

The Hallandsås railway tunnel project

Josefin Päiviö*
Hans-Georg Wallentinus*

Background information - project and EIA content

Development aim

In the summer of 1991, the Swedish Government assigned the work of constructing a tunnel through the Hallandsås ridge in South-western Sweden to the National Rail Administration (NRA). This project is part of the west-coast rail link between Gothenburg and Malmö, and comprises 14.5 km of new track, of which 8.6 km is tunnelled (double tunnel, with one track in each direction, 25 metres apart). The decision to build a tunnel was preceded by a series of discussions, studies and investigations begun as early as 1975, by Swedish State Railways. In the mid – 1980’s, this process was intensified when a group of senior executives of major European companies, the so called “Round table group” presented a report on “Missing links”, describing a number of specific projects to eliminate bottlenecks in the European transportation system. In addition to discussing a fixed link between the UK and the Continent, the report also examined the relevance of a “Scandinavian Link” to improve transportation capacity between Oslo and Germany. Free movement of goods was not enough - goods also had to move rapidly.

Background

In 1985 The County Administrative Boards of Malmöhus, Kristianstad and Halland initiated an ambitious study of the possibility

* Research Assistant, EIA Centre, Swedish University of Agricultural Sciences, Uppsala.

* Associate professor, lecturer, EIA Centre, Swedish University of Agricultural Sciences, Uppsala.

of building a tunnel through the Hallandsås ridge. The objective of the investigation was clearly influenced by ideas put forward by the “Round table group”; namely that Europe needed an improved infrastructure to be competitive with USA and Japan. The regional and local authorities wanted a modernised railway operating in close proximity to where people lived, which in turn would aid the strengthening of local industry, and help in attracting more tourism to the region concerned. A tunnel through the ridge was considered to be an important component of the “ScanLink” project.¹ The study was based on the assumption that it was actually technically possible to build a tunnel through the ridge, a view that had indeed been forwarded in a prior investigation conducted by Swedish State Railways in 1975.² The aim of the 1985 study was however simply to compare the positive and negative effects of building the tunnel. As such, it was concluded that the positive effects of the tunnel on the environment were of greater impact than the negative ones. Moreover, the tunnel plan, it was suggested, could mean that typical and persistent traffic induced problems such as air-pollution and noise would be reduced, as would the number of wildlife accidents. Areas today used by the current railway could instead be used for other purposes. In addition, it was specifically stated that there were no significant problems relating to water or environmental protection. The study also indicated that construction of the tunnel itself would generate only what were termed “insignificant” environmental effects; an old elm forest would need to be removed. In addition passengers, in order to expedite their journey through the ridge, would miss out on the aesthetic pleasure that only beautiful scenery can provide. The 1985 investigative team went to Swedish State Railways with their plan, however no resources were at that time available to initiate the project.

¹ Järnvägstunnel genom Hallandsåsen. En förstudie. (Länsstyrelserna i Kristianstads, Malmöhus och Hallands län, 1985, sid. 4-6)

² Statement from the Geotechnical department at the National Rail Administration’s main office. After having studied accessible maps and after having scouted the proposed tunnel-site the following judgement was announced “The rock in the ridge Hallandsåsen is of such quality that construction of the proposed tunnel is possible.” (Geotekniskt utlåtande 96/75, sid. 1).

methods prescribed by Government.⁴ For political reasons the NRA's headquarters was located in Borlänge. This was however to be a decision that has had significant implications for the NRA's ability to attract sufficient quantities of personnel of the right calibre. Key personnel within the old organisation decided to remain in Stockholm at the "Eastern Region" headquarters, even though their knowledge and experience could perhaps have been better utilised running the new NRA. The 1988 political decision on traffic (1988 års trafikpolitiska överenskommelse) guaranteed the Swedish Rail Administration (NRA) an annual amount of approximately 6 billion Swedish crowns (SEK). The total amount budgeted was approximately 50 billion SEK over a period of a little more than 10 years.⁵

The NRA decided that a portion of their budget should be earmarked for improving and upgrading the West Coast line between Gothenburg and Malmö, which included the building of a tunnel through the Hallandsås ridge. It could be argued therefore that local groups working for the construction of the tunnel had succeeded in their attempt to draw national attention to the idea. In 1989 the NRA ordered two further investigations. The first, conducted by consultants Plantech, sought simply to document the perceived economic advantages of building a one-way tunnel through the Hallandsås ridge.⁶ The study focused predominately on timesaving, claiming that the negative effects of tunnel-construction were insignificant measured against the time saved by using the tunnel. It was calculated that the economic benefit of the tunnel exceeded its cost. The second investigation initiated by the National Rail Administration was a study of the ridge's geology.⁷ Sydkraft, the company responsible for the investigation itself, were instructed to study if it was technically possible to construct a tunnel through the ridge. The actual direction of the tunnel itself was however already determined, and thus NRA left no room for the investigation of other alternatives in this regard. The study subsequently reported that it was indeed geologically possible to construct a railway tunnel through the ridge.

⁴ Ny kurs i trafikpolitiken, SOU 1996:26

⁵ Hallandsås – questioning absolute presuppositions. Paul Westin. KTH School of Industrial Management. 1998

⁶ VKB Göteborg-Malmö. Delen Skottorp-Vejbyslätt. Tunnel genom Hallandsås. Plantech, 1990-01-08.

⁷ Järnvägstunnel Hallandsås. Sydkraft TBV, augusti 1989, 6.1

with the regulations then governing the construction of railways.

Commencement of the construction of the tunnel through the ridge however would see the groundwater level drop significantly in the construction area. According to the existing Water Act, a permit was needed to be able to undertake measures altering the groundwater level. This in itself is significant, but it was made even more so by the fact that since 1987 the Water Act itself required the inclusion of an EIA in every application for a permit to be granted by the Water-rights Court.⁹

According to the Planning and Building Act, the area affected by the tunnel had to have a planning permit and a building permit from the municipality of Båstad. The NRA was responsible for these applications, though neither required an EIA.

EIA legislation

The EIA process was conducted in accordance with the paragraph in the National Water Act relating to EIAs and to the EIA ordinance itself. Sweden was not a member of the European Community when the project began. Thus the EU directive on EIAs was not applicable. The Swedish legislative position has however changed substantially since the tunnel project was initiated. The Railway Construction Act has been in force since 1996, and it requires an EIA to be included in investigations constituting “the planning process”.

Moreover, with the new Environmental Code being in force since January 1999 we have another significant legislative change that affects the importance of the EIA as a measure aimed at improving environmental standards and conditions. This Code includes a chapter (chapter 6) that deals exclusively with environmental impact assessments. We should therefore be in no doubt over the increased salience of legislation highlighting the use of EIAs in this area. Chapter 6 of the Environmental Code plainly highlights the sectors in which an EIA should be included. Alternatives have to be accounted for, and a non-technical summary has to be included. The ability of the general public to affect the process has also increased. In addition, in the first paragraph of chapter 17 of the Environmental Code, it is stated that construction of a railway longer than 6 kilometres must be approved by the Government. Moreover, in all construction cases an EIA is now mandatory. By analysing the actual course of events it is possible to infer from the Government’s expropriation decision that it

⁹ Prop. 1990/91:90 s 175 f (MKB-prop.).

had examined, and was convinced of, the permissibility of the project in question. In the text of the governmental decision it was established that the tunnel should be constructed in such a way that the impact on groundwater levels would be minimised.

