OCEANAGOLD
WAIHI OPERATION

Backfill

Background

The early Martha Mine worked from 1878 to 1952. When the mine was closed the pumps were turned off and the underground workings were flooded. Unlike today, however, the underground workings were not backfilled. Large underground areas which had been mined out were left as large caves which miners call stopes. Over the decades some of these stopes got bigger as the roofs collapsed. In three instances the roof collapses have been so extensive that the surface above them has also collapsed. This is called a subsidence. There have been three significant subsidence events in Waihi as a direct result of historic unfilled workings. One occurred in 1961, another in 1999, then in late 2001 historic underground workings opened up underneath houses in Waihi East. This resulted in the evacuation and eventual demolition or removal of many homes which government department Geological and Nuclear Sciences deemed unsafe to live in because of the possibility of future subsidence in that area.

Underground mining today

What's to stop similar subsidence events happening at Correnso?

Modern mines are backfilled. Favona, Moonlight and Trio have all been backfilled. Correnso will be too. All of the areas where ore is removed and large voids are created are backfilled as the mine develops. The consent conditions require mined areas to be backfilled, and the way the mine is operated means that backfilling has to happen anyway. Our mines are worked 'bottom up'. We start at the bottom of the ore body and work our way up. As each level or ore is removed it is replaced with waste rock either from the mine or a nearby quarry. Then the 50 tonne mining machines drive on the waste which is now the 'ground' to work on the next level. By the time the ore body has been mined out the void has been progressively replaced with compacted waste rock.

We don't fill the very last little bit of the stope right at the top, and we don't fill the deep five metre high drives (tunnels) which we use to access the orebody. So, what's to stop these unfilled areas from collapsing and creating a subsidence on the surface? When rock collapses, say, from the roof of a drive, it swells or bulks up because of the air gaps between the pieces. The rock in this area bulks up by a factor of between 1.3 and 1.5.An everyday example would be firewood stacked tidily in rows and firewood just thrown in a heap. The heap is bigger, but there is still the same amount of firewood. So, if rock has a bulking capacity of 1.5 and it falls from the roof of a drive it will fill an area half as big again as the gap it creates when it falls. This only has to happen a few times and the void chokes off. There is no room left for rock to fall, and no possibility of a void migrating to the surface and becoming a subsidence.