

# Amphibious houses

Over the last decades, the world has witnessed, on countless occasions, a growing number of floods in urban areas. Climate change and rapid urbanisation, partially driven by urban migration, will exacerbate this trend. Besides structural measures aiming at a reduction of the probability of flooding, new approaches need to be developed to further reduce the vulnerability of cities to floods. Many urban regions worldwide are faced with the challenge to establish integrated solutions in which urban development allows for absorption or 'moving with' the flow of excess water.

Two-thirds of the Netherlands would be inundated if there were no dikes or coastal protection. The Netherlands is one of the most densely populated areas in the world. This specially holds for the western region of the country. This Delta Metropolis faces huge challenges in the decades to come. There is an urgent need to implement safety and mitigation measures towards flooding, and to improve the spatial quality while, at the same time, the enormous demand for new houses, workplaces and infrastructure need to be accommodated.

The development and construction of 36 amphibious houses and 14 floating houses in Maasbommel, in

the province of Gelderland, is DuraVermeer's answer to the tense relationship between the growing need for land for housing, and the need to preserve flood plains and retention areas in the Netherlands.

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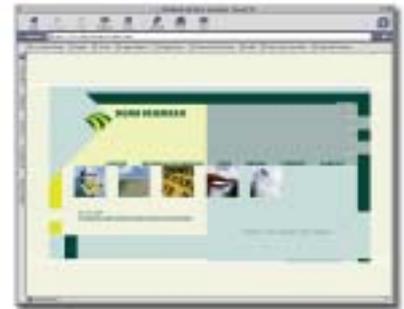
The site in Maasbommel is located outside the dikes in a recreational area that was intentionally chosen for its regularly high water levels. Floods in recent years and subsequent dike reinforcements in the catchment basin have led to the development of houses according to an entirely new concept: houses that float during floods.

To get the houses to move with the water level, they are built on concrete floating bodies with a coupling construction. At low water level, the houses rest on a concrete foundation. The houses have a wood-frame construction in order to keep them as light as possible. To prevent the houses

from floating off during a flood, they are anchored to flexible mooring posts that cushion the swell of the water. It is expected that, once every five



*Houses that float during floods...*



years, the water will rise to such a level (more than 70 centimetres) that the houses will lift off the ground. The houses can accommodate a difference in water level of up to 5.5 metres.

DuraVermeer is a Dutch, innovative developing company in the construction and infrastructure sector. Due to increasing changes in society and the sector, DuraVermeer considers it imperative to innovate continuously, and to actively seek new ways of co-operation with different markets and governments. The design and construction of urban developments that are adapted to fluctuating water levels and resilient to floods present a major innovative challenge for the company. DuraVermeer employs about 4,000 people.



**Dr Chris Zevenbergen**  
**Managing Director**  
**Business Development**

**DuraVermeer**  
**PO Box 3098**  
**2130 KB Hoofddorp**  
**The Netherlands**

**Tel: + 031 23 56 92 345**

**czevenbergen@**  
**duravermeerdiensten.nl**  
**www.duravermeer.nl**