

The development of Groningen during the centuries

One of the aspects of the Groninger North coast is the continuous growth of the salt marshes by accretion of silt. Throughout the centuries the coastline moved slowly further North. In the northwestern part of the province, the Marne area, this can be seen by the parallel lines of the villages. The first population probably already lived at this area about 500 years BC. The salt marshes were only flooded at higher water levels resulting in the growth of vegetation. It is assumable that the landscape looked similar to the current foreland of the Waddensea dikes. Cultivation of the area was therefore possible.

The sealevel started to rise but also the accretion continued and new land developed. The coastline moved further northwards as can be seen by the 'wall' on which the villages Wehe-den Hoorn, via Leens and Ulrum naar Menneweer are situated. This proces repeated itself several times finally resulting in the line Wierhuizen, Pieterburen and Westernieland (probably around 1300 AD) on which a seadike was build.



The construction of the forelands

In the beginning of 20th century constructing of forelands from the salt marshes was still a heavy job. Most off the work was done by hand or with simple instruments.



Sometimes transport by train was possible for the first part off the trip









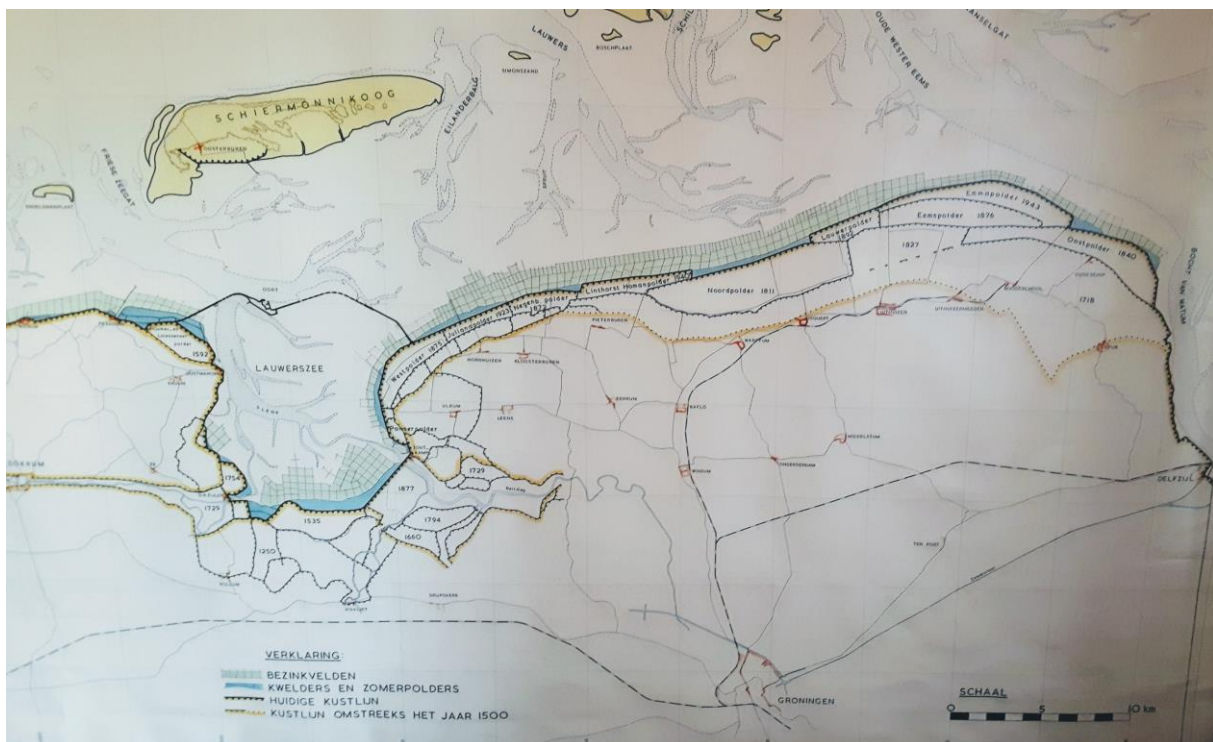




The ownership of the salt marshes / forelands

During centuries the farmers enlarged their property by cultivating the new sludgy salt marshes which were developed by natural process. In Groningen the common right contended that who owned the land behind the saedike had the right to claim the new land which was development by the 'natural growth' of the salt marshes in front of their property.

