



Phase 3 Development Project Factsheet 3: Overburden

July 2011

Overburden is the term used to describe the waste material surrounding the zinc-lead ore. The overburden includes some topsoil, clay and a variety of rocks. For every tonne of ore mined at MRM, there are five tonnes of overburden mined.

Overburden is not subject to any mineral processing at the mine. The different types of overburden have different uses at the site: clay may be used for building pads and dams; small rocks used for building roads; large rocks used for armouring against erosion; and topsoil used for rehabilitation. Some materials are temporarily stored in stockpiles. Unsuitable or excess overburden is permanently stored within areas called Overburden Emplacement Facilities (OEFs).

The proposed Phase 3 Development Project is expected to generate an extra 500 million tonnes of overburden. A number of options for its storage, including an expansion of the existing North OEF, are under review as part of the environmental planning.

Storing of overburden

OEFs are designed to protect against any environmental impact. To do this, they must be physically stable in the long term. The position, height and slope of the OEFs are important factors in their physical stability.

The most important chemical property of the overburden is linked to what happens when it oxidises through contact with air and water. Oxidation of rocks may produce a liquid called leachate. The nature of this leachate determines which category of overburden the rock belongs to:

1. Non-acid forming (NAF) materials – about 80% of the rocks – are chemically stable. When wet with rain, they will not generate any by-products that could impact on the environment. Only NAF material is used on the external faces of all mine structures such as the bund wall.

2. Potentially acid forming (PAF) materials – are the types of rock that, when exposed to air and water, can generate an acidic water, soluble metals or salts that could impact the environment.



Rocks are classified

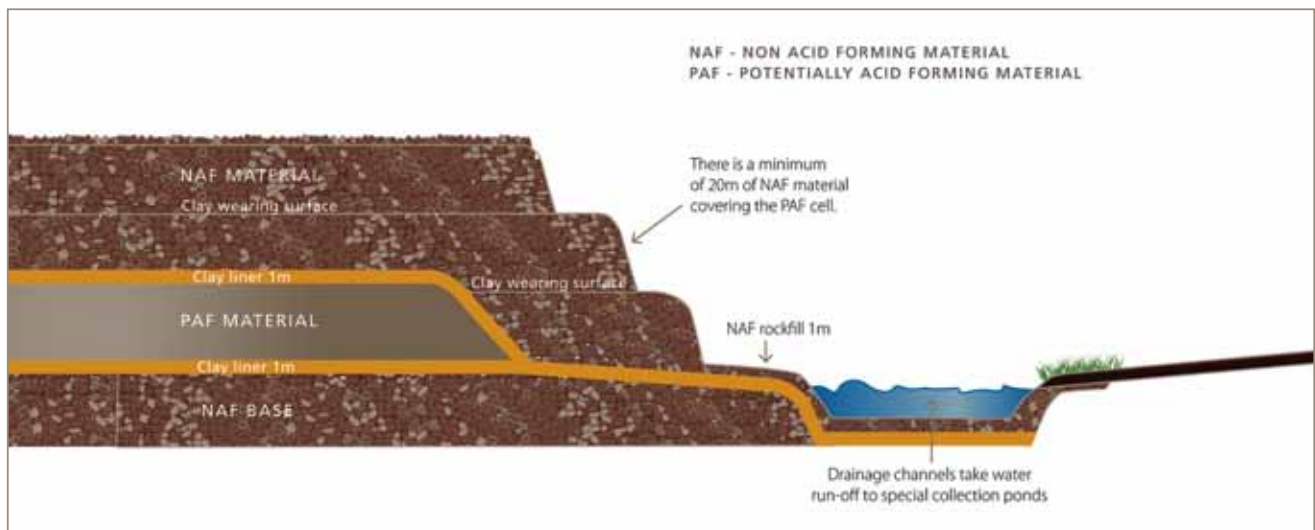
Identifying the ore, overburden and the different types of rock is important for both the mining operation and environmental protection.

Geologists check each stage of mining using extensive studies, geochemical testing, maps, surveys and samples. They physically walk the face to be mined and mark it up with coloured paint and tape to differentiate between the ore and types of overburden.

Separated while digging

Each section of ore and the different types of rock are scooped up separately by the diggers, and placed into the back of large trucks. The trucks also identify whether they carry PAF, NAF or ore material. The type of rock determines where their load is deposited.

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Most goes to the North OEF

The North OEF is where most of the overburden is currently stored. This area has the capacity to store 185 million tonnes of waste rock over a 255 hectare footprint to a previously approved height of 80 metres.

Options are under review to increase the total OEF capacity, which will examine expansions to the North OEF as well as additional OEF locations.

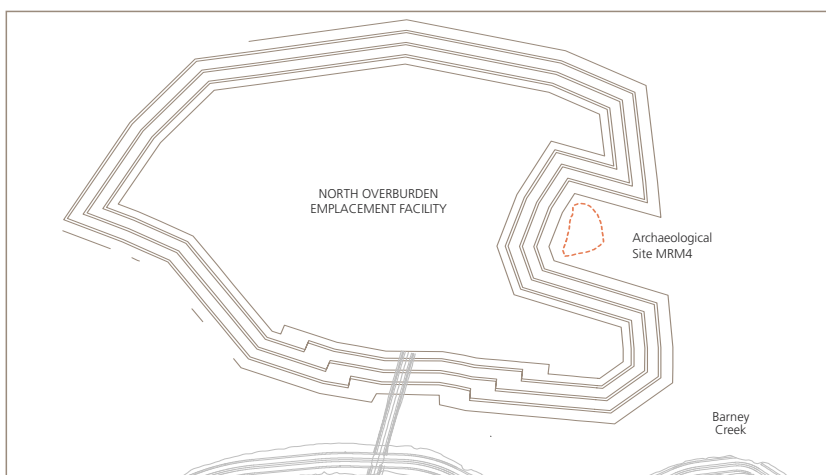
The PAF rock is placed in specially constructed cells inside the core of the North OEF. The cells are completely surrounded by layers of clay that minimises the amount of air and water contacting the PAF rock. A layer of NAF material then further protects the cell from oxidation and erosion. The PAF cells are located above the 1-in-100 year flood level to ensure they don't get wet from floodwaters. The multiple layers of protection isolate the PAF rocks from the weather and protect the environment.

The OEFs are extensively monitored

MRM's environmental monitoring program has demonstrated the mine has had no adverse impact on the McArthur River or Gulf environments. The performance of the overburden facilities is monitored to check:

- water quality and sediments in the North OEF run-off ponds to make sure rocks are being categorised correctly and the management strategies are working
- groundwater quality through monitoring bores installed around the mine site
- physical stability against wind and water erosion.

Specialist testing is also underway to help future management of overburden. Called a 'Kinetic Column Leach Test', this process simulates the natural weathering of rocks. From this, MRM can better plan strategies to keep improving the performance of the overburden facilities.



Cultural heritage is protected

The shape of the North OEF has been designed to ensure an archaeological site is protected. This is the site of a stone artefact quarry. Custodial elders and Traditional Owners of the Gurdanji people and an archaeologist inspected this site before the North OEF was developed. It is now protected as a site of archaeological significance.

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