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In Punaauia, on the west coast of Tahiti, the ageing underwater outfall of the wastewater treatment plant posed a growing risk to the quality of the lagoon and its coral reefs. Faced with repeated pipe breaks and poorly controlled effluent discharges in shallow areas, the government of French Polynesia decided to rebuild the structure from scratch. Project management was entrusted to SEM Vaitama, a semi-public company dedicated to water sanitation in Tahiti, while Geoclean, a VINCI Construction Grands Projets brand specialising in marine hydraulic infrastructure, was selected to carry out the maritime part of the project (Lot 1), at a cost of around XPF 1.25 billion excluding tax, entirely funded by the French Polynesian Government (main funder), with support from the European Union as part of the implementation of its water policy.

Beyond simply replacing a pipe, this project is part of a long-term strategy to secure the discharge of treated wastewater, preserve a lagoon that is central to the island's tourist appeal, and strengthen residents' confidence in the sanitation service.

Reliability is essential for coastal protection

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Commissioned in 2002, the Punaauia wastewater treatment plant was one of the first wastewater treatment facilities in French Polynesia. Today, it serves a rapidly growing coastal area characterised by intensive urbanisation and increased pressure on coastal environments.

The original outfall, a steel pipe submerged for more than twenty years, had reached an advanced state of deterioration, requiring several emergency interventions and episodes of discharge into shallow waters. In this context, upgrading the structure was no longer a simple maintenance issue, but a structural investment for the protection of the coastline and the continuity of public service.

The new pipeline aims to restore controlled discharge into the sea, in accordance with dilution and distance requirements from bathing areas, while giving the local authority more flexibility to support the future growth of the municipality.



Pipeline assembly: Prefabrication of 1400m of HDPE pipe by polyfusion welding

Technical specifications: HDPE, depth and durability

Lot 1, entrusted to Geocean, involves the construction of a new marine outfall connecting the shore of Taapuna Park to a discharge area located offshore, at a depth of nearly 60 metres. The structure takes the form of a pipe approximately 1.5 km long, made of high-density polyethylene (HDPE) with a diameter of 560 mm.

HDPE was chosen for two reasons: to eliminate the risk of corrosion from contact with both effluent and seawater, and to ensure high durability throughout the structure's lifetime. The pipeline is prefabricated on land, welded by polyfusion and then assembled in sections before being towed and submerged using procedures already tested by Geocean on other projects in Polynesia and in sensitive areas across five continents.

The route leaves the coastal fringe to reach significant bathymetry, where current and turbulence conditions ensure better dilution of the treated effluent. This deep-water positioning significantly limits the interaction between the discharge plume and sensitive areas of the lagoon, whether fringing reefs or popular beaches.

The stability of the pipe on the seabed is ensured by a concrete ballast and anchoring system, designed to withstand extreme weather events and cyclonic stress.

As Alexandre Leroy, project manager at Geocean, points out, "the **Punaauia** project uses methods that we have mastered over several decades, with **HDPE** pipes, significant depths and delicate towing operations. " In the project design, the depth of the outlet, the nature of the material and the mechanical strength of the structure were considered to be genuine environmental parameters.

The new outfall was brought into service ahead of schedule on 31 December 2025, in response to an emergency caused by the failure of the existing structure, to ensure the continuity of the public sanitation service and prevent any environmental risk to the lagoon.

A clean construction site and a social commitment

Geocean has made sustainability and environmental respect a top priority at the **Punaauia** site. A strict Environmental Management Plan (**EMP**), developed in collaboration with the **EGIS/NEOSEA** project management consortium, has provided a framework for all marine works to minimise disruption to the lagoon and marine habitats. This **EMP** covered, in particular, the monitoring of benthic habitats, strict waste management and the adaptation of the intervention schedule to weather conditions. Specific actions, including the strong mobilization of teams, made it possible to structure sorting, recycling and the adoption of good handling and washing practices, to minimize the operational footprint.

In addition, **Geocean** chose to support local environmental and social projects, in line with its **CSR** strategy and in support of the protection of the lagoon. In particular, the company supports a coral restoration program in **Punaauia** and organizes eco-citizen days with schoolchildren. Geocean also supported the purchase of a catamaran for an association that supports young people in precarious situations. Support for these CSR projects is based on the belief that 'for a project like **Punaauia**, it is a way of leaving a positive mark that goes beyond the structure itself. By securing wastewater discharges and actively participating in reef restoration, the **Punaauia** outfall is an essential link in protecting the lagoon.



Perfect integration of the project into the local activities

Marine expertise: installing underwater infrastructure to connect land and sea

The Punaauia project is a continuation of Geocean's technical expertise, which has been involved for several decades in projects that combine water intake and discharge into the sea, whether for seawater air-conditioning (SWAC) systems or desalination units. In Polynesia, the company has already installed long HDPE pipes in a coral environment. In particular, it built the SWAC for the French Polynesian Hospital Centre (CHPF), which uses more than 4 kilometers of HDPE pipes and is considered one of the longest systems of its kind in the world, illustrating its ability to design maritime infrastructure with high environmental value.

This accumulated experience was directly applied in Punaauia to design the procedures for towing, submerging and stabilising the new outfall, as well as for managing interfaces with port authorities and lagoon users.

The case of Punaauia illustrates how the modernization of sanitation infrastructure in island environments can become a lever for coastal resilience. By anticipating the renewal of a critical structure, integrating the maritime component as a key element of environmental performance, and backing the project with a demanding EPM and CSR actions developed by the company, SEM Vaitama and Geocean are proposing a model that can be transposed to other coastal areas facing ageing outfalls.

For coastal project owners, the challenge is no longer just to maintain a compliant sanitation service, but to transform it into a tool for adapting to climate change and sustainably protecting coral reefs. In Punaauia, the reconstruction of the outfall meets this equation: securing the discharge of treated wastewater, preserving a lagoon that is part of the collective heritage and leaving future generations with a more resilient coastline, thanks to the technical, environmental and societal choices made by Geocean.

Contact:

info@geocean.com

About Geocean

As part of VINCI Construction Grands Projets, Geocean is a maritime contractor specialising in sustainable access to energy and water. It operates in isolated territories and the most complex maritime areas nearshore.

For the past 40 years, Geocean has been carrying out complex maritime projects to link the sea to the land. These projects benefit customers who wish to be supported by an experienced contractor from the feasibility options up to its very end and the start-up of the infrastructure.

With a human-scale team, Geocean offers flexibility, tailor-made solutions, and agile turnkey solutions to meet the needs of all its public and private clients.