Contents and quality of the EIA documents and the EIA procedure

Table 1. EIAs conducted in the Hallandsås tunnel project

Year	Name	Applicable legislation	Conducted by
1990	Tunnel genom Hallandsåsen: Banutredning huvudtext	The Water Act	VBB Viak
1991	Tunnel genom Hallandsåsen, Banutredning*	The Water Act	VBB Viak
1995	Skottorp – Förslöv, ny järnväg, tunnlar genom Hallandsåsen, mellanpåslag vid Severtorp: Miljökonsekvensbeskrivning	The Water Act	VBB Viak
1997	Banverket, Södra regionen Skottorp – Förslöv, Ny järnväg, tunnlar genom Hallandsås, MKB Södra randzonen: Tidigare lovgivna vattenföretags och det nu sökta företags samlade miljöpåverkan inom södra randzonen	The Water Act	VBB Viak
2000	Projekt Utredning Hallandsås. Miljökonsekvensbeskrivning	The Environmental Code	J&W

*) Deepening of the 1990 EIA

The first EIA document

In April 1990 VBB Viak conducted yet another, though this time more extensive investigation of the Hallandsås ridge for the NRA.¹⁰ As we have seen previously however the provisions of the Water Act made it necessary for the NRA to obtain a permit from the Water-rights Court in order to be able to lower the groundwater level in the ridge. This provision moreover necessitated that an environmental impact

¹⁰ “Tunnel genom Hallandsåsen: Banutredning huvudtext” (Banverket Södra regionen, april 1990)

assessment had to be attached to the application submitted to the court. Notwithstanding this however, Water-rights courts have gained the reputation of favouring exploitation over preservation of the environment, and the quality of EIAs attached to the applications before it has reflected this. The EIA compiled in conjunction with the VBB Viak study thus describes the effects of the proposed project on the environment and on its natural and cultural resources in particular in an objective though essentially superficial way. The necessary operations along the route of the new railway north and south of the tunnel are briefly accounted for, as are its effects on the landscape. Moreover the EIA notes that building a railway of the chosen standard requires that certain technical questions be addressed whilst blandly stating that the visual effects would be most significant at the tunnel-openings. The document also states that as the project in question is a tunnel, the effects on top the ridge itself would be less dramatic and the environmental impact most certainly would decrease in relation to the existing railway. The fact that it was a tunnel, whose environmental effects were perhaps “elliptically” hidden from view was at this stage used as a pro-environmental argument. Such points clearly indicate an inability to discuss and describe complex relations as the ecological, ethical and psychological aspects which are difficult to quantify and thus to describe objectively. In comparison, issues such as measurable noise and vibration effects were carefully described and compared to current acceptable standards. Moreover such points were often supported with substantial calculations, tables and maps.

The Hallandsås ridge is a primary horst formation consisting of fractured granite rock partly converted into clay. It is considerably more aquiferous than most primary rock formations in Sweden, which makes the area on the ridge and the Bjäre peninsula highly suitable for the cultivation of vegetables. Considerable use is made of water resources for irrigation purposes. The fact that the Hallandsås ridge is a problematic rock to excavate was also recognised at this stage. A technical investigation had shown that the rock was fractured, partly converted to clay and very aquiferous requiring the implementation of special construction techniques with extensive supporting actions and

lining of the tunnels.¹¹ The language used in the investigation's final report was predominantly based on the point of view of those in the construction field, as expressions such as "bad rock" and "bad quality" (expressions cited from different sources), were used throughout to describe the ridge. Indeed it is stated that an effective tunnel lining will minimise potential groundwater problems, yet it is never explained precisely how this will be done. Moreover, potential complications relating to such work remain unvoiced. Basic problems such as these are indicative of the lack of attention to detail shown throughout this stage of the Hallandsås project. The poor quality of the Hallandsås ridge rock formation and problems with groundwater leakage are mentioned several times through the numerous investigations. Ultimately however such concerns are usually neglected, or perhaps viewed simply as technical problems, rather than as significant problems of practical concern to the successful completion of the project as a whole. It thus appears that such naive and optimistic attitudes contributed to the inability of those who were responsible to fully appreciate the extent of the technical problems sooner than they did.

The more westerly parts of the ridge were of poorer quality than elsewhere. Nevertheless it was decided that the tunnel would be situated close to the centre of the Båstad village. Local interests were permitted to dictate the precise localisation of the tunnel once the general area had been chosen, although of course they could have little impact on the geological conditions found at the actual site.

So, at this stage two very important choices were made; the NRA decided to:

- Build a tunnel and
- The tunnel was to be built in the western portion of the ridge close to the Båstad village (where the ridge, as has already been stated, was particularly fractured).

The fact that the Hallandsås ridge, including the neighbouring coastal area, is considered to be of national interest and therefore protected by law – in other words that this area is regarded as unique – was never mentioned. The area is also protected against measures, which may harm the natural or historic environment. Interests relating to the countryside and outdoor life must be taken into account when

¹¹ Jan Andersson and Tord Persson, "Tunnel genom Hallandsås", *Väg- och vattenbyggaren* 1991:4, 36-39.

assessing whether any disturbance of the environment is to be permitted. This is a traditional countryside area, with archaeological relics and, in a Swedish context, a considerable measure of biological diversity. In addition, the Hallandsås ridge and its surroundings have for many years benefited from national status as an important tourist site. None of these facts were mentioned in the 1990 investigation. Indeed it was even stated that lining the tunnel walls would deal with the groundwater issue, and that the environmental effect of the tunnel would thus be insignificant.

The results and conclusions of the investigation were circulated to sixteen authorities and 26 responses were submitted. Such individuals generally contributed to the investigation process by imparting their expert knowledge within the field they represented, for instance in defence, agriculture or safety. The authorities however were never asked to question the need for a tunnel in the first place, or to discuss possible alternative traffic solutions. After the results of the initial investigation had been circulated for comment, the EIA process could be said to be nearing completion, with only the need for the NRA to apply for expropriation rights and a permit to lower the groundwater. Therefore the EIA was in some aspects complemented. In spite of this several authorities were still critical to its contents and wanted it improved. The county Administrative Board of Kristianstad and the Swedish Environmental Protection Agency comments on its inadequacy and the Ministry of the Environment wanted a more concrete description of the cultural and environmental impacts of the tunnel before they would make any decision on expropriation rights.¹² The agricultural section at the County Administrative Board of Kristianstad County demanded a measuring program controlling the ground and surface water levels during the construction phase.¹³ Thus this requirement was added to the Government's expropriation rights decision.¹⁴

¹² Miljödepartementet, Enhet 7 Fysisk planering, PM 1992-01-27.

¹³ Länsstyrelsen Kristianstads län, Lantbruksavdelningen

¹⁴ Kommunikationsdepartementet, 1992-03-05, "Regeringsbeslut 1", K91/580/1.



Figure 3. The slope of the Hallandsås ridge towards the north-west. The northern tunnel mouth is situated to the right of the photo. Photo: H-G Wallentinus, January 2000

The second EIA document

A new geotechnical investigation was conducted prior to the forwarding of the application to the Water-rights Court in April 1992. It was again stated that certain sections of the ridge had an extremely high water transport capacity. If no lining work was conducted, this would result in substantial losses of groundwater through the tunnel, thus lowering the ground water level, which would have significant implications for a comparatively large area. A mathematical model was used to prove that lining could reduce the amount of leaking water down to 3.5 l/s per 1000 meters of tunnel. With this in mind, the tunnel lining issue is subsequently described as a technical problem almost solved. It was stated in the 1990 EIA that the yearly precipitation in this area is of such a volume that the yearly excess of surface water would in fact compensate for decreasing groundwater levels. As such, the effects of a lowered groundwater table would not be that dramatic. As insurance, the NRA prescribed a measuring and control program designed to monitor effects on important parameters relating to this issue.

