



Reference: A 44 Kassel
Noise Protection

Embankments in Kassel, Germany

Due to its proximity to the motorway A 44, the residential area of Kassel-Oberzwehren was exposed to increased traffic noise. Although the corresponding levels did not legally entitle the residents to noise protection measures, the city of Kassel nevertheless wanted to improve the situation. After appropriate consideration, a decision was made to build an embankment that combined noise and sight protection. Owing to a restricted budget, it would have been difficult to implement this voluntary measure. Consequently, the Kassel Environmental and Parks Department specified cost-effective construction with secondary building materials in its tender documents.

Planning stage

The embankment in Kassel Oberzwehren is approximately 650 m long, 16 m high and 40 m wide. Responsible for the specification of the embankment was ASP GmbH, an engineering consultancy with significant expertise in the design of noise barriers.

The embankment was planned for the use of various secondary materials. The regulatory bases were the German provisions of Release 20 of the Regional Working Group on Waste (LAGA M20) and the "Notice concerning construction methods for technical safety measures when using soils and construction materials with environmentally relevant substances in earthworks (M TS E)", published by the Research Society for Highway Engineering and Transportation (FGSV).

The rules of the above regulations define limit values for chemical and material properties, and give details

on the method of construction. In this case, only the core of the embankment consists of secondary building materials covered by accordingly thick layers of clay. This provides a watertight surface. Also, the site is not located in a water protection area, and the distance to the highest groundwater level exceeds 2 m.

Tendering stage

A call for tenders was announced, and a consortium consisting of the companies EUROVIA Teerbau GmbH, BAUREKA Baustoff-Recycling GmbH (a REMEX associated company) and Heinz Schnittger Transporte GmbH was awarded the contract.

The city of Kassel, as the owner of the project, acquired the land on which the embankment was to be built. The raw material for the IBAA used in the embankment originates from the Kassel Energy from Waste plant.

After the thermal process, only incinerator bottom ash (IBA) remains.

This residue is delivered to the BAUREKA processing facility, where it is treated by separating the mineral content from other materials such as metals and organic matter. The result is IBAA that fulfills the requirements for application as secondary aggregate.

As a sensible alternative to landfilling, IBAA can be used in construction – resulting in significant financial and environmental benefits. The city of Kassel uses the embankment as a reliable and safe method of recovery. This pays off in the form of a low-cost noise barrier.

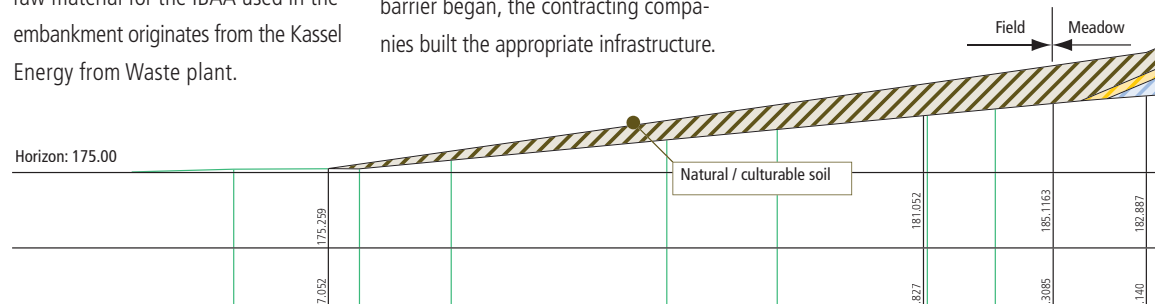
Implementation

Before the construction of the noise barrier began, the contracting companies built the appropriate infrastructure.

This included providing the access roads to the site, an office, the required technical equipment such as a weighbridge to control in- and outgoing material flows, and a truck tire washing facility in order to avoid pollution of the surrounding area.

This infrastructure ensured a controlled construction process and, since quantities of up to 4,000 tonnes per day had to be handled, it also formed the basis of the project's success.

Approximately 800,000 tonnes of soil and 95,000 tonnes of IBAA were delivered for the Kassel-Oberzwehren embankment. For the other embankment in Kassel-Nordshausen, which



is still under construction, nearly 1 million tonnes of soil and rubble and up to 400,000 tonnes of IBAA are being used.

Quality

Despite the official aim to increase the use of secondary construction materials, citizens and local governments often still seem sceptical about the safety of such projects, despite there being clear rules to govern this kind of construction. To address this, in a common effort, all participants developed and agreed on a quality assurance plan, ensuring the continuous monitoring of quality and providing transparency to all stakeholders.

Specifically, the quality protocol comprises:

- an operations diary
- monitoring and reviewing of the exact type, quantity and origin of the incorporated materials
- documenting the locations of the different secondary materials
- regular tests of the material quality

In addition, it was agreed to contract the quality control during construction to an external consultancy. This consultancy is responsible for regular tests of defined chemical, physical and material parameters.

