

**SOUTH WESTERN AUSTRALIA 60 YEARS OF HEAVY MINERAL SAND
PRODUCTION COMPATIBLE WITH NATURE RESERVES, TOURISM, HIGH VALUE
AGRICULTURE AND POPULATION GROWTH**

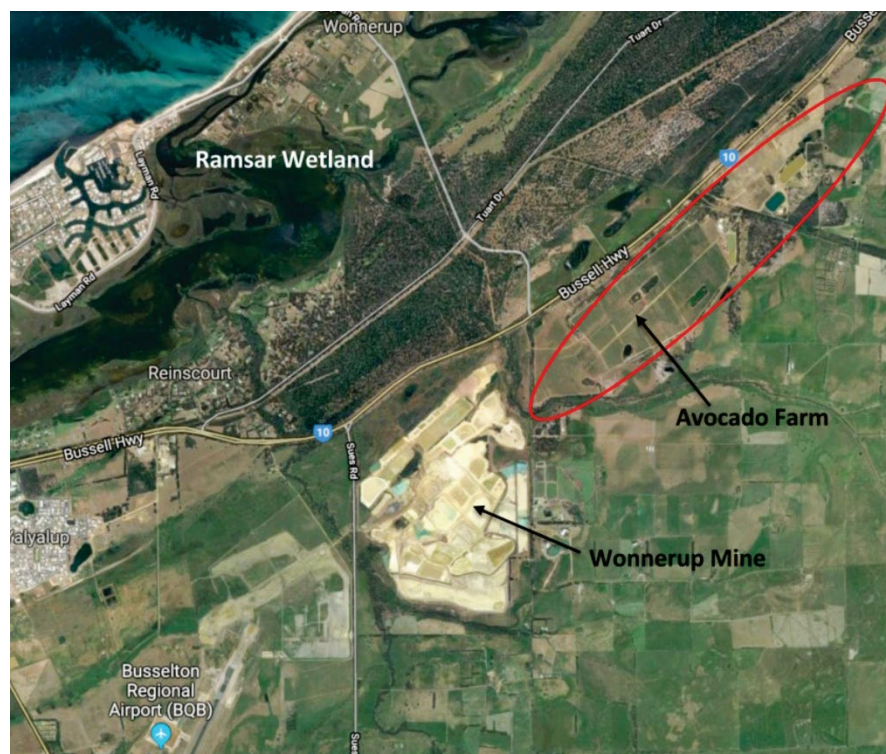


For over 60 years heavy mineral sands have been produced from 20 plus sites in the South West Region of Western Australia and have co-existed with wetlands and nature reserves of international significance, high value agriculture, growing tourism numbers and increasing population. These operations have provided local employment to thousands and been a major contribution to the local and national economy. Active operations are shown in red above , completed and rehabilitated projects in blue.

CO-EXISTING WITH THE ENVIRONMENT

Mineral sand operations can co-exist with environmental reserves and high value agriculture because the environmental impacts are manageable, particularly water management. Water management in South West Western Australia is critical since annual rainfall is between 600 and 900mm per year.

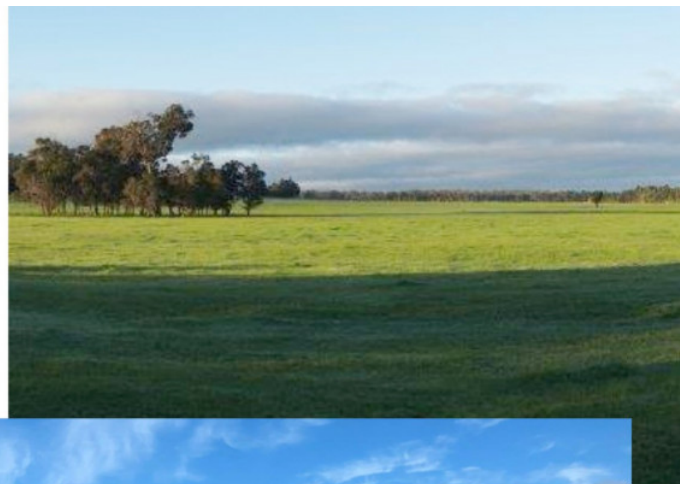
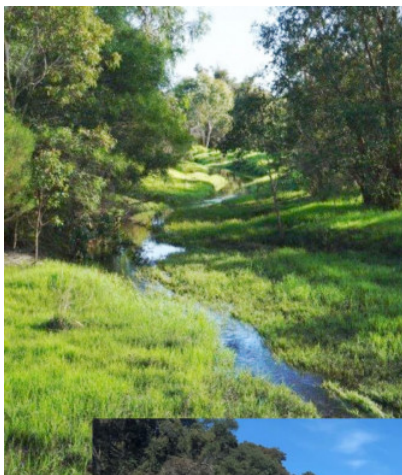
- Water used in the primary concentration of heavy minerals by simple gravity processes is recycled and there are no noxious chemicals that are discharged to the environment.
- Ground water tables can therefore be maintained at natural levels protecting sensitive nearby ecosystems and other ground water users both agricultural and the local population.
- Noise emissions are exceptionally low and do not impinge on nearby residential areas.
- Rehabilitation of operational areas to pre-operational or better than pre-operational conditions is possible because the recovered heavy minerals generally represent only 3 to 6% of the sand and the remainder is returned to reform the land surface.
- Reforming the land as operations progress laterally can be done to enhance the agricultural or natural value of the land through careful re-structuring of the soils profiles and optimising rainfall capture or efficiency of irrigation in the soil profile.