The Water-rights Court gave the NRA a permit to release 3.5 l/s

of groundwater per 1000 meters of tunnel or a maximum of 33 L/s for both tunnels together. The Water-rights Court did however also highlight a number of insufficiencies in the application and pointed out the additional conditions that needed to be met.¹⁵ In particular, they questioned the accuracy and applicability of the mathematical model used to calculate the tunnel's effects on ground and surface water levels, suggesting that further work needed to be done on the lining issue. Furthermore, they also stipulated that the measuring and control program should include a chemical analysis of the water to ensure the water-quality.

In February 1992 the question of whether the NRA would receive a legal permit to build the tunnel finally came to a head. It is however notable in this regard that the Government, as of the spring 1991, had already set aside money for the project and thus it can be assumed had already approved the planned actions. The conclusion that should be drawn from this attempt to unravel the decision-making process surrounding this project is that the environmental implications of the tunnel was never tested prior to the decision to initiate the project. Indeed this was not done until 1992; i.e., the Government investigated the environmental impact of the project *after* the decision to build the tunnel. The extent, to which an interest ever existed in analysing the environmental aspects of the project in an unbiased manner, or in developing alternative solutions that did not include a tunnel, may therefore be questioned.

¹⁵ Växjö Tingsrätt, Vattendomstolen, Deldom 1992-11-24, Dom nr DVA 7071992, Mål nr VA 55/1991.



Figure 4. The northern tunnel mouth. Photo: H-G Wallentinus, January 2000

The technical difficulties of building a tunnel through the ridge were recognised at an early stage in the process. Yet the EIA neither recognised the “groundwater” issue as a significant problem nor did it discuss the possible environmental effects related to the lowering of the groundwater table. It is therefore justifiable to claim that the EIA was used to “rubber-stamp” the project, and that significant problems were either ignored or it was claimed that they had already been technically solved. For example, the mathematical model used to illustrate the effects of groundwater leakage was based on an ideal calculation, and not on realistic estimations. In this context it is important to ask why the tunnel project was permitted to continue despite the lack of proper preliminary investigations.

EIAs had been discussed in a Swedish context since the 1970’s, though the concept was not introduced into the laws regulating use of and construction in water until 1987, and into the laws regulating the use of natural resources until 1991. The NRA thus did no more, or no less, than was then legally required in this regard. The array of political supporters in favour of the project was impressive both locally and nationally, whilst a number of strongly interested parties also supported the project. As was the norm at this time in relation to large infrastructure projects of this type, the Government had decided to initiate the project before the application for expropriation was

submitted, before groundwater lowering and building permits were obtained and a more accurate EIA was undertaken and completed. Issues of time and cost are fundamental aspects of working with infrastructure projects, and these aspects are often in conflict with those connected to the environment. As such, it can be seen that the NRA gave priority to issues relating to time and cost at the expense of the well-tried methods and carefully conducted preliminary studies relating to issues of environmental protection.

This was reflected in the NRA's choice of contractor. In March 1992, they choose a tender submitted by Kraftbyggarna AB. Their approach was to use a method called TBM technology (Tunnel Boring Machine), which promised to tunnel through the rock at a speed of 100 metres per week. Their tender was the least expensive proposal of the ten given; 690 million SEK and it was accepted despite the fact that the NRA had previously been advised not to accept it by a consultant contracted to evaluate the tenders. The consultant considered the TBM method to be at best "experimental," pointing to the fact that Kraftbyggarna AB had no construction work experience in rock of a similar quality. As the consultant anticipated, the large TBM-machine got stuck in the clay after only 17 metres had been dug out, and a more conventional approach to construction through drilling, blasting and excavating had thereafter to be used. After two years of continuous problems, and only a fraction of the tunnel completed, Kraftbyggarna AB decided in 1995 to withdraw from the agreement. This in itself is indicative of how time and cost issues interfered with the decision-making process even after construction had begun. Losing time was akin to losing money, and if it were possible to reduce the time consumed by the construction process, the total cost of the project would be reduced as well. After Kraftbyggarna AB's failure to complete became public, a new request for tender was made, and Skanska was awarded the new contract in January 1996. The contract was worth approximately 900 million SEK. It was based upon conventional tunnel drilling and blasting techniques, with Skanska as the lead contractor. Kraftbyggarna AB had offered to assume greater responsibility for the project as general contractor, however Skanska sought a more traditional role performing the detailed tasks specified by the NRA.

The third EIA document

The next move by the NRA once again clearly illustrates how important aspects of time and cost were to them. Kraftbyggarna AB's failure was viewed as a troubling waste of valuable time (see above).

To speed up the construction process however the NRA planned to open a working tunnel running from the peak of the ridge down to the tunnel level. This would permit operations to be carried out on four tunnel faces simultaneously but it also meant that the local environmental impact of the project increased significantly compared to the original plan. Moreover it completely demolishes their own argument that the tunnel project not would have a significant effect on top of the ridge. This decision should therefore be seen as an important bifurcation point in the process as a whole. The NRA was thus presented with an opportunity to suspend construction for a time to analyse why Kraftbyggarna AB's TBM method had failed. In essence they were given time to reflect upon how the project as a whole should proceed. Instead of "taking stock" of the situation in this manner however they simply continued with the construction process without any particular regard to the environment, more afraid of losing valuable time and money that actually finding the correct and balanced solution to the technical difficulties faced.

The local authorities and landowners on the ridge protested against the planned action from an early stage. In a sharp and unified statement made in August 1994, the municipal council of Båstad confirmed that building the working tunnel was an unacceptable solution to the problem faced. Construction of the working tunnel necessitated significant interference with the environment on the ridge, as well as with the groundwater, and the council made it clear that they would try to stop the project with all the means at their disposal.¹⁶ To continue with their construction plans for a working tunnel, the NRA needed a building permit from the municipal council of Båstad, and a new ruling from the Water-rights Court regarding adjusted groundwater levels.

As with the previous application, an EIA had to be attached. With the media becoming more interested in the project however, and with more attention thus focused on it, the demands on the EIA itself necessarily increased. This is reflected in the content of the new EIA, as it is more ambitious in scope than the previous attempt. Nevertheless, findings were still adjusted to show that the planned actions would not have a significant impact on the environment. Indeed, the document carefully explains how such effects as did occur would be minimised by restorative measures. The planned actions

¹⁶ Båstads kommun, Kommunfullmäktige, "Sammanträdesprotokoll", 1994-08-24.

were to be seen as temporary. It is obvious that this fact was expected to provide justificatory evidence for their continuation and thus to suppress critical voices. This in itself demonstrates a very technical approach to the environment as something that it is possible to create and recreate at will (Florgård, pers. comm.). Negative effects could be neglected as long as it was possible to recreate what had been damaged and to make it appear, after the fact, as if nothing had been done.

The EIA described how it was planned to carefully document the area prior to the construction-phase. During the construction period in-flowing water would be pumped back to save sensitive areas and to prevent a general lowering of groundwater levels. When the construction period was over, the working tunnel would be sealed and roads leading to the construction site removed, measures restoring cultural and environmental values would also be undertaken, and a guarantee was made that after a couple of years no trace of the construction work would be visible.

Such argumentation was used in an attempt to prove that the working tunnel was not contrary to environmental law. As the area would be restored, though not of course to its unique and original “pristine” condition, it was claimed that the working tunnel would be merely a temporary measure. Moreover it was also claimed that in making judgement on the environmental impact of the working tunnel one had to take a long-term perspective. Thus if it could be said that the working tunnel would not cause any long-term damage, it could also be claimed that it could not be contradictory to the long term protection of the local environment. What was meant by use of the word “temporary” in this case, or how the site developers could guarantee that the effects would be of a “temporary” nature were however never explained. Is it possible to recreate an area and yet still claim that it remains pristine? If you view nature in the same way as Skanska and the NRA most obviously do, then the answer to this question is probably yes. They adhere to a strictly technical approach to the environment and to environmental questions, viewing any technical problem as potentially solvable through the use, manipulation and recreation of the products of nature. Consequently they were not favourable to the opinion that in nature is an authenticity that man cannot simply recreate. This is reflected in the emphasis on cosmetic measures described in the EIA document. Reconstructions and other aesthetic solutions revolving around a remoulding of the landscape architecture, as well as using natural materials for noise

reduction among other things are discussed throughout as measures aiming to ameliorate the negative effects of construction on the local environment.¹⁷ These are not unimportant measures though they only address one aspect of the total set of environmental concerns connected to the construction of the working tunnel.

