

Worleyparsons Showcases A Spectrum Of Skills On St Helena Airport Project

WorleyParsons, one of the world's largest EPCM businesses, is approaching the end of its task as lead design engineer on the iconic St Helena Airport project, an undertaking that has provided an exceptional showcase of many of its design engineering skills in a single project.

St Helena is one of the most geographically isolated islands in the world, located approximately 1950 km from the south- west coast of Africa and 2900 km from South America. Since the island's discovery in 1502, the only access has been by sea on the British mail ship, the RMS St Helena. Landing infrastructure on the island has also been limited, with no breakwater or mooring facilities at Jamestown on the seafront. Cargo is transported ashore using towed barges and passengers are ferried to and from the ship by small launches.

The construction of a modern airport and the establishment of a permanent wharf now herald a new era for the island by providing employment, creating opportunities for the local "Saints" to learn new skills, stimulating the expansion of support industries and boosting the island's economic growth with the increased tourism that will follow.

"The St Helena Airport project incorporates many unique and unusual features that have required advanced engineering ingenuity and thorough planning," says Graham Isaac, Technical Director Special Projects at WorleyParsons. "The remoteness of the Island, its size, materials supply logistics, unique geology, topography and climate, endemic biodiversity with sensitive environmental heritage, ethnic diversity and history called for real innovation in the design of specific aspects of the project infrastructure. The design also necessitated careful

consideration to ensure ease of constructability and programming of design delivery, calling for close integration between the members of the design and construction teams.”

Working alongside main contractor Basil Read, WorleyParsons’ scope of work has covered a full spectrum of infrastructure design aspects for the airport project, notably, landside engineering, airside design and the airport buildings, including a bulk fuel storage facility for 6 million litres of Jet A1, diesel and gasoline fuels, and a winding, twisting 14,5 km access road rising over 300 m in the first 5 km.

Apart from the varying geographical features of the island, the airport site presented a unique challenge in terms of the setting and history of St Helena. There were protected slave burial sites and archaeological finds to contend with, apart from the site being close to the breeding area of the Wirebird, indigenous to St Helena. The site is also in close proximity to some 40 species of invertebrates that can only be found on the island. Environmental protection is being guided by Basil Read’s Environmental Management Plan and the independent Landscape And Ecology Mitigation (LEMP) programme, a four year initiative that will focus on habitat restoration and landscaping.

One of the biggest project challenges has been filling the so-called “Dry Gut Gorge” with 8-million cubic metres of blasted rock to a height of over 100 m, with a width of 750 m, to create an embankment that will form part of the runway. Fill material is sourced from the site area as the landscape and hills are levelled. When completed, the 2 km long concrete surfaced runway will provide an effective 1550 m available landing distance.

Isaac says the assessment of materials, design components, predictions in terms of the Dry Gut’s potential settlement and the construction method were among

the biggest risks on the project. The rockfill has been designed for stringent final level tolerances (6 mm in 3 m straight edge) in supporting the concrete runway pavement. The strength and settlement characteristics of the rockfill determine the side slopes and service performance of the embankment, drawing on WorleyParsons' extensive international experience in design principles from rockfill dams. Settlement monitoring instrumentation has been designed and installed at strategic stages in the fill matrix to enable assessments of settlement during construction.

On the aviation side, the WorleyParsons team had to take the remoteness of the island into account when engineering an innovative airport design capable of ensuring that aircraft would be able to land safely, with sufficient fuel to return to the originating airport. The terrain on the island made positioning of the airport runway difficult, particularly when remaining in the bounds of cost and environmental impact.

"WorleyParsons RSA response to the exacting requirements of this unique project underpinned this project," Isaac concludes. "For the bulk fuel facility, for instance, we drew on the expertise of our world renowned in-house hydrocarbons design expertise and, in terms of the design of the 14,5 km access road, bulk earthworks, concrete runway, structural components of the terminal buildings and related services WorleyParsons has a global track record and drew on our core in-house skills in the built environment."

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