



Coastal groynes

Cayeux-sur-Mer | France



The Bas Champs coastline in the town of Cayeux-sur-Mer, located in the Bay of the Somme in Picardy, has long been affected by severe erosion of its pebble beach – the only natural barrier protecting a low-lying area of 4,300 hectares from marine incursions.

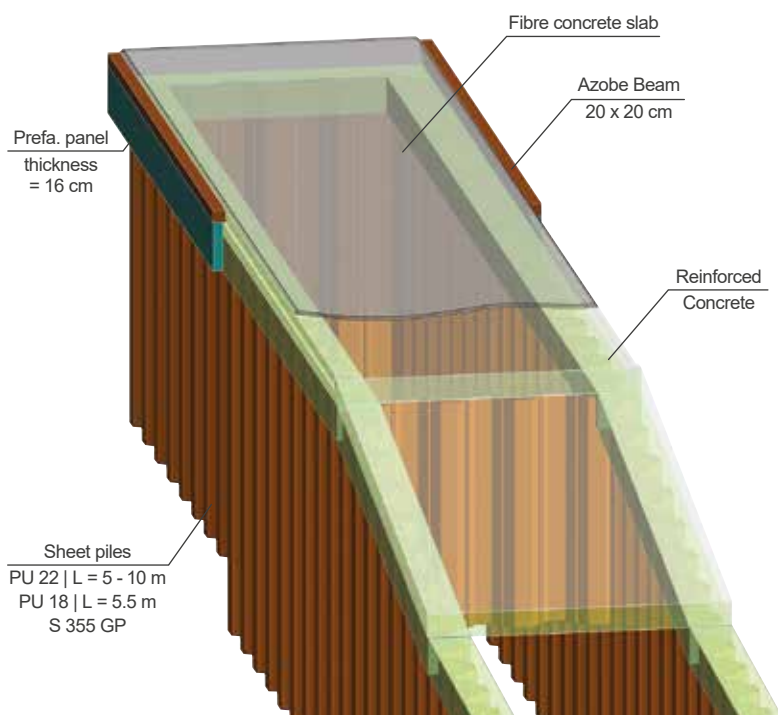
To address this issue, the project involved the installation of 24 new coastal groins to extend the existing network of 80 groins. Additionally, the pebble beach was replenished over a 2.2 km stretch between Amer Sud and northern Cayeux.

By stabilising the beach, these new structures will effectively reduce erosion and lower the risk of flooding in the town.

The long-term success of the project relies on regular site maintenance, including periodic recharging of the pebble beach. The groynes were built using **PU 12, PU 18, and PU 22** steel sheet piles, with lengths ranging from **3.8 to 10.0 meters**, in steel grade **S 355 GP**. The sheet piles were capped with a reinforced concrete beam topped by an exotic hardwood edge made of Azobé.

The construction of the new groynes also required pebble replenishment both prior to and during the works. Nearly 250,000 m³ of pebbles were backfilled in total. After each groyne was completed, the project owner carried out the necessary pebble backfilling to help stabilise the structure and ensure its long-term effectiveness. This specific contract was awarded to a local company.

Typical 3D cross-section of a cob



The 24 new groynes are spaced 90 meters apart along the full stretch of Cayeux beach, with the final six gradually set back toward the backshore. Each groyne is between 85 and 90 meters long and 90 centimeters wide, except for three double groynes, which are 5.16 meters wide. One of these serves as a ramp, another provides access for emergency services and pedestrians, and the third is designed to offer greater resistance to erosion on its northern face.

Single piles consist of a single sheet pile wall capped with a crown beam, while double piles feature two parallel sheet pile walls with a crown. Installation was carried out using an ICE 28RF (Resonance-Free) vibro-driver, offering an adjustable eccentric moment from 0 to 28 kgm and a centrifugal force ranging from 0 to 160 kN. From the installation of the first groyne onward, acoustic monitoring was conducted both on land and in the water to ensure compliance with the concession's noise restrictions. These regulations required that noise levels not exceed 85 dB(A) at a distance of 40 meters from the vibrating source.

If noise thresholds were exceeded, mitigation measures had to be implemented.



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Client	Syndicat Mixte Baie de Somme Grand Littoral Picard (SMACOP)			
Design office Driving	SOGREAH (Artelia)			
Company	SARL Revet TP			
Sheet piles	PU 12	3.8 - 5.5 m	S 355 GP	25 t
	PU 18	5.5 m	S 355 GP	163 t
	PU 22	5.0 - 10.0 m	S 355 GP	2130 t
Total	2318 tonnes of Sheet piles			

Additionally, the parts of the pile driver that came into contact with the sheet piles were required to be made from non-metallic materials to minimize impact and vibration noise.

Over their service life, the sheet piles will be exposed to strong wave action and abrasion from pebbles. Preliminary design was conducted by the engineering firm SOGREAH (Artelia), and final structural sizing was carried out by the contractor in accordance with applicable European and French standards (Eurocode 7, NF P 94-282, etc.). **The design accounted for a steel thickness reduction of 3.5 mm per face – 7.0 mm in total – over a 30-years service life**, without the use of additional surface coating systems.

The steel sheet piles were delivered in several batches between January and October 2014. It is worth noting that project specifications imposed strict limitations on construction activities during the 2014 summer season.

The groynes were officially inaugurated in June 2015, and the entire project was completed and inaugurated as scheduled in December 2015.

The total cost of the works amounted to €18 million, partially funded by the European Regional Development Fund (ERDF).

