

## Design of the Ax/A11-motorway: balancing the interests of ecologically important areas, local citizens and the port of Zeebrugge

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### Summary

To optimize road access to the Port of Zeebrugge the Ax-project was set up: a new highway A11 will be built connecting the harbour to the E40 and E34 motorway. As the port is adjacent to one of the oldest and purest polders of Flanders, environmental impact is to be considered carefully. Part of the landscape and buildings are protected heritage, or protected habitat areas for avifauna. The A11 will cross railways, a navigation channel, secondary roads, pipelines of national importance and fragile hydraulic systems. Two Interchanges and one exit/entrance complex in the harbour are to be built. Several “feasible” alternatives with bridges and or tunnels were tested. A methodology was established to rank alternatives. Using an integrated design approach a solution was found in designing a partly subterranean highway. The design includes more than 60 civil engineering structures. Among them a movable bridge, two approach viaducts, and tunnels.

**Keywords:** Infrastructure in context, sustainability, durability and innovation, case histories.

### 1. Introduction

The impact of an infrastructure on its surroundings can never be underestimated. Due to the long life cycle of an infrastructure asset, the important related costs and the fact that many people use it, infrastructures have consequences far beyond its pure technical aspects. These can be local as well as out of the project borders, at short time notice as well as over a long period. Influence can reach from easily predictable consequences as e.g. impact on groundwater, to more complex systems as ecology, agriculture, social perception etc. In environmentally constrained and/or urbanized areas a new infrastructure interferes with vulnerable and complex systems, which could be permanently destroyed or ruined. Every infrastructure therefore deserves an integrated and careful design approach. The design approach for the Ax/A11 motorway project was based on this approach. On top of the functional requirements and goals set by the road administration, the design team added durability, integrated design quality as predominant decision factors. By carefully and continuously checking the consequences of its decisions on all aspects the design team achieved not only to keep the support of stakeholders (administrations, political decision makers, etc.) but also to do this in a for the Flemish context short design cycle.

### 2. Context

#### 2.1 General

To allow for the further development of the freight port of Zeebrugge, the current access will be improved making a highway that connects the port to the E40 and E34 motorway. The new connection will link Zeebrugge with the ports of Ghent and Antwerp and the hinterland. The project