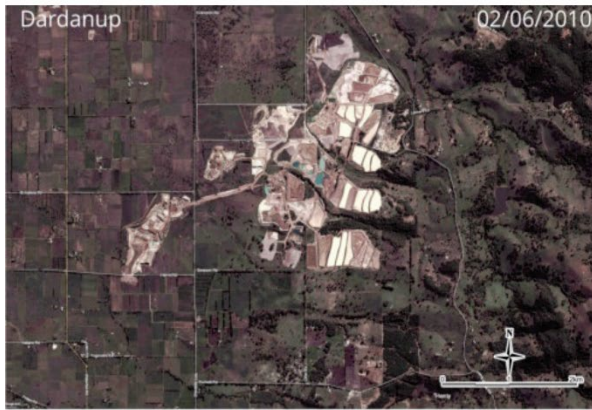
The Wonnerup Heavy Mineral Sand Operation adjacent to an internationally significant RAMSAR wetland, a major avocado farm and built up residential areas.

**REHABILITATION COMMENCED DURING OPERATIONS CAN CREATE ENHANCED LAND USE
AND RE-CREATE NATURAL VEGETATION AND LANDFORMS**

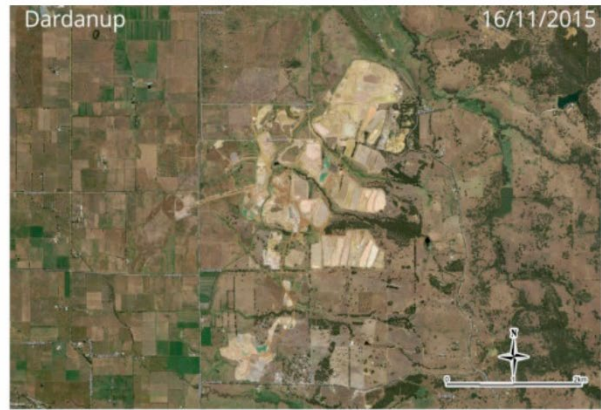
Rehabilitation is an integral part of heavy mineral sand operations. Collection and conservation of soils and organic matter from the land surface in advance of operations enhances the re-establishment of soils and vegetation on the reformed land surface as the operation moves on. Revegetation can be aimed at development of self-managing and evolving natural systems or enhanced commercial land use or a combination of both. Rehabilitation has to be specific to the local setting and goals established with all stakeholders, landowners, and regulatory agencies.



**Heavy mineral sand operational areas rehabilitated to natural systems and to cropping
and grazing agriculture, South West, Western Australia.**



June 2010: Eight years after project commencement



November 2015: Just before mine closure



February 2013: Just prior to final mine expansion



November 2017: Two years after mine closure

No you see it, now you do not. Rehabilitation of the Dardanup Heavy Mineral Sand Operations in South West Western Australia to natural vegetation and enhanced agriculture.

MINERAL SANDS OPERATIONS HAVE BEEN AND REMAIN A MAJOR ECONOMIC CONTRIBUTOR TO THE REGIONAL AND NATIONAL ECONOMY

Heavy mineral sand operations South Western Australia have been a significant contributor to the regional gross economic product and to the national GDP and tax revenue.

- Thousands of the local population in the South West of Western Australia have been employed over the last 60 years in long term and well paid skilled jobs.
- Local businesses have developed high levels of fabrication and maintenance skill servicing the mineral sands industry.
- Contributions to the regional gross value add of heavy mineral sands operation have in some areas contributed over double the contribution from fishing and agriculture.
- Productivity per hour worked in heavy mineral sand production in terms of contribution to the regional gross value add is over 9 times the average value per hour of all other occupations in the same region.
- Heavy mineral sand operations have been able to offer local people well-paying long term jobs that have replaced declining employment in sectors such as agriculture where mechanisation and changes to farming practices has increased efficiency and reduced the need for agricultural workers.