MUNMORAH POWER STATION REMOVAL.

Location
Munmorah, NSW

Client
Generator Property Management

Duration
28 months

Project overview

The project involved the removal of a 1,400 megawatt coal fired power station including four 350 megawatt steam driven turbo-alternators, two 155 metre high chimney stacks, four boiler houses, coal handling plant and conveyors and 2.3km of ash lines. The project is the largest power station demolition project to be carried out in Australia to date.

The Munmorah plant presented a unique challenge by requiring the removal of 890 tonnes of bonded and friable asbestos from throughout the site. A crew of 20 specialist asbestos removal workers were mobilized to the project to complete this challenging task. A range of negative air encapsulations were constructed throughout the 60m height of the boiler structures, including a highly engineered and detailed access scaffolding and enclosure to access the penthouse at the top of the boiler houses, which included the use of a 300t crane to lift up the required plant & equipment.

A full-time hygienist with an on-site lab was deployed to look after the extensive air monitoring and inspection regime required. More intensive investigations identified numerous areas of asbestos which were not previously identified and were removed in consultation with the client. Approximately 30,000 square metres of galbestos wall sheet on the turbine hall had been identified for removal during the demolition, involving the use of Elevated Work Platforms at heights of up to 40 metres.

Four turbine generators located within the 270m long turbine hall, weighed in at 1,200 tonnes each. During the planning process, it was identified that the two 90 tonne gantry cranes located within the turbine house would need to be re-energised and re-certified to assist in the deconstruction works. These cranes have been extensively used to remove rotors weighing 54 tonnes, condenser tube casings, and stators all weighing 50t plus after downsizing.

A combination of hand cutting techniques using standard oxy torches, high flow oxy torches and thermal lances were required to downsize the larger parts of the turbine generator prior to lifting these heavy items to the turbine house floor, and eventual movement to the scrap area for further downsizing.
During project pre-planning phase the project team discovered the presence of asbestos in the vent sleeves at the very top of the twin 155m stacks, and in accordance with strict Australian regulations, these had to be removed prior to receiving approval for the explosive demolition permit. Liberty Industrial deployed its specialist rope access team to climb the stacks, install a work platform and safely core drill and remove the conduits. No mean feat in an area prone to high winds. Liberty Industrial’s project team spent many months of careful planning and consultation with SafeWork NSW and a number of government regulatory authorities in the lead up to demolition day.

To ensure the stacks fell safely in the intended direction, carefully selected sections at the base of each stack were saw cut and removed and explosives placed as designed in the blast panels. Additional measures were put in place to minimize noise and dust from the impact. Finally, in March 2017, Liberty’s meticulously organized and executed controlled explosive techniques toppled the majestic twin stacks, exactly as planned.

Following the successful demolition of the chimney stacks, Liberty set its sights on the boiler house and coal hopper structures. The structures needed to be reduced to a suitable height for mechanical processing. Liberty engineers started with a carefully designed and calculated sequence of engineered induced collapse techniques designed to pre-weak the structure.

Detailed engineering studies identified that the coal hoppers on boilers 3 & 4 needed to be removed to reduce the force on the structural beams and facilitate the rolling of the structure during the blast. However, on Boilers 1 & 2, the dilapidated condition of the structure precluded the removal of the hoppers prior to explosive demolition, it was simply too risky to send personnel in to separate the structures by hand. Instead the coal hoppers remained intact, to be demolished as one with the boiler structure.

Next, strategic pre-weakening of the huge steel box columns with explosive charges strategically placed and sand bagged, again ensuring that the structures would collapse safely in the predetermined direction. Finally, these mammoth structures were ready to come down. The boilers are the largest demolished in Australia to date.

The power station’s Turbine Hall was collapsed using a controlled cut and pull demolition technique. Engineered pre-cutting and inertia was utilised to bring the structure to ground level for processing. A120 tonne excavator was used to apply sufficient inertia to induce the collapse.

Liberty Industrial’s 230 tonne Liebherr 994, complete with the world’s largest shear attachment, the Genesis GXT 2555R, in combination with an Hitachi Ex1200 with Genesis 990R Shear and heavy demolition grab, was put to work processing the debris for recycling and shipment off site. The scrap processing yard on-site, a significant work front on its own, comprised 3 x Volvo EC380 with Genesis 660R Shear’s, 1 x Squalo 2000 Box Shear, 2 x Liebherr materials handlers and a team of 10 hand cutters.

Liberty Industrial constructed a 30m x 20m removable dome shelter for use as a fully functional mechanical workshop. Consisting of Liberty’s in-house mechanics and boiler makers, sufficient to maintain extensive array of equipment including 230t, 120t, 70t, 46t, 38t and 8t excavators and attachments including grabs, magnets, pulverisers, hammers and shears.

Stakeholder engagement and management was an important consideration during the demolition with an operational gas fired power station, two electrical switch yards, and surrounding residential community.

Communication was the key to success in keeping all stakeholders informed and aware of activities on-site. Stakeholders were informed via daily prestart
meetings, face to face briefing and information sessions, regular progress via email, letter box drops, weekly reporting and progress meetings, management plans, monthly reports and a 24hr a day 1300 number to raise any questions or concerns in the lead up to the 3 x explosive demolition events.

Excellence in environmental management was a key to the success of the demolition of the Munmorah Power Station project which was located between Lake Munmorah and Lake Budgewoi. The lakes are connected by the two cooling water canals that run through the site, and as such are managed under a strict Environmental Protection Licence (EPL).

Storm Water & Erosion Management was a significant factor to consider to manage the impacts of the surface water and drainage system run-off that could affect the two lakes. The existing drainage systems on site were retained which consisted of two discrete systems - green drains remained as a dirty water system and red drains remained as the clean water system. With the dirty water system progressively capped and decommissioned as the structures were demolished, Stormwater was managed via the open culverts on-site which fed the two of the main sediment basins, which were monitored weekly and after major rain events. The monitoring involved regular and comprehensive water testing for TSS and pH as well as spot testing for any heavy metals. Once tested the basins needed to be pumped down to create capacity for the next rain event. Excess clean water was pumped to the canals and even used by the water trucks on-site for dust suppression. Such was the cleanliness of the water. The remaining water was left in the basin to evaporate, further improving the capacity of the basin and preventing unwanted discharge of sediment laden water at the base of the ponds.

Noise emissions were monitored continuously throughout the full duration of the project. Noise was the primary concern for the residential neighbours, particularly towards the end of the project when the majority of the structures had been demolished.

A sound level meter was used in 6 external locations around site. These locations were selected to be indicative of the most noise sensitive residential receivers in the area of the project. Controls implemented for noise reduction included reducing the use of hammers, using hydraulic concrete crackers and pulverizers, staging noisy activities from Monday to Friday, locating scrap metal and concrete stockpiles at strategic locations around the site to provide noise barriers and where loud activities and generation of high noise levels are unavoidable as with the explosive demolition events, early notification was given to stakeholders.

Upon completion a total of 102,392 tonnes of material has been recycled. A staggering 98% of all waste was recycled.

The project won the Industrial Demolition Award at the 2019 World Demolition Awards.