



Flood maps in the Netherlands

Why do we need flood maps?

The Netherlands is situated in a low-lying delta where the rivers Rhine, Meuse, Scheldt and Ems debouch into the North Sea. It is a very flood prone country: about 60% of the country is situated below sea-level, 9 million people live here and about 65% of the Gross Domestic Product is earned here. Because of this, Dutch flood protection policy concentrates on prevention against floods, i.e. minimizing the probability of flooding. However, absolute protection is impossible, there will always remain a small chance that strong and impressive protection works fail. The flooding of New Orleans (September 2005) has illustrated the damage and disruption that may occur when large metropolitan areas are flooded. Therefore, in addition to flood prevention, it is crucial to be prepared for flooding as well. This policy is needed to minimize damage, casualties and disruption when the rare disaster becomes reality. In this respect flood risk maps play a vital role:

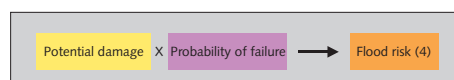
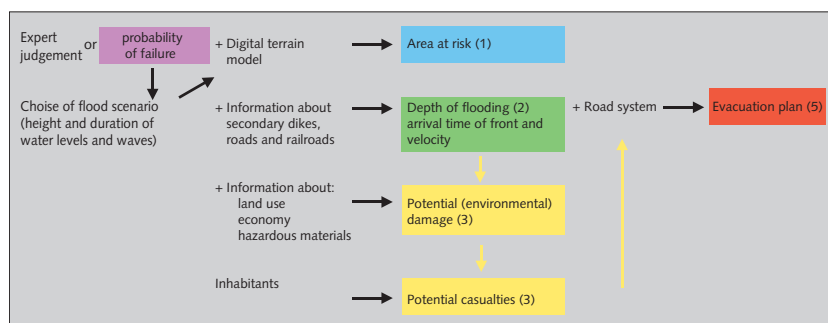
- For spatial planners they indicate high risk locations for new urban or industrial developments;
- Citizens, companies and network-managers become aware of the flood risk they face and are stimulated to take their own responsibility in reducing damage;
- Administrative authorities can prepare their disaster mitigation /evacuation plans

In November 2006 the preparation of flood risk maps was announced in the Government Decision on Flood Contingency Planning (Kabinetstandpunt Rampenbeheersing Overstromingen). The preparation of flood maps will also be prescribed in the European Directive on the Assessment and Management of Flood Risks, which is expected to become effective this year.

What are flood risk maps?

Flood risk maps may contain different types of information. This information is partly interdependent and the production may require several steps (see figure 1):

Figure 1
Flood risk information and map types



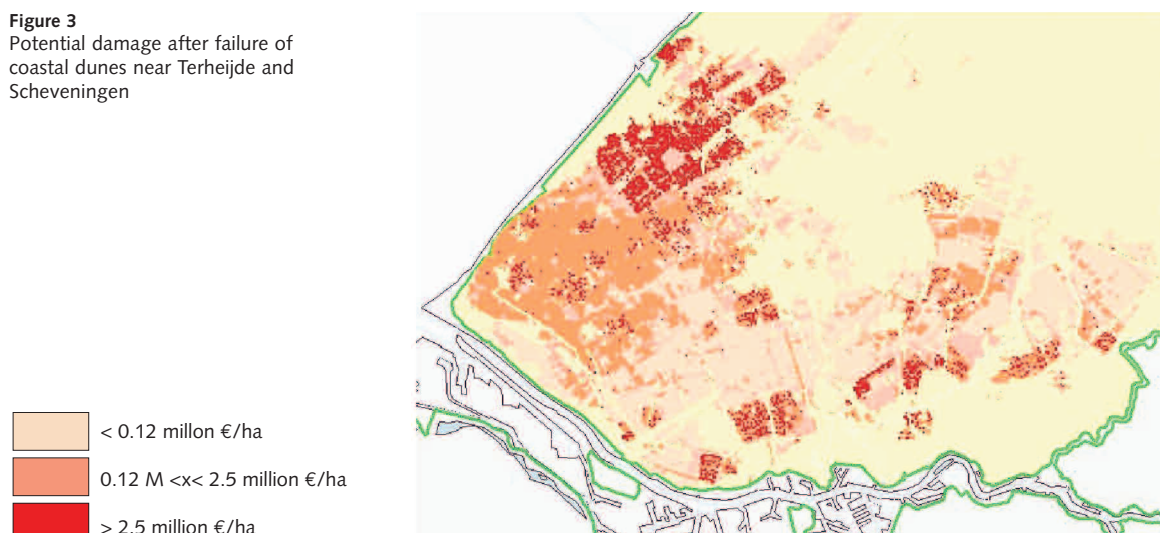
- Possible *extent of flooding*: in fact all areas in coastal and riverine floodplains, inside and outside the embankments, that are situated below a flood level with specified frequency (e.g. 1/10.000)
- *Character of flooding* (when a protection work has failed), like potential depth of flooding, current velocity, duration of front migration, rate of water level rise. This information depends on the behaviour of the flooding process. This information is generated by a model computation (simulation). The results depend on the failure location, inflow characteristics and level and roughness of the flooded area (see figure 2 for failure of coastal dunes). When the results of different simulations are combined, for every gridcell a worst-case value can be established (e.g. maximum expected flood depth).