The EIA also dealt with the impact that noise, the discharge of waste material and fumes, and the disposal of excavation debris may have on the surrounding environment. The NRA assured concerned parties that the greatest possible respect would be paid to the natural environment and that the best possible methods of reducing and controlling such discharges and disturbances as did occur would be used. Notwithstanding this however they sought a permit to store material dug out from the tunnel in the area because it was too expensive to remove to another site. The NRA did recognise that this action may have negative consequences for the local environment in the short term, though they claimed that such negative effects would decline over time. Moreover they also rather bizarrely stated that because such storage activities would only be visible from a short distance, that their actual effects would be somehow diminished! It thus appears that for the NRA, environmental degradation occurs only in the eye of the beholder, and that the distance between the viewer and the site itself in some way determines the extent to which such negative effects are perceived as impacts.

¹⁷ “Estetik och miljö allt viktigare inslag på Västkustbanan”, *Banverket bygger Västkustbanan* 1996:9, 2-3.



Figure 5. The working tunnel on the Hallandsås ridge. Photo: H-G Wallentinus, January 2000

As with previous environmental impact assessments, analysis of the ecological effects of the tunnel project were to prove to be insufficient. This can be easily illustrated by reference to the work access tunnel, which lay within an area protected by Swedish law (because of its natural beauty). The access tunnel it became clear, would only affect a relatively small area where no key high value biotopes were to be found, and in this light the NRA stated that the area's biological diversity would not be affected. The fact that emission levels from the extensive number of large vehicles moving to and from the site roughly corresponded to that which was normally discharged from a stretch of highway a few kilometres in length was simply overlooked. Moreover, as no highway had previously traversed the area, the likely impact of such movements of heavy vehicular traffic would be highly significant. Such issues were however simply not discussed in the EIA document. In addition, it was stated that birds and animals initially frightened by the noise and vibrations during blasting would soon get used to such disturbances as they learned that such sounds were not a threat to them, and thus their fear would pass.¹⁸

¹⁸ Banverket, Södra regionen, "Skottorp-Förslöv, ny järnväg, tunnlar genom Hallandsåsen, mellanpåslag vid Severtorp: Miljökonsekvensbeskrivning", 1995-12-15, VKB U31/95, 7.

Recently it has been shown that road traffic might have a very clear negative impact on a number of bird species.¹⁹ Once again the NRA tried to show, through the medium of the EIA document, that the access tunnel would not cause any major negative effects on the environment. Either it did not occur to them, or if it did, they simply ignored the fact that rather than a stage for advocacy, the contents of the EIA document were supposed to reflect a neutral fact-finding process.

As mentioned above, the local authorities were from an early stage very negatively disposed towards the NRA's plan refusing to let them proceed. The NRA became very frustrated with this situation, finally deciding to negotiate a deal where the NRA promised to give the municipality of Båstad 100 million SEK to improve their local roads if they, the NRA, were allowed to continue with the railway construction. The municipality finally accepted the deal and the construction of the access tunnel started in the spring of 1996. The reason that the deal was accepted was that it gave some measure of control over some of the terms of reference regulating construction, to the local authority. If they had simply said no to the deal proposed by the NRA, and the Government had subsequently approved the measures proposed by the NRA, the municipality of Båstad would have lost any ability that it had to influence the process.

The fourth EIA document

The problem of leaking groundwater increased in spite of the promise of effective tunnel lining. This problem was simply exacerbated by construction of the access tunnel, causing several wells on the ridge to dry up. Skanska seemed surprised to discover such unsatisfactory conditions, suggesting rather apologetically that it was very difficult to investigate the conditions at tunnel level. Moreover, the ridge was described as both unstable and unpredictable, with it seems the contractors never knowing what to expect next. Skanska would however be penalised on a weakly basis if construction was not finished on time, and the NRA was thus understandably anxious to solve these problems. Lowering the groundwater level below the tunnel level on a temporary basis was the quickest and cheapest way to solve the problem. To undertake such a course however

¹⁹ Wallentinus, H-G 2000. "Vägars effekter på fågelliv och klövvilt." Samhälls- och landskapsplanering nr 8. Institutionen för landskapsplanering Ultuna. Uppsala 2000.

necessitated a return to the Water-rights Court for a new permit, and this in turn demanded a new EIA. This time however it concerned only the southern mouth of the tunnel.

Altered water levels, precipitated in the main by the drying out of well areas, had the potential to significantly impact on sensitive areas on the southern slope of the ridge and on agriculturally valuable land, as well as on people resident in the area. A control programme should ensure that the negative effects on the environment were as small as possible so that people resident in the area would not be affected. Yet it was not longer possible to claim that groundwater levels would be only marginally affected as wells, wetlands and ponds in the area had already dried up. The upshot of this was that the risk to people could no longer be claimed to be insignificant either.

The EIA also stated that the accidental leakage of chemicals could negatively affect the groundwater on a permanent basis. It was thus very important that such chemical accidents and leakage were not allowed to affect streams and wetlands. It was also suggested that an action plan be drawn up which could be activated should the safety measures fail to the extent that groundwater levels decreased dramatically, re-circulated groundwater was found to be of bad quality, or a leakage of chemicals occurred. What kind of measures was planned, and thus what the action plan actually amounted to, in practice were however only briefly alluded to in the document. Indeed the only concrete measure outlined was that dealing with the pumping of water from the tunnel, for irrigation purposes, should decreased groundwater levels threaten flora and fauna through drought.²⁰

The Water-rights Court was however very sceptical about the granting of a new permit under these circumstances, so they passed the case on to the Government.²¹ Moreover, considerable levels of criticism had been raised by the general public against the granting of a new permit. Indeed, nearly 200 property owners (stakeholders) had officially complained about the potentially reduced water supply. The municipality of Båstad had already expressed their concern when fighting against the construction of the access tunnel. The National Board of Fisheries and the County Administrative Board of the

²⁰ VBB Viak, 1997-03-26, "Banverket, södra regionen Skottorp-Förslöv, Ny järnväg tunnlar genom Hallandsås, MKB Södra randzonen. Tidigare lovgivna vattenföretags och det nu sökta företags samlade miljöpåverkan inom södra randzonen".

²¹ Växjö tingsrätt, Vattendomstolen, "Beslut 1997-06-18", VA 38/96.

Region of Skåne (formed by the former counties of Kristianstad and Malmöhus) also expressed their concern and highlighted a number of corrections that needed to be done before the planned actions could be approved. The NRA thus never received the permit to go through with the planned action on groundwater levels as the Government thought that rising public concern over the negative environmental impact of the project combined with the increasingly complicated geological conditions, made this particular solution too hazardous to pursue both politically and technically.

Applying new methods – Back to square one?

Water leakage however continued to be an important problem, and the NRA was thus still eager to find a way to keep the amount of inflowing water below the allowed limit. With their plan to reduce groundwater levels for the moment blocked up, three alternative paths remained open to them:

1. Lining,
2. a return to the Water-rights Court in the hope of receiving a favourable new judgement allowing higher losses of groundwater or
3. an improved injection method with a more effective injection agent.