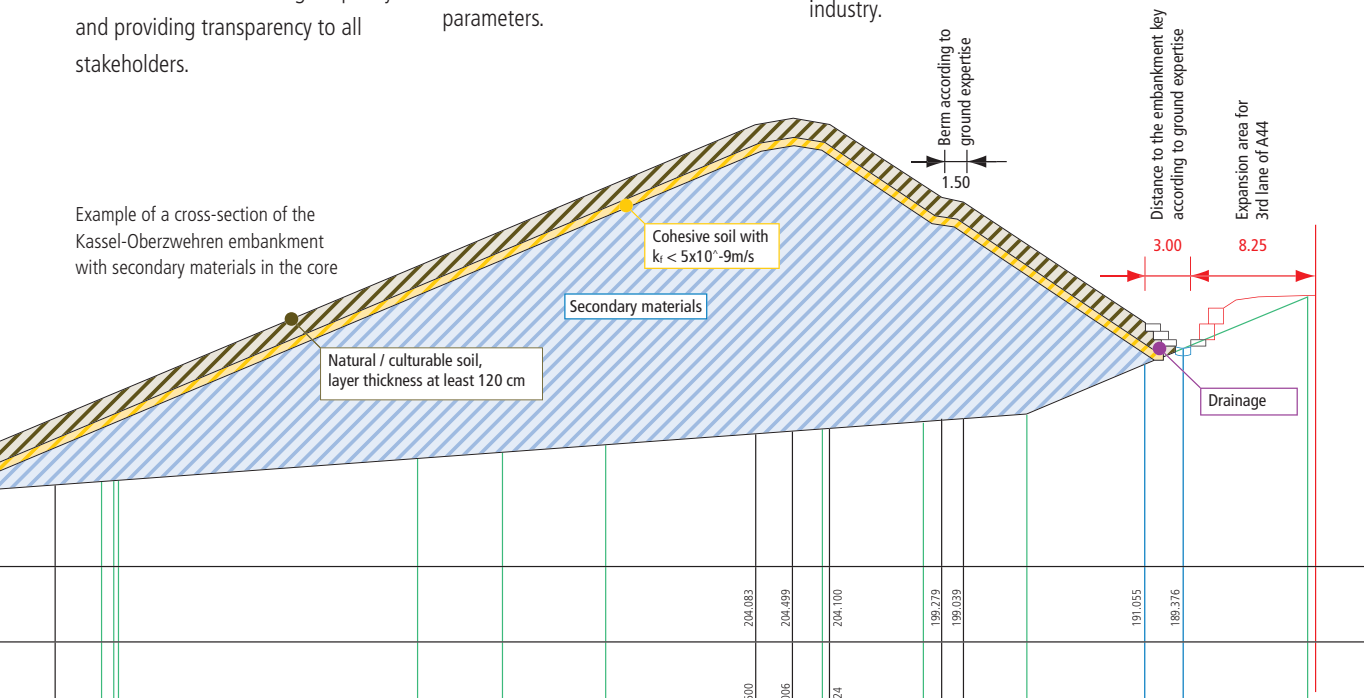
Conclusion

The Kassel-Oberwehren embankment was completed in 2008 after 4 years of construction. Convinced of this technically proven and sustainable method of construction, as well as the economic and environmental benefits, the city of Kassel has decided to build a further embankment at Kassel-Nordshausen. This is scheduled to be completed in 2018. Residents also view the project in a positive light: due to the embankment, the noise situation has already improved noticeably – a successful project for the city and local industry.

The local press reported on progress of the embankment regularly



Example of a cross-section of the Kassel-Oberwehren embankment with secondary materials in the core



An aerial photograph showing a multi-lane highway interchange. In the foreground, a large area of land is under construction, with visible earthworks, sand piles, and some structures. The highway curves through a green, wooded area with residential buildings and a school building visible in the background.

Facts at a glance:

Two embankments along the motorway A 44,
junction Kassel-Wilhelmshöhe

- Owner of the project:
Environmental and Parks Department of the city of
Kassel
- Contractor:
Consortium consisting of:
 - EUROVIA Teerbau GmbH
 - BAUREKA Baustoff-Recycling GmbH,
a REMEX affiliated company
 - Heinz Schnittger Transporte GmbH
- Responsible planning office:
Büro ASP GmbH
- External consultants:
Erd- und Grundbau-Ingenieure Kratzenberg GmbH

Embankment:	Kassel- Oberwehren	Kassel- Nordshausen
Construction period:	4.5 years	approx. 8.0 years
Completion:	2008	expected 2018
Length:	650 m	650 m
Width	40 m	150 m
Height:	16 m	25 m
Replacement materials:	900,000 t (= approx. 450,000 m ³)	1,400,000 t (= approx. 700,000 m ³)

Further references

Noise prevention measures as part of the 3 lane extension of the motorway A 4 near Weisweiler

- Owner of the project: North Rhine-Westphalian State Office for Road Construction (StraßenNRW)
- Construction of a 2 km long noise protection embankment with an additional wall as noise barrier
- Use of IBAA for the core of the embankment
- Delivery of 80,000 tonnes of IBAA 0/32
- Supplier of material: MAV Mineralstoff - Aufbereitung und - Verwertung GmbH, a REMEX affiliated company





REMEX is a waste management company with expertise in mineral waste, demolition and remediation services, stabilisation and backfilling of disused mines, landfill site operation and production of secondary construction material.

The REMEX Group consists of over 60 business locations and around 650 employees. Its network of around 20 construction waste treatment facilities produce approximately 2.3 million tonnes of high quality recycled aggregates, sold under the remexit® brand name. Additionally, REMEX produces around 1.3 million tonnes of quality assured secondary aggregates from waste incineration slag and ash which is marketed under granova®.

REMEX is part of the REMONDIS Group, one of the world's largest recycling, service and water companies.