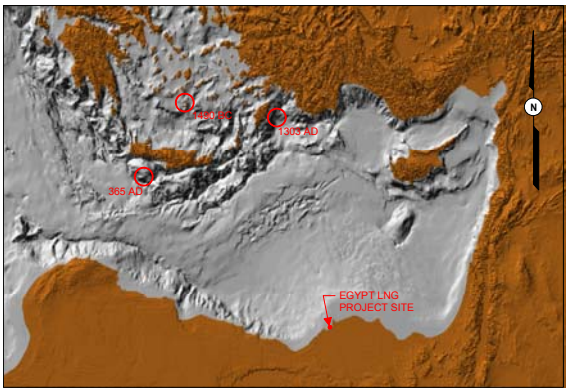
PROJECT PROFILE

GEOHAZARDS ASSESSMENT, EGYPT LNG PROJECT, NILE DELTA, EGYPT

Client: Bechtel International, Houston, Texas

Bechtel International led the FEED study for an LNG export facility near Idku Egypt. In addition to gas treatment and liquefaction facilities, the plant will have a number of large cryogenic LNG tanks designed to the NFPA 59A code. D'Appolonia evaluated the geohazards associated with the project, including tsunamis, seldom considered as significant along the Egyptian coast.



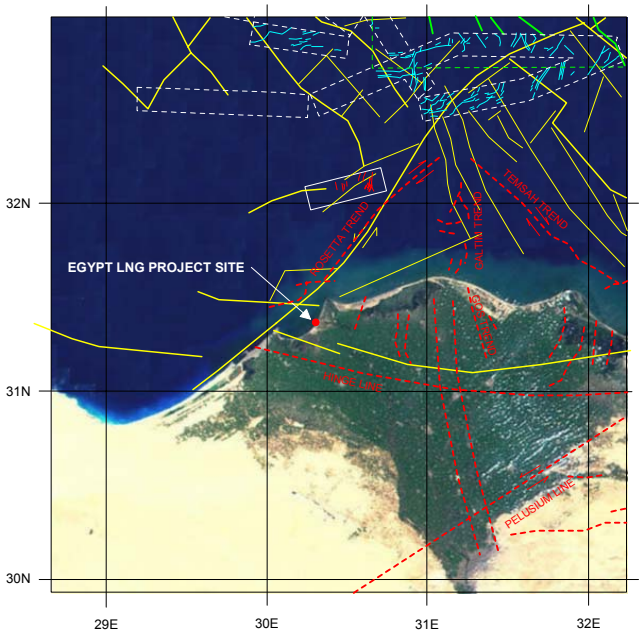
Location of historical earthquakes producing tsunamis along the Egyptian coast

A probabilistic seismic hazard assessment (PSHA) was used to define the OBE and SSE. Seismotectonic source zones were identified from the regional geology. Source activity was determined by analysis of historical and instrumental earthquake catalogs. The ground motion induced at the site was modeled with a set of appropriate attenuation laws. Uncertainty was addressed using a logic tree formulation.

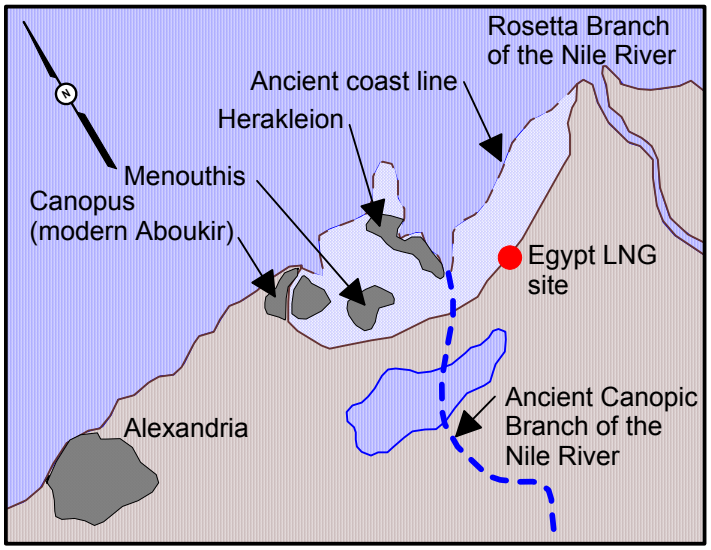
Numerous faults have been mapped in the Nile Delta. A lineament analysis of satellite imagery was used to screen for unidentified faults. Offshore and onshore geophysical data was interpreted for evidence of faults displacing recent sediments. The study showed that while geologically young faults are present in the region, no faults exhibiting Holocene displacement are found near the site.

Tsunami proved to be a significant hazard along the Egyptian coast with three major tsunami that have affected the nearby city of Alexandria in the past 3000 years. A review of the Mediterranean tsunami catalog identified the primary source zones. Deterministic analysis was used to predict tsunami run-up and incursion for a 5000 year event.

An interesting aspect of the fault study proved to be an evaluation of the sunken cities of Herakleion and Menouthis, where recent archaeological studies have found that these cities suddenly disappeared beneath the sea more than a thousand years ago. Over the past several years there has been a public controversy regarding the possibility that an active fault could have been the reason that these recently discovered ancient towns are now submerged beneath the sea. The offshore seismic reflection data compiled for the Scarab-Saffron project, where D'Appolonia was responsible for the interpretation of the offshore geophysical data, however, demonstrate that an active fault was not the cause of the sinking of these two towns. Slope failure related to major flooding involving the migration of the ancient Canopic Branch of the Nile River to its present Rosetta Branch appears to be the most probable cause.



Regional faults in the area of the Nile Delta



Location of the ancient towns of Herakleion and Menouthis, where active faulting has been postulated to have caused these towns to sink beneath the sea, but where a shifting of the mouth of the Nile is a more likely cause.

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