PFAS CONTAINMENT POND CONSTRUCTION.

Location
Moorebank, NSW

Client
Qube Logistics

Duration
4 months

Project overview
The Basin was designed for the management and temporary storage of surface water run-off, impacted by PFAS.

PFAS is an abbreviation for per- and polyfluoroalkyl substances, and encompasses a whole family of manmade chemicals that contain a carbon and fluorine atom.

PFAS compounds came into common use in the 1950s and '60s and are used in hundreds of industrial processes and consumer products. PFASs are also used in commercial/industrial processes and, particularly, in firefighting foams. PFASs where and still are in some cases, a component of the firefighting foams used by the military, airport authorities etc. It is these foams that are most often identified at the source when PFAS is found in surface waters, groundwater or the environment.

The site is split in to the East and West and both areas were identified early in the project as having soils impacted by PFAS contamination. Unfortunately, what was not identified was the ease with which PFAS becomes mobile and is released to groundwater or surface waters through the percolation of rain water or surface water run-off.

The act of removal of surface vegetation, concrete and tarmac hard standing lead to much more of the PFAS soils being exposed to the elements and being mobilized.

The west of the site, where work is still being undertaken by Liberty Industrial, is carefully managed with a series of swales and basins, capturing surface water run-off and ensuring release of PFAS impacted water to the wider environment is precluded. However, as the East side of the site was gradually built out, it was recognized by the client QUBE that an off-site storage, management and treatment was required.

Qube, Liberty and their consultants worked together to develop a solution to stormwater management and surface water run-off that could be potentially impacted by PFAS. An area was identified in the West with potential pipework access below Moorebank Avenue utilizing existing infrastructure.

The chosen site area identified was also recognized to potentially contain contamination in the form of asbestos. The asbestos was as a result of the long history of development at the site and the uncontrolled tipping of demolition materials which was once common practice. However, asbestos is fundamentally an inert substance and only becomes a problem if it becomes airborne and it is not prone to mobilization through surface or groundwater as it is entirely insoluble and provided it remains within the soil mass, poses no risk.
To avoid disturbance of the ground it was decided the best course of action was to build an above ground basin.

The preliminary designs were undertaken by Liberty Industrial and ratified by their project consultants, with the final design being approved by Qube.

One of the key elements of the design was to ensure that impacted water could not be released to the environment, to this end it was decided to construct the above ground basin with a robust imported sandstone to ensure structural integrity and to line the basin (which by now had become known as the Turkey Nest) with a High Density Polyethylene (HDPE).

The HDPE was decided upon as it has a permeability of less than $1 \times 10^{-11}$ has a high strength and is designed with a high carbon black content which makes it highly resistant to degradation by UV rays. This latter element was very important as the basin was designed with a 0.5m freeboard to ensure the retained capacity of over 3 mega litres, 3,000,000 litres or 3000 cubic meters (It’s worth of note that an average Olympic-sized swimming pool has a capacity of 2.5 megalitres) had no risk of overtopping.

The actual HDPE is provided in 6m wide rolls and the impermeability is ensured by fusion welding; effectively melting one panel on to the next. The integrity of the liner weld is proven by an air pressure test. The liner is held in place at the top of the slope with a 1m deep anchor trench with the HDPE lapping down one side of the trench before rising up the opposite side which is then back filled with sandstone guaranteeing the HDPE cannot be dragged down into the basin.

Samples of the HDPE are sent off for independent laboratory testing for destructive testing to ensure the material meets the Australian standards for strength and ensuring the minimum carbon black content. Weld samples are also sent off for destructive testing to ensure the weld strength is in excess of that of the material itself.

Following construction of the stone basin, the entire sides and base are trimmed and proof rolled to ensure a smooth surface; the surface is then inspected and hand picked to remove any sharp protrusions which could damage the liner integrity. As a final precaution the entire surface is covered with a protective geotextile.

The basin was constructed with an outflow in the base (utilizing a fusion welded HDPE Pipe) which can gravity feed to the water treatment plant, reducing the need to access the upper sloped of the basin and ensure safe operation and reducing the need for pumping by mechanical means.