In the time of Napoleon legislation was changed and the State became the owner of the new lands. When the French retreated the law remained in place leading to a juridical conflict between the farmers and the state, which was so called "de Kwelderkwestie". Because of this and changes in the social-economic situation maintenance of the forelands no longer took place. This finally led to erosion instead of further growth. At that time the seadikes were so called full green dikes just build with local clay and grass as dike revetment and thereby fragile. Heavy storms resulted in severe damage. Finally the farmers won. Finally in 1932 by the Acte van Dading special agreements were signed by which the responsibilities of the State and the landowners were recorded. The original rights were reclaimed and the ownership reached even 300 m beyond the solid land. In that area the State was to take measurements to gain new land. Once this new land was usable for cultivation the farmers had the right to buy this for a relative low price. The last land reclamation happened in the Lauwerssea in 1969.

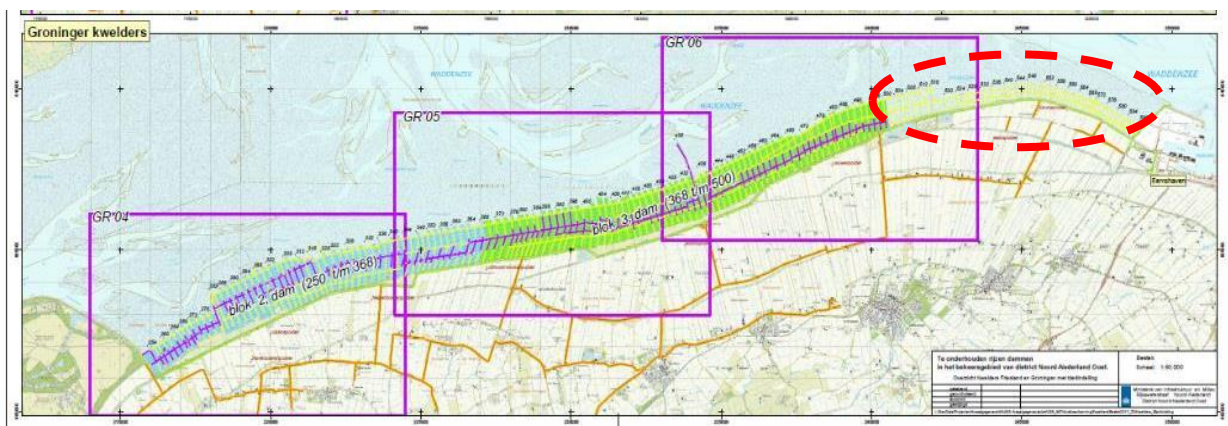
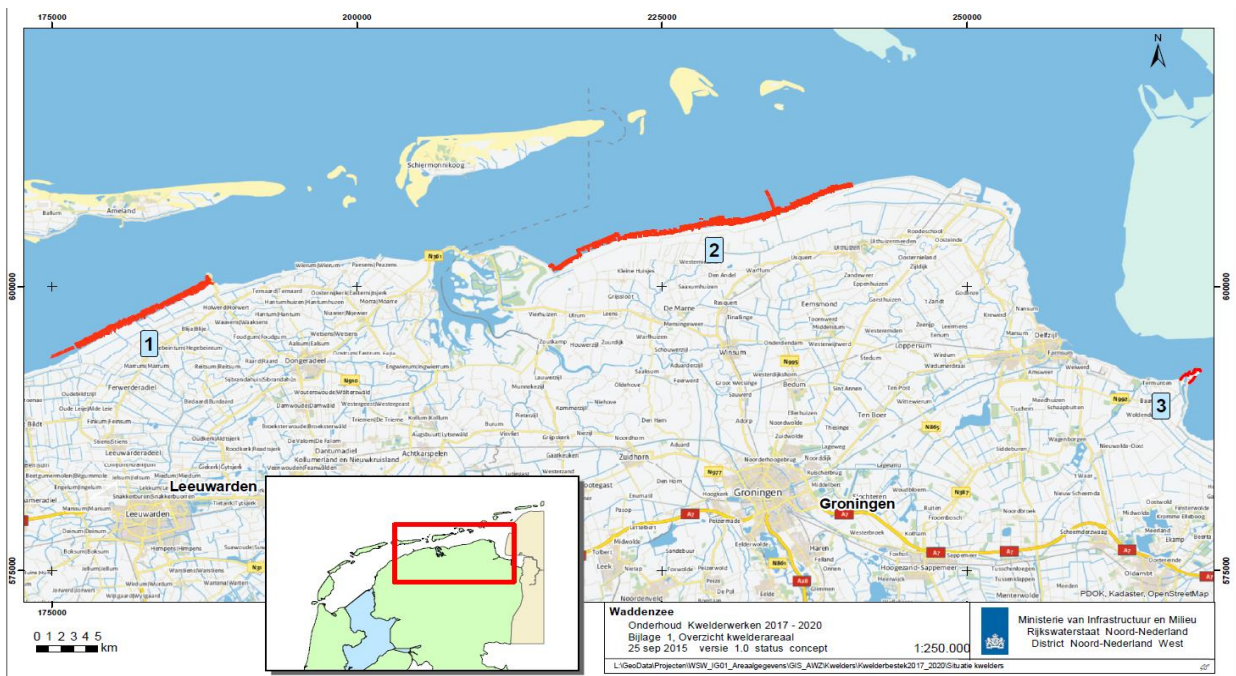


Maintenance of the forelands

In 1971 the Waddensea officially was labeled as wetland by the Ramsar Convention on Wetlands. By this was stated that the protection of the interests of nature has a higher priority than those of men.