Lining is a very expensive measure and the NRA wanted to minimise the use of this method to keep the costs down. Thus in 1997, preparations were made to submit a new application to the Water-rights Court in order for groundwater levels to be reduced. The NRA had considered the existing terms too strict and had in practice never actually adhered to them despite the fact that they had been told to do so. A new decision from the Water-rights Court should not however be considered as a true solution considering the potential environmental impact, but rather as a way of legitimising such impacts as did occur.

The Rail Administration's were sure of getting a new permit. This is reflected in the decision not to go through with lining (that was part of the original permit), as it was too expensive. Discussions concerning the negative effects on the environment were absent in the meetings between the contractor and the NRA until August 1997, when the department of ecology at Lund University was asked to conduct a study. This study was not however finished prior to the

halting of construction later in the year (see below).

A third way of dealing with the water issue was to find a suitable injection agent. The poor quality of the rock made the search for a suitable agent more difficult because it needed to be of low viscosity to penetrate all the fractures. Over 80 different agents, based upon cement, were tested itself causing a rise in pH levels in the water, which in itself can be regarded as an environmental problem *per se*. In January 1997 the use of the chemical grout Rhoca Gil was first discussed, and it was tested on shorter sections during the spring of 1997. The grout had the proper viscose properties; it was flexible and could hold the pressure from the groundwater. Rhoca Gil seemed therefore to be a success, and the NRA started using the grout on a larger scale. During the summer and autumn of 1997 however questions began to emerge over the use of the grout both internally and from external actors.

Stopping tunnel construction

In late September 1997 further problems emerged, as it became increasingly obvious that something was not right at the construction site. The contractor had taken samples of the water following complaints by workers, who claimed that a foul odour could be detected during the injecting process. Measurements in the tunnel showed that the limits for acrylamide and formaldehyde had been exceeded several times over. At this stage it also became known that cows that had drunk seepage water became paralysed and eventually died, and that fish died in a breeding facility in one of the watercourses into which seepage water was released. The immediate reason for stopping construction at this point was thus that the water pumped or seeping out of the tunnel was shown to have a high acrylamide and N-methylacrylamide content.

Acrylamide is a substance which causes serious effects on health whilst N-methylacrylamide, though still potentially damaging, is less toxic. Both substances are to be found in the Rhoca Gil grouting material used to seal the tunnel surfaces. By the time construction ceased, a total of 1400 tonnes of ready-mixed grouting had been used which, it is estimated, corresponded to approximately 140 tonnes of acrylamide and N-methylacrylamide. These toxic substances had been dispersed with the seepage water, but had also penetrated into the groundwater. A total of 29 wells in the area were polluted in this manner.

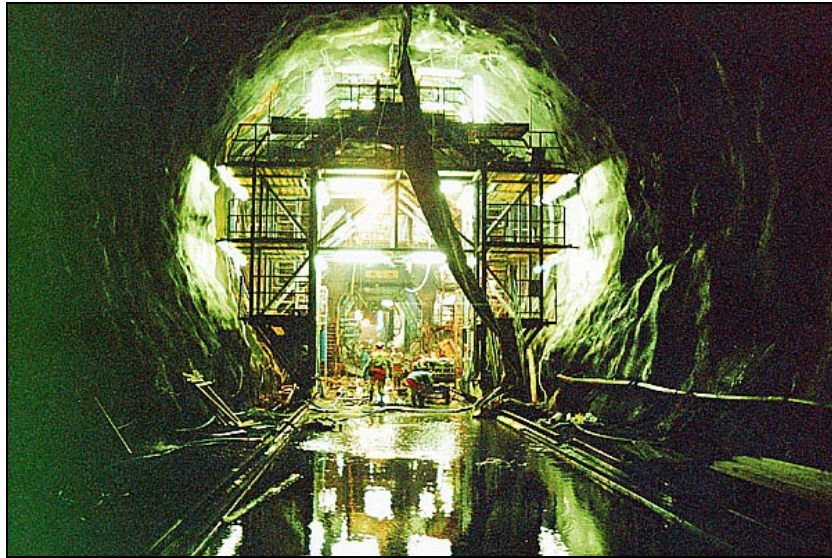


Figure 6. Work going on in the northern part of the tunnel to stop groundwater leakage. Photo: H-G Wallentinus, January 2000

The NRA and its contractor Skanska were under considerable pressure to solve the problem of leaking groundwater and to reverse the financial losses connected to the amount of time lost on the project. Other substances were also tested, though no proper investigation indicating possible negative effects on the environment was ever carried out. By early 1997 the project had reached a critical stage. Promising results from the Rhoca Gil testing however saw optimism return as it became apparent that there was now a distinct possibility that the project could be completed within the agreed time limit.

It is certainly the case however that the NRA did not want to see new problems emerge just as old ones were about to be solved. Local authorities had already expressed concern over the use of the grout, and the instructions from the French company that was manufacturing the product advised users to handle it with care, as it was poisonous. Yet, the product was never properly tested before use, in reference to its negative effects on the environment. The instructions were somewhat difficult to understand, though if they were in doubt, the contractors could and should have consulted an ecotoxicologist specialised in the field for advice. It is fundamentally important that any organisation knows its limitations and is able to

identify where it is lacking in competence, thus not exceeding its authority in a specific field. The information given from the manufacturer and from Skanska/NRA about the grout is full of contradictions but it was nevertheless clear that Rhoca Gil was a poisonous substance, which needed to be handled with care. In addition to killing fish and cattle, a number of people working in the tunnel were intoxicated, though fortunately no one died from exposure to the chemical agents. The simple fact of the matter leading to the intoxication incidents was that Skanska did not take the necessary security measures needed in dealing with such a toxic substance.

The fifth EIA document – the first proper EIA process?

In 1999 the Government gave the NRA the task of investigating whether the tunnel could be finished without incurring significant further environmental damage.²² The results of the investigation were to be submitted by October 1 2000. In this instance, the NRA decided to use an EIA model in accordance with the Environmental Code as the base for their report. However, as the Environmental Code was not an *ex post facto* law, it acted more as a guideline than a rule. It is still unclear to the authors why the NRA undertook to perpetrate such a “fake” EIA, because by law they did not need to adopt this method, indeed a number of other approaches were available to them. In retrospect it is unclear why they did not use the Railway Construction Act, the wording of which is almost identical to that of the Environmental Code. The official reason given is that the NRA sought a set of new working conditions from the Environmental Court (the redesigned Water-rights Court) rather than a discussion of new alternatives in other places. As the wording is the same in both the laws it remains unclear why the Environmental Code was chosen. Perhaps the truth of the matter lies in the fact that the NRA needed “good press” at this time and they calculated that an EIA conducted according to the Environmental Code could give them this.

The Government shall particularly examine the permissibility of the railway project. The 2000 investigation made as a result of a Governmental decree is based upon a consideration of the rules applied in the Environmental Code and also on the ruling of the Environmental Code’s chapter 11 on water operations. In its

²² Actually an EIA had been carried out in 1998 by Ekologigruppen AB, but this was never recognised as an EIA. Instead it is described as an “environmental analysis”.

examination the Government seeks not only to investigate the environmental effects of construction of the tunnel, but also its effect on the groundwater. It is unlikely that the Government will determine how much water will be allowed to leak out of the ridge, though they may prescribe permissibility conditions. Permission to construct a railway is given by the NRA, after having duly consulted the affected County Administrative Board. All other permits are announced through the Environmental Court.

Public participation

The NRA suggested that, in accordance with the Environmental Code the findings of the new EIA process would illustrate their readiness to respond to the demands of irate stakeholders. During the EIA process however it became obvious to the current authors, who followed the process step by step, adopting the stance of a quality assurance team, that the NRA would not be able to rid themselves so easily of their “stakeholder problem”. They remained on the defensive throughout the process, trying manfully to defend their former views whilst giving neutral or even misleading answers to questions put by the public (such as “the EIA will solve all problems” [project leader Miguel Guirao, January 2000]).

