Practice, FPP polypropylene provides an extremely effective lining system.

The entire area of 7000 m2 was covered in approximately 7 days including welding of 7 pipe boots of 300 mm diameter OD on site. On the finished liner surface, 200 mm of coarse sand was evenly placed using rubber track excavators and spreaders.

The side slopes were covered with Syntex GNP E1 (Strength Class E), heavy weight geotextile cushion before covering the area with 75 mm thick reinforced concrete. The heavy weight nonwoven geotextile was selected because it provides a higher angle of friction and greater puncture resistance to protect the liner from any damage. Syntex GNP E1 is specially manufactured for geomembrane protection.

PERMATHENE Earth Solutions

PROJECTS

Pond Liner - Golf Course

Flexible Polypropylene (Permaliner®)
Auckland, New Zealand

Site: Akarana Golf Club
Date: April 2002

The Akarana Golf Club in Auckland built a series of three ponds. The design included a small pond in the foreground with a waterfall, made using large boulders. The total pond area is approximately 6,000 m^2 which we mostly welded on-site using a 1 mm Permaliner FPP polypropylene pond lining membrane.

For the middle pond the liner was factory made due to this pond being an old swamp. The knee deep in mud conditions making onsite welding impossible. As this middle liner was 1800 m^2 (over 1.5 tonnes of material) deploying it over the extremely boggy site conditions proved to be quite a challenge. However, the Permathene installation crew still completed the job ahead of schedule.

Permaliner FPP is a triple-layered, coextruded polypropylene product available from .5 mm to 2 mm thickness. It has excellent tensile strength and flexibility to withstand ground settlement, loading stresses, high tear, puncture resistance, and is free from additives such as plasticisers, adhesives and lubricants. It is manufactured to food grade standards and is suitable for potable water so will not contaminate ground water.

All welds were double fusion welds with testing channel to ensure seam integrity.

Each pond from the smallest to largest is built to allow water to flow from smallest to largest. This provides an attractive water feature for this city golf course.

The area around the completed ponds was then landscaped with pathways built to provide access for golf carts.

PERMATHENE Earth Solutions

PROJECTS

Exhibition Lake (Temporary)

LLDPE
Showgrounds, Auckland, New Zealand

Client: Auckland Boatshow
Date: June 2001

We go back to the future for the nation's premier marine exhibition this year at Auckland Show Grounds, Greenlane. For more than a decade until 1979, the New Zealand Boat Show staged all sorts of aquatic excitement on the man made lake in the arena. Back in those days a hole was simply dug and a liner installed. Today, with more stringent rules, the lake had to be made completely above ground. This of course presented a whole range of engineering problems.

It was decided by the clients to create an 11 million litre lake for the country's biggest marine exhibition at the Auckland showgrounds for a 5 day event. The size of the artificial lake was 135 m x 85 m x 1.6 m deep. The lake wall was constructed with wooden poles and plywood panels. The sides of the lake were covered with Syntex nonwoven geotextile to protect the liner from damage.

Due to cost considerations and the fact that the lake would only be used for 5 days, the material had to be both economical and yet tough enough to resist puncture. The clients selected a 0.25 mm blue material which had excellent puncture resistance and tensile strength.

The plan was to on-site weld large factory made panels inside the arena 1 week prior to the show. However, due to extremely poor weather and high winds Permathene had no other option than to factory manufacture the complete liner in one-piece and then deploy.

The material was fusion welded using a modified welder which could seal a .25 mm LLDPE in one panel of 144 m x 92 m weighing approximately 3.6 tonnes. This was the largest one piece liner ever fabricated in New Zealand and deployed to site.

On the day of installation, it was raining with winds gusting to 60 km/hr. The liner was transported to the site using a crane and unfolded with the help of 30 workmen. It took 2 days to do the complete installation and making the lake ready to be filled with water.

Some air bubbles were formed during filling the lake due to inadequate drainage beneath the liner. The air was released and the liner patched with Vulcanseal. Finally sand bags were placed on the bottom of the liner to hold it down where necessary. Some cuts were made to the liner by propeller blades of the boats during practice sessions, which were repaired by Permathene installers using Vulcanseal Underwater Repair System. The material had to be cleaned of oily film from the boats. The cuts were as large as 1 m in places which seriously risked complete failure of the liner. Without the ability to make these emergency repairs such a project would not be viable. Wetsuits had to be worn due to the very cold temperatures.

The daily events included water skiing, exhibitions, jetsprints, jetskis, power boats, etc. and a helicopter rescue demonstration.

Disclaimer

The information presented herein, while not guaranteed, is to the best of our knowledge true and accurate.

While every effort has been made to provide accurate and reliable information, it is up to the user of this brochure to verify all information, including designs it might be based upon, with an independent source. Application of this data must be made on the basis of responsible professional judgement.

Except when agreed to in working conditions of use, no warranty expressed or implied is made regarding the performance of any product, since the manner of use and handling is beyond our control.