## Building With Nature In The Dutch Delta Dune Coast

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Between 2009-2011, a new dune area was constructed by beach and foreshore nourishment along the Delfland Coast in the south-western Netherlands. The new area is meant as a compensation for predicted loss of high quality dune areas nearby, due to the use of Maasvlakte 2, the new harbour extension of Rotterdam, starting from 2013. The use of Maasvlakte 2 will cause extra emission of, especially NOx (by boats, cars, etc). The airborne deposition of NOx will act as an extra nutrient load that will damage high quality, nutrient poor, dune habitats nearby. Because these habitats are protected under the European Natura 2000 network, a new dune area had to be constructed as compensation. The target habitats for the compensation include dry "grey dunes" and moist dune valley grassland. Because of this, the nourished material had to have a special character and the nourishment was carried out according to a special design; also the initial development of the new area had to follow certain pathways in order to meet the compensation requirements. To assess whether the development is indeed taking place in the direction of the desired target habitats, careful monitoring is done, both in the compensation area as well as in surrounding dune areas. This paper reports on the construction of the area and the first years of development and monitoring, which mainly concerns dynamic development of the abiotic landscape elements, geomorphology and groundwater. The area is a unique example of "building with nature", a new concept in coastal management, that is regarded as an innovative alternative for traditional civil engineering approaches that involve hard structures. Key words: Rotterdam harbour extension, Natura 2000, building with nature, coastal dune management