Statens vegvesen

# Road Project
## E134 Gvammen–Århus

INFORMATION | September 2013

**E134 is the shortest road from Drammen to Haugesund, and it is one of the main roads connecting Eastern and Western Norway. The current E134 between Gvammen in Hjartdal Municipality and Århus in Seljord Municipality is in poor condition, with narrow and winding sections. However, the greatest challenge is the significant gradients in the Nutheimskleivene that, particularly during winter season, significantly reduces heavy vehicle traffic regularity. The speed limit has been reduced in several places due to ribbon development and exit roads, and through traffic represents a traffic safety issue.**


Gvammensletta

## ABOUT THE PROJECT

The E134 Gvammen-Århus project starts in the east, where the new road will join the existing E134 directly northwest of Hjartsjø. Once it has crossed Gvammensletta, the road continues in a long tunnel, and it exits the tunnel at Århus. The linking of the new and old road just south of Lønnestad farm must be designed with a view to minimizing the difference in standards. Today's E134 around Nutheim will be reclassified as county road once the new road is opened, and it will be connected to the new E134 through a channelled T-intersection on each side of the mountain.

## CONTRACTS

### MAIN CONTRACT

The majority of the work concerning this project is related to tunnel construction. The area topography limits the number of natural points of attack to two. Consequently, we are planning to announce the tunnel and road construction as one joint enterprise. The distance between the points of attack along the current Gvammen and Århus line is 22.6 km.

### ENTREPRISE

Electrical engineering / control and monitoring
E134 Gvammen-Århus

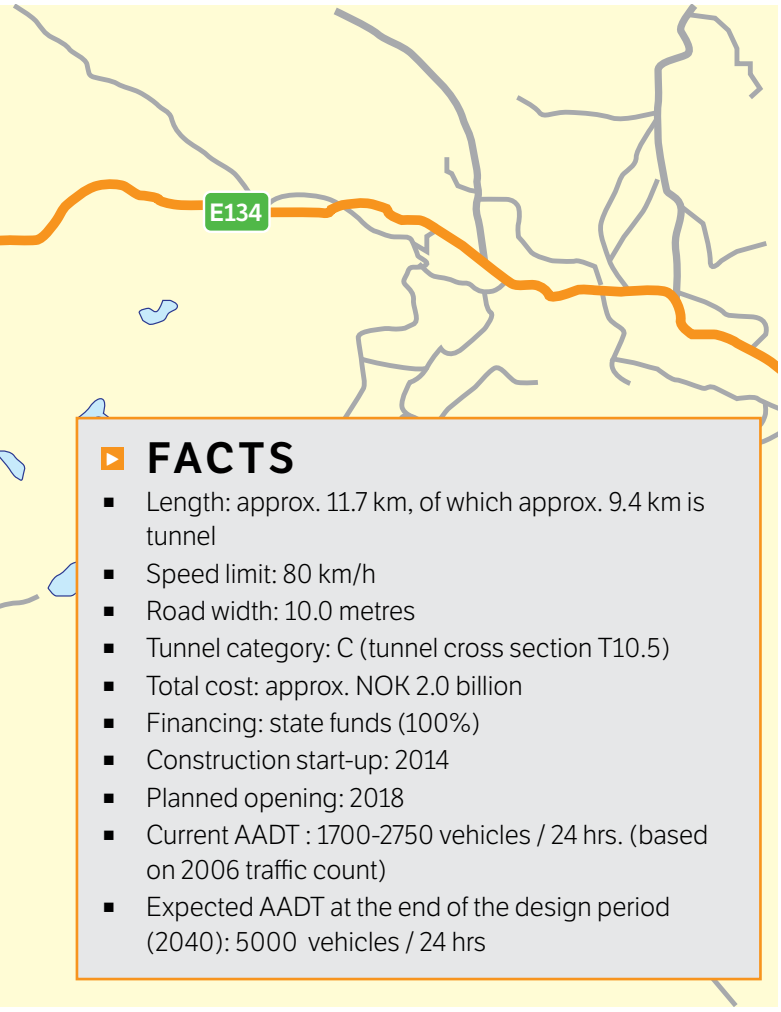
## PROGRESS PLAN

- Construction planning: 2013–2015
- Preparatory works: 2013-2014
- Construction start-up, main contract: summer/autumn 2014
- Opening: 2018


