

# Bentofix® X

Environmental protection along the  
UK's HS2 railway

Project name  
HS2 Railway, UK

Designer  
Ramboll

Product  
Bentofix® X2 NSP 4900







**Fig. 1: On-site transportation of GCL**

HS2 is a new high-speed railway under development in the United Kingdom. It will link up London, the Midlands and the North along lines that serve eight of the country's 10 largest cities.

The state-of-the-art HS2 high-speed line is a critical component in the UK's low carbon transport future. It will provide much-needed rail capacity across the country and will quickly enhance railway connectivity in the North and Midlands. HS2 is widely viewed as an efficiency-oriented way to help rebalance the UK economy.

### Challenge

Naue was approached by the designer to propose a suitable product to be used as lining system for an attenuation pond. The initial specification was for a puddle clay. However, the contractor was unable to find a suitable source, so they sought suitable alternatives. The attenuation pond was needed in the short term to manage runoff from railway construction activities (potential for hydrocarbons). In the long term, the pond would be used to manage the runoff from the HS2 line (potential for heavy metals from brake linings, hydrocarbons from trains).

### Solution

After analysis of the short and long-term potential for contaminants in the runoff, Bentofix® X2 NSP 4900 was used to ensure suitable protection against potential groundwater contamination from runoff. Bentofix® X is a shear strength transmitting coated geosynthetic clay liner (GCL), also known as multi-component GCL. The robust geotextile cover and carrier layers provide exceptional strength in the installation while the addition of a polymeric coating on one side of the GCL enhances the containment performance of the liner. It is stronger against the potential contaminants in runoff than a standard GCL and the coating also improves performance against roots and desiccation. The use of high-quality sodium bentonite powder in the core of the product plus edge impregnation of bentonite for each panel ensures a very low permeability for the attenuation ponds.

The GCL used for the HS2 is as innovative as the high-speed railway itself.



**Fig. 2: Cutting the coated GCL to length**



**Fig. 3: Cover soil placement over the protection nonwoven of the coated GCL**