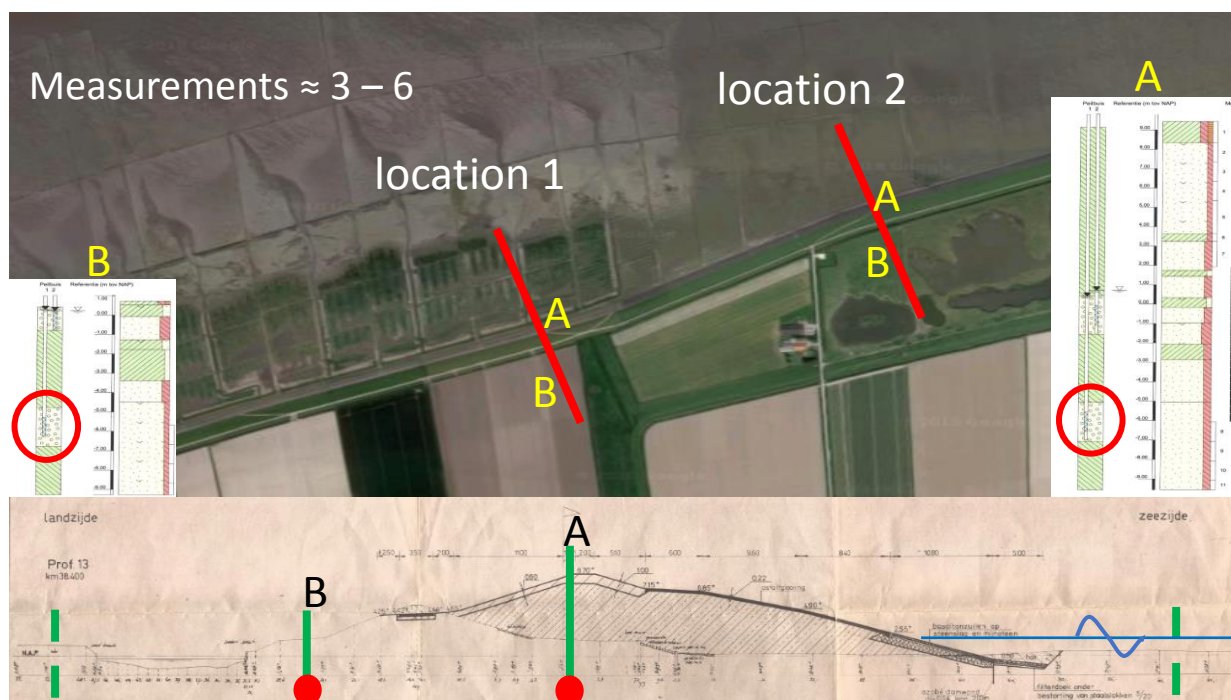
In the last decades the forelands were not used so intensively anymore. This resulted in a more rugged vegetation and the bird population became less diverse. The forelands are very important though for the ecological system of the Waddensea and are part of the Nature 2000 area. To restore their value the Kwelderconvenant was worked out by lead of the regional government of Groningen. In this the tasks are described for all the organisations who have direct interest in the existence of the forelands.

A remark has to be made though. During the 20th century lots of new foreland was gained. Finally this came in to conflict with the Nature 2000 goals and maintenance by Rijkswaterstaat of the rijshoutdammen partly was stopped. Just west off the Eemshaven the land now has been given back to the sea. This is the red surrounded area.



Geotechnical aspects of the forelands

During the centuries the sludgy area of Groningen enlarged very slowly. This resulted in soil that is build up by fine layers of clay and sandmixes (see yellow surrounded area). This characteristic is very important for the failure mechanism piping. In case of gaining more information of our dikes we did a lot of cone penetration tests and soil-drilling tests and took many borehole samples. Since the water permeability is very important for the stability of the dike and the aspect piping we decided to do field tests. For this watertension instruments were placed in the soil under the dike on two locations, one where there is foreland and one nearby where there is no foreland.



Crossroad of a formal seadike

In the small house wooden beams were kept to close the 'gap' in case of a high water situation. Often clay and/or manure was placed in between the two lines of beams.