According to the Water Act, public participation in the process is restricted to the actual hearing at the Water-rights Court. Legitimate parties to the appeal are strictly limited to those organisations or individuals directly affected (municipalities, land owners or people living in proximity to the project site). In the EIAs undertaken in accordance with the Water Act no public participation at all was necessary. According to the new Environmental Code (as well as the Railway Construction Act), a broader definition of the affected public should be used. The project was considered to have a potentially significant environmental impact, and therefore it was expected that the general public should take an active role in the EIA procedure. The decision as to whether the project would have a significant impact or not is taken by the county administrative board (in this case the County Administrative Board of Skåne). The NRA however suggested that the project could have a significant impact.

So, following the legislation an early consultation was held with “interested” parties including the general public, the municipality, and the county administrative board. This meeting was subsequently held on January 17, 2000. Concerning the issue of EIA work still to be completed, these actors as well as other interested NGOs, were invited

to further participate in the consultation process. During the course of this consultation process a number of extended consultations were held. These meetings should have been used by the EIA consultants as a forum for discussion and questions. The NRA however set the date for this enlarged consultation before a consultant was hired. Thus when it came to the appointed day (March 22, 2000), very little in the way of new information or results was forthcoming. Of course this further contributed to public levels of anger and frustration as it became apparent that only the same level of information as had been released at previous consultations in 1999 and 2000 would be forthcoming (see below). Therefore extra consultation meetings with stakeholders and NGOs had to be scheduled for the end of May 2000. After the completion of the first version of this manuscript, an extra consultation meeting was held in September 2000 possibly as a result of the complaints from NGO:s.

Two of the NGOs involved in this process were the Swedish Society for the Protection of Nature, and the action group “Three villages”. The latter consists of people living on the ridge atop the northern part of the tunnel.²³ As always with such large projects, action groups tend to focus in particular on the items that they are most committed to. In consequence, their information may be considered to be as potentially biased as that of the NRA. This fundamental difference of view is simply illustrated with reference to the Internet sites indicated in footnote 23. “Three villages” sent a letter to the Government arguing that they have not been able to take part in the EIA, or at least, in certain parts of it. Evidently therefore problems remain with the consultation process procedures. In the present authors’ judgement, this is partly due to the inadequate time made available for the completion of the EIA. This in itself was mostly due to a certain sluggishness in the autumn of 1999 over the launching of

²³ Some valuable Internet links:

“Three villages”: <http://www.tunnel.nu>,
Swedish Soc. for Env. Protection: <http://www.bjare.snf.se>,
The municipality: <http://www.bastad.se>,
“The action group against the tunnel”:
<http://home.sverige.net/mot.tunnelbygget/>,
The Rail Administration: <http://www.banverket.se>.

Unfortunately all of this information is available only in Swedish. A short information file in English can however be found at this address:
http://www.banverket.se/project/pdf/hall_eng.pdf.

the EIA process, and to the late delivery of background data that rendered the EIA procedure immobile until it could be integrated. The immediate complaint being that the EIA connected to the construction phase was not discussed in any consultation meeting. (Actually, part of the EIA was printed in mid July 2000, whereas other parts were printed in mid June of that year. As late as August 2000 however, sections of the EIA were still unavailable in the public domain, see footnote 24.) The NGO also noted that a new workplace on the ridge was introduced in the context of the EIA, and that this had been done without previous consultation.

Parallel to these enlarged consultations, the NRA continued with their regular information evenings on the project, whilst the MGG (the Environmental Monitoring Team, established after the Rhoca Gil debacle in 1997) also held information evenings on their activities. It was however extremely difficult for the public to differentiate between these three types of meetings. The result of this being that the general public did not really know where or when to put the right questions.

In conclusion it can be stated that the NRA continues to have significant problems with the notion of including the public in the planning process. Even if the will exists to act in an open and fair manner, old habits appear to die hard. Indeed it seems that “the public” are still viewed almost as a hindrance to the project, rather than as an asset to the process as a whole. Perhaps the reason for this is that the NRA still retains remnants of its former military like organisational structure, with its avowedly “top down” management ethos. It is clear therefore that the move towards modern management practices such as accountability and transparency, the overseeing of large numbers of public consultations, and the opening up of company decision-making to outside assessment has not been easy for the NRA.

Preparation of the EIA document and connected background documents

The EIA document was prepared by the consulting company J&W.²⁴ A background document on the impact on agriculture, forestry and

²⁴ Projekt utredning Hallandsås. Miljökonsekvensbeskrivning. Arbetsmaterial 2000-06-14, Projekt utredning Hallandsås. Miljökonsekvensbeskrivning. Kompletterande arbetsmaterial 2000-07-15, and Projekt utredning Hallandsås. Miljökonsekvensbeskrivning. [final document] Banverket och J&W Energi och miljö.

“natural” vegetation was prepared by the Swedish University of Agricultural Sciences, Uppsala.²⁵

As already indicated, the timeframe for production of the EIA was very short. Indeed, it is the authors’ opinion that the time given was insufficient for what was required. It should be noted however that this is not an unusual situation, or in any way particular to the EIA procedure under scrutiny here. Perhaps the most obvious result of the paucity of time for preparation was that the draft report was incomplete on publication in July. This fact alone seemed to negate the whole purpose of the public consultation process, as without the requisite information they were unable to make a rational and informed decision as to the merits, or otherwise of the case. The reason for the short preparation period, and for the lack of certain information in the draft publication was that the consultant charged with conducting simulations of the ground water table changes did not get the correct information on what to do and when to do it from the NRA. The consultant proceeded to calibrate the method (the Mike She method) only to bored wells, not dug wells. The results gained however had the effect of making the impact calculated too large in some areas with low hydrological conductivity in the soils (for example areas rich in clay) (Olofsson, pers. comm.). The late delivery of information therefore delayed preparation of the background document and thus also the EIA itself.

The EIA document is supposed to be neutral, that is to say it is an aid to planning rather than a policy-making device. The Environmental Bill clearly states that the proponent (the individual or organisation who intends to undertake the activity) should pay for the EIA. This is however often seen as a weak point in the EIA process, as it could potentially open up the process to unwanted bias. Critics of this state of affairs naturally focus on the fact that the consultant is dependent on future commissions, and thus may feel the need to take on the role of project promoter, rather than neutral investigator. In an optimal EIA process therefore, the proponent should not be allowed to intervene. The NRA did not follow this principle in full. Two examples of such questionable intervention in the preparation of the EIA are illustrated below.

²⁵ Florgård, C., Linnér, H., Olsson, M., Olsson, S., Persson, G. & Wiklander, G. 2000. Grundvattensänkning på Hallandsås. Effekter på natur, jordbruk och skogsbruk. Samhälls- och landskapsplanering nr 9, Institutionen för landskapsplanering Ultuna, SLU

In preparing the draft EIA document, two different methods of calculating possible ground water sinking were used. The first was the “Mike She” method described above; the second, the RV method, is based on measurements taken in dug wells in the area and in another part of the same ridge. Results from the RV method were taken out of the draft EIA document. The reason for this is said to have been that the MGG (see above), that had recommended use of the other method, was at that time putting the RV method in question. As the calibration of the Mike She method was done only on bored wells, it thus gave different results from those obtained by use of the RV method. This difference was significant enough to justify, in the current authors’ opinion, the public presentation of results from both methods, but the NRA didn't want a discussion during the period when the EIA was out for consideration (Staflin pers. comm.). However, the results of the RV method were re-inserted in the final EIA document. The question remains what impact the fact that part of the material was not presented in the draft EIA had on the comments from the parties concerned.