Nutheim


## KEY ELEMENTS

- 9.4 km single tube tunnel with a T10.5 tunnel cross section (theoretical blasting profile 79 m2)
- Mass transport: approx. 1.2 mill pfm tunnel rock, some of which will be used at the construction site. Most of it, however, will have to be transported to the landfills at Moen in Hjartdal (6 km) and Flatin in Seljord (2 km).
- 2.2 km 2-lane main road with a road width of 10.0 metres (road category S4)
- A total of 5.1 km of local road, access road and rural road (new roads and improved roads)
- 3-400-long footpath
- 2 channelled T-intersections
- 7 constructions (2 steel bridges, 3 concrete bridges, 2 tunnel portals). New bridge on the access road to the landfill at Flatin will be constructed in 2013-2014. Additionally, it might be necessary to construct a wooden pedestrian bridge.
- New picnic area, including upgrading the adjacent bathing place
- Two new public transport hubs with adjacent car parks
- Noise reducing measures for six properties
- Construction start-up: 2014
- Planned opening: 2018
- Current AADT: 1700-2750 vehicles/24 hrs. (based on 2006 traffic count)
- Expected AADT at the end of the design period (2040): 5000 vehicles/24 hrs.




## FACTS

- Length: approx. 11.7 km, of which approx. 9.4 km is tunnel
- Speed limit: 80 km/h
- Road width: 10.0 metres
- Tunnel category: C (tunnel cross section T10.5)
- Total cost: approx. NOK 2.0 billion
- Financing: state funds (100%)
- Construction start-up: 2014
- Planned opening: 2018
- Current AADT : 1700-2750 vehicles / 24 hrs. (based on 2006 traffic count)
- Expected AADT at the end of the design period (2040): 5000 vehicles / 24 hrs


Gvammen

## PARTICULAR CHALLENGES AND CONSIDERATIONS

### Geology

The tunnel alignment route mainly runs through quartzite. The thickness of the overburden in the greater part of the tunnel will more than 1000 metres, which results in high rock stress and danger of rock burst.

Prior experiences from nearby power plants indicate aquiferous zones in the area nearest Århus. There is also a certain degree of uncertainty with respect to where some crushed zones cross the tunnel axis and to what extent they are pervasive. Due to the large rock overburden, it is difficult and costly to obtain more detailed information about the conditions of the alignment route before construction works have begun. Geological examinations of tunnel working face are essential in respect of reducing the level of uncertainty during tunnelling.

### Geotechnics

The uncompacted material at Gvammen consists of rich deposits of sand and gravel; somewhat rocky. The upper 1-2 metres consist of fairly poorly graded sand and silt. At 3–18 metres' depth are layers of organic material (peat) and gravel with high contents of organic material (considerable amounts of tree residue). The shallow and the lower groundwater reservoirs are sealed between the organic materials where they are under artesian pressure. Due to the difference in pressure, it is essential that the sealing layer is not punctured!

The abutment areas for the bridges at Gvammen were preloaded during the summer of 2013, and settlement measuring will be used to follow up the areas. The future line will also have to be preloaded for a longer period of time. The Gvammen waterworks is currently located close to the planned alignment route, and it may suffer subsidence damage as a result of the preloading.

Despite proximity to the construction works, future pollution by road traffic is not very likely. However, Hjartdal Municipality is considering whether to construct a new waterworks approx. 100 metres upstream. The uncompacted materials at Århus consist of sand, gravel and rock. No particular problems are anticipated in connection with the construction of the new road, nor with using shallow foundation when constructing the new bridge.

### Cultural heritage

At Århus, the road runs close to an automatically protected site (burial cairns), to which attention must be paid during the execution of the construction works.

### Traffic safety

The construction sites at Gvammen and Århus are, to a great extent, separated from other traffic. Any traffic challenges will therefore mainly be in connection with the large mass transports along E134 (the landfills are 6 km and 2 km from the tunnel and excavation sites). At Flatin, the access road will be improved, including an intersection with E134, during the course of 2013-2014. Before the landfill can be used, a new access road to the landfill will have to be constructed at Moen, including an intersection towards E134.

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Felling of timber to prepare for the tunnel entrance at Gvammen

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