Figure 2
Maximum potential flood depth after failure of coastal dunes near Terheijde and Scheveningen



- *Effects of flooding*, like damage and casualties. These parameters depend on the combination of flooding characteristics, the spatial distribution of land use, properties and inhabitants. These parameters are combined with each other by so-called flood-damage relationships, assuming an increase of damage due to increasing flood depth and/or current velocities (figure 3, same area as figure 2).

Figure 3
Potential damage after failure of coastal dunes near Terheijde and Scheveningen



- *Flood risk*, defined as a combination of flood probability and damage.
- *Evacuation maps*, informing citizens where to go when a flood becomes a real danger and authorities order inhabitants to leave their

houses. This requires information about the spatial distribution of people to be evacuated and the road network available. After administrative decision making on prioritized groups, routes to take (and to be closed), the resulting maps can be published (see figure 4 for an example from dijkkring 48 / Rijn & IJssel).

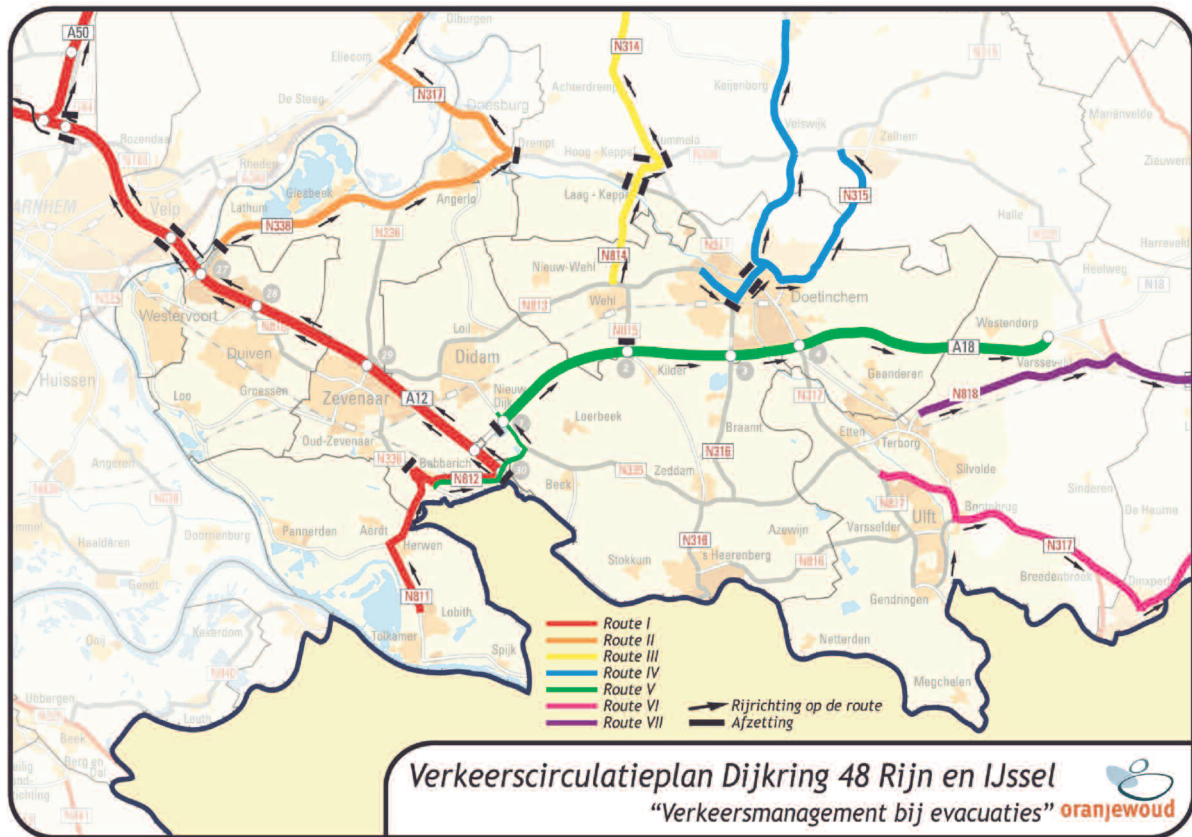


Figure 4
Flood evacuation map of dijkkring 48
(Rijn & IJssel) (Oranjewoud, 2006)

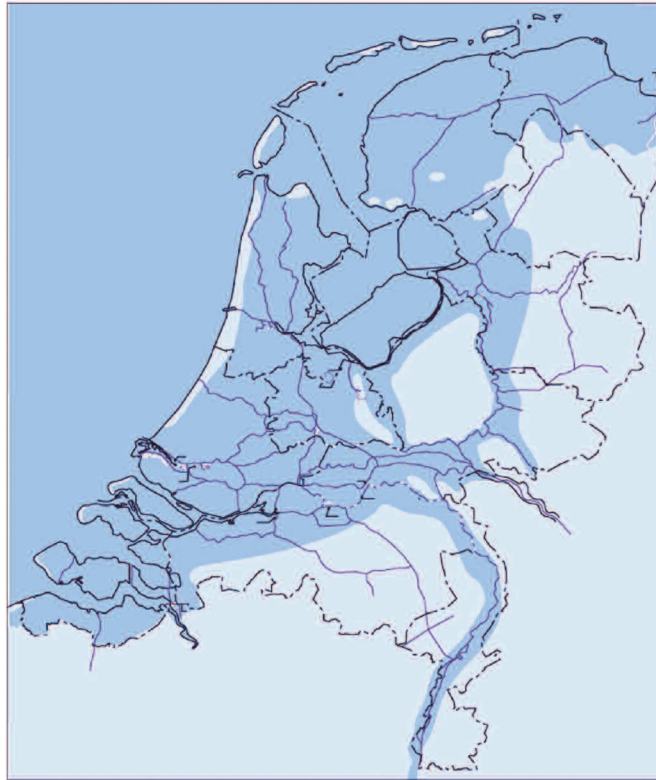
Who, when and how

The preparation of the flood maps benefits from many simulations done already by the provinces, waterboards and Rijkswaterstaat in the last few years, mainly within the frameworks of National Administrative Agreement on Water Management and Flood Risk and Safety in the Netherlands (FLORIS/VNK). The results of these simulations regarding potential depth of flooding are stored in a national database, allowing for flood depth maps on different scales (national, regional, local, postal zip code level, highways and railways). It is planned to have these maps available mid 2007. The coming years the FLORIS project will yield information on current flood probabilities, potential damage (and hence risk). It is expected that in 2009 flood damage and risk maps may become available. Regional disaster management authorities are preparing evacuation maps. Pilots have been started in Utrecht (Eem-valley), dike-ring 48 (Rijn&IJssel) and Haaglanden. Experiences with these pilots and from abroad (USA, Japan) will be used to formulate guidelines for these kind of maps in 2007

Presentation

In the Netherlands provinces are responsible for risk communication to the public. For this purpose since 2006 a website is available (www.risicokaart.nl, in Dutch). The flood maps that become available will be presented to the public and professionals on these provincial websites.

Flood prone areas in the Netherlands



Higher lands
Flood prone areas

Further information:

Jos van Alphen
projectleader flood maps
Rijkswaterstaat RIKZ
jos.van.alphen@rws.nl

Ab van de Berg
projectleader provincial risk maps
IPO
avdberg@ipo.nl

Derk van Oosterzee
Ministerie van Binnenlandse
Zaken en Koninkrijksrelaties
derk.oosterzee@minbzk.nl

Ministry of Transport, Public Works and Water Management



Interprovinciaal Overleg **ipo**



Ministerie van
Binnenlandse Zaken en
Koninkrijksrelaties