During the preparation of the final document on the project’s impact on agricultural land, forests and natural vegetation, the investigators were asked by the NRA if their findings were “set in stone”. This could be understood by NRA now exploring the possibility of trying to get them to tone down some of the conclusions. As a consultant on the EIA, the senior author of the present paper has often met with this attitude from proponents, namely, that the document should suitably reflect their interests. The SLU study used the material handed over by the NRA (Florgård, pers.comm.). This meant that the study was predominantly based on the Mike She model described above. The model overemphasised the risk of a considerable decrease of the ground water table in some areas and therefore the SLU conclusions indicated more a pronounced impact in some areas than would have been the case if the RV method had been used instead. This bias is taken into account in the final EIA document which makes an overall assessment of the SLU and other material on the impact of the railway tunnel (Berglund, pers.comm.).

If the EIA process is to be looked upon as one in which all significant impacts are described and catalogued in an adequate fashion then it is fair to say that current realities fall way below such expectations. As such, the need for a strong review body to correct this situation is evident. The reviewing role currently lies with the county administrative boards, though they are often short of time and

money, and thus often unable to do a thorough review of all EIAs submitted. The Government should therefore be more attentive to this fact, when allocating money to these county administrative boards.



Figure 7. One of the most vulnerable ecosystems on the ridge, the alder wood. Most of the negative impact on valuable vegetation sites would occur in this ecosystem. Photo: H-G Wallentinus, "Slottet", April 2000

The situation today

A draft EIA was sent out for consideration in the summer of 2000. The question this time was not whether to finish the tunnel or not, but to review the EIA document as such to see if it could be acceptable as a basis for a decision by the Government. The answers should have been submitted to NRA in September 2000, with the final EIA being presented to the Government on October 1, 2000. This has however not done until November 2000.²⁶

²⁶ The Government has 2001-03-09 still not taken any decision on whether to continue the tunnel project or not.

Discussion: The role of EIA in the railroad planning process

If the EIA process as it developed in the Hallandsås ridge case is compared with comparable EIA processes in similar infrastructure projects at that time, there appears to be little variance in quality between them. What is done in this context is done to fulfil the formal legal niceties needed to commence work on the project. In this project, as in other contemporary infrastructure projects, the Government had approved the planned action *before* the permit to build was granted by the local authorities, and before proper environmental investigations, like the EIA, could be conducted. This is a good case in point of a “real” decision preceding a “formal” one. The unusual order of such decisions themselves may have contributed to the difficulty in apportioning blame and to the intensification of demands on all sides. Moreover, it should also be stressed that the NRA have played a number of different roles during the evolution of the project as a whole.

- They took part in the lobbying campaign that called for a tunnel.
- They were the authority ordering the project.
- They applied for permits.
- They were responsible for the EIA process and economic investigations.
- They conducted investigations relating to groundwater levels and environmental effects.
- Finally they assisted the entrepreneur in the construction work, consequently taking on the role of developer as well.

Therefore they can be said to have been wearing a large number of different hats, which might have been a problem when trying to keep neutrality in its capacity as a state agency.

With government support for the project secured, the NRA could pose as an independent authority, whilst at the same time, advocating for the project and assisting with expert knowledge in tunnel building. These “interests” invested in such relationships and roles can however be seen to have severely compromised the ability of the NRA to oversee an impartial and open study of the tunnel project’s environmental effects.

The NRA held a key position in the Hallandsås ridge Project, a project which was supported by a strong network of interested parties

(including experts, NRA offices, decision makers etc on different levels) with a similar view of the project and of problems related to the project. With this level of backing those involved in the construction of the tunnel had a clear view of what was expected of them. The combination of this measure of backing, and the high level of expectations it precipitated, left the contractor little alternative but the hard bargaining approach to negotiations that was adopted. It is striking how little the views of the affected people such as the local protestors and environmental organisations were actually reflected in the investigation materials, such as the EIA, or other documents. It was often difficult for critics to argue against the expert opinion and the wider economic “interests” connected to the project. This was so, principally because the EIA procedure lacked transparency and was difficult to understand for non-experts. The upshot of this was that protests articulated outside the boundaries of the process were, more often than not, simply neglected.

In the light of such criticisms it is easy to see why the Swedish EIA process, in the context of the legislative framework pertaining at the time of the project’s inception, has been criticised.²⁷ Many essential concepts were poorly defined and the procedural routes were not properly formalised, giving space for a wide range of interpretations. In addition it fairly quickly became apparent that “the environment” as a concept was in fact negotiable rather than absolute. There were few possibilities to influence either the decision making process or the written material used in it. Moreover, no legal requirement existed making advertising on the plans compulsory before decision. If one was not intimately affected by the project, few possibilities existed to influence and control the decisions made, or to demand that the EIA document should be completed. It is impossible to formally prove that the NRA did anything improper connected to the EIA process. Yet, it can be shown that the EIA process was used to “rubber-stamp” the tunnel project decision and in the name of environmental awareness make it possible to increase the environmental influences instead of being a tool to minimise the environmental influence.

A characteristic common to all of the EIA documents discussed in this paper is that they were overly optimistic, and that they often

²⁷ Ulf Kjellerup, “MKB-proceduren- offentlighet och aktörer”, *Trafik och miljö: Forskare skriver om kunskapsläge och forskningsbehov*, ed. Hans E. B. Andersson (Lund, 1997), 374-386.

underplayed the possibility of negative effects. Perspectives, which adopted an argumentative or critical approach, were thus lacking. Instead, throughout the process as a whole the focus remained squarely upon technical calculations of noise and vibration, and on the discussion of cosmetic measures to disguise negative environmental effects. This was done in spite of the knowledge that the rock was very difficult to assess having complex geological conditions, which made it difficult to predict effects on the groundwater and on the ecology. Moreover, no profound risk assessment was ever undertaken, nor was the problem concerning what would happen if these complex relations were disturbed sufficiently discussed. In the EIA documents the focus was always pitched at the level of the “ideal case,” more often than not with no alternative solutions outlined should such initial calculations prove overly optimistic. Where an alternative was introduced it was always dispatched as unrealistic, expensive or time-consuming. Control programs were established to guarantee quick solutions if anything went wrong, but these programs must be seen to have had little or no effectiveness. In consequence, when the constructors came up against a complex problem that had not been envisaged from the outset, solutions had to be found in an “ad hoc” fashion, through trial and error.

The oblique balance of power inherent in the EIA proceedings resulted several times in the NRA getting their demands approved for an increase in environmental impact levels. However, it is important to bear in mind that in an EIA process different stakeholders have different roles. It is unavoidable that the stakeholder applying for a permit to go ahead with a project will attempt to prove that the measures will not have any significant negative effects. Moreover, for an equal process to exist, it is necessary that different stakeholders represent different interests. Lacking distinct and powerful stakeholders however those opposed to the Hallandsås were always fighting an uphill struggle against the well supported “vested interests” that backed the tunnel constructors. The municipality of Båstad, and the local organisations opposed to the tunnel were too weak, too isolated and too divided amongst themselves to be able to significantly affect the development. In most documents it was only the tunnel constructor’s perspectives and interests that were presented or discussed. The process could basically be characterised as a long drawn out monologue conducted by various experts and authorities within the project organisation, and within the decisive and controlling authorities. Those building the tunnel, and the authorities controlling

it, used a similar “world-view” to describe the problems they faced.

Success or failure

The question whether the study on which the track report and the associated environmental impact assessment was based was sufficiently comprehensive is now a legitimate matter for discussion. In any case, the conclusions drawn may be questioned. The decision by the Water-rights Court indicates a considerable margin of error – a factor of five to ten times – as regards the conclusions drawn from the possible impact of the tunnel on groundwater levels. It has been suggested that this could simply have been a writing error (perhaps it should have been 0,5 - 1,0), though there is no evidence to suggest that this is the case. However, the reason that groundwater levels dropped more than anticipated was that the technology employed was inappropriate for construction operations in this type of rock. Until Rhoca Gil was introduced, efforts were made to seal the tunnel surfaces with concrete, though this technique proved ineffective. The use of new boring equipment, untried in rocks of the type found in the Hallandsås, also proved to be unsuccessful. These various failures cannot however be blamed primarily on inadequate control and management of the project. Broadly speaking, supervisory operations functioned in an acceptable manner, based on the available resources and possibilities, though they failed to prevent the incident related to the inappropriate use of Rhoca Gil.

What would have made a difference?

The Government considered the permissibility of the project, for example from an environmental perspective, in accordance with current legislation and within the framework of the expropriation issue. However, the Government had already approved the project in a previous decision taken nine months earlier. The extent to which they thus had an interest in analysing the environmental aspects of the project in an unprejudicial manner, or in developing alternative solutions may therefore be questioned. The environmental impact assessment to which the Government had access was inadequate. Throughout the document fundamental problems were often described as mere challenges, which would, by their very nature, be tackled successfully.

The NRA used the EIA studies to legitimise the project, rather than to minimise its negative environmental impact. Throughout the

long-drawn out process no alternatives to the initial proposal for a rail tunnel were ever indicated.

The need therefore emerges to counterbalance the dominant role of the applicant when determining the scope and contents of an environmental impact assessment. The Environmental Code (valid as of 1999) gives the County Administrative Boards an important role in this process. It is likely that the Swedish Government will continue to take “political” decisions on major infrastructure projects – that is to say decisions arrived at without proper scientific investigation as a basis for decision. Therefore the manner in which the requirements for an environmental impact assessment are determined becomes a crucial issue. An environmental impact assessment must contain adequate and relevant alternatives. This is essential if the potential problems are to be impartially analysed and the priorities between the environment and other interests clearly established. A committee assigned by the Government²⁸ to investigate the tunnel-project proposes that the most environmentally friendly alternative should always be considered, at least in the case of operations and measures, which may be expected to have a significant environmental impact.²⁹ The dominant stakeholders among the applicants need to be counterbalanced by an impartial review and/or by strengthening the position of other stakeholders in the process.

The Environmental Code undoubtedly gives the general public a better opportunity to influence the investigation process. In addition, it extends the “interested parties” concept, and gives environmental organisations an opportunity to present their case. This will hopefully, in the future, secure the quality of the environmental impact assessments by adjusting the balance of power between those affected by the planned action.

The actions of the supervising authorities also need to be considered. There may be some scope for criticism, but on the whole the supervisory process was conducted more or less as may be expected in view of the opportunities and resources at its disposal. The conclusion to be drawn here however is that, given their current level

²⁸ Through a decision October 20 1997 the Government authorised the director general of the Swedish Environmental Protection Agency to call in a commission owing to what had happened as a consequence of the tunnel construction through the Hallandsås (dir 1997:124).

²⁹ SOU 1998:137, Miljö i grund och botten- erfarenheter från Hallandsåsen. Slutrapport från Tunnelkommissionen

of resources, and the current regulatory structure, supervisory activities have little opportunity to prevent serious environmental damage of the type that occurred on the Hallandsås ridge project, particularly in regard to the discharge of toxic substances. The authorities must be able to take action more rapidly and more effectively. The circumstances surrounding this particular incident were however unusual given that the County Administrative Board and the Municipality itself were responsible for ensuring that a project led by a central governmental authority, and commissioned by the Government, was implemented in accordance with the relevant legislation and with the proper permits. The county administrative board was responsible for monitoring the water aspects of the project, and a control programme for water seepage was implemented. Losses were measured on a continuous basis, and certain tests were carried out to determine the chemical composition of the water.



Figure 8. Many of the sensitive ecosystems are found in depressions. However, if water is lost to the ground, it will be replaced with water from the sides, as far as there is any water there. In spite of this a background document to the EIA prepared by the SLU indicates that roughly 10% of the valuable ecosystems will be significantly affected by the lowered groundwater. Photo: H-G Wallentinus, April 2000

The NRA's organisational structure is based on the principle of

the delegation of responsibility and authority to the lowest possible level in the organisation. It is however not clear how the problems occurring at the site were reported back up the chain of command to the highest levels of the organisation. Faced with an increasingly difficult situation as problems mounted, pressure grew on those who were immediately responsible, but given the lack of corporate focus, a number of important actors within the organisation appeared unable or unwilling to take the initiative, waiting instead for someone else to solve the problems. The studies conducted by the NRA were used proactively to justify the project, rather than as a neutral basis for decision. The NRA failed to take advice from the consultant over the question of the wisdom of trying to drill a tunnel through the ridge. On other occasions, the NRA failed to obtain all of the relevant information it needed. The attempt to drill a tunnel resulted in substantial delay and considerably higher costs, and the NRA's accounting system was not compatible with the needs of the project, which probably made it difficult to monitor project costs. The failures encountered in the project must therefore primarily be regarded as the result of deficiencies in management and control. Furthermore, in its efforts to maintain progress on the tunnel, the NRA neglected its responsibilities as a governmental authority serving the interests of the general public as a whole.

Legislative framework

The Railway Construction Act entered into force in 1996. The act refers to the EIA ordinance. Under the act, the NRA determines plans for rail facilities, including its own plans. This means that the NRA acts as its own supervisory authority. This has not changed with the introduction of the Environmental Code and certain amendments to the act. Once the Government has determined the permissibility of a major rail project, the NRA decides on the scope of the permit and the conditions, which are to be applied. Under the Environmental Code, the Government is to determine the permissibility of a number of specified major projects that are considered to have a significant impact on the environment. Permits for projects under the Environmental Code are granted by the Environmental Court. Where railways, roads, certain navigational channels, etc. are concerned, the EIA must be reviewed and approved by the county administrative board before planning is allowed to continue. None of the EIAs in the Hallandsås ridge case have been examined in accordance with either the Railway Construction Act, or the Environmental Code, as neither

of them was in force during the development of the project. The Government will decide whether to continue with the tunnel project. The most recent EIA is done in accordance with the Environmental Code even though the NRA does not need a new permit. When the last two EIAs were undertaken in 1995 and 1997, Sweden was already an EU member and consequently these EIAs should have been carried out in accordance with the relevant EU directive. Moreover, when the fourth EIA was conducted in 1997, the Swedish Railway Construction Act was already in force. These circumstances were neglected however, and as no one appealed, nothing was done about them.

Is the tunnel a “special case”?

As mentioned above, in the case of the Hallandsås ridge the first EIA documents are comparable with EIA processes of similar infrastructure projects at that time. The actions taken were designed to fulfil the lawful and formal demands required getting the project up and running. In this project, as in other contemporary infrastructure projects, the Government had approved of the planned action prior to the permit to build being made available by the local authorities, and before proper environmental investigations could take place. This order of decision may have contributed to the difficulty of apportioning blame, and to the intensification of demands on all sides.

Conclusions: Lessons learned

The most important lesson to be learned from this project is the fact that even a complete and well conducted EIA would not have helped to prevent the environmental damage that occurred because the findings of the EIA documents were themselves neglected during the decision making stage throughout the entire process. Evidence pointing to the likely effects of the tunnel construction on groundwater levels were presented in the EIAs, yet no one, either on site, or at senior management level seemed willing to and/or able to fully comprehend the meaning of this evidence. This resulted in the fact that problems on site were either solved on an “ad hoc” basis, or simply went unresolved until they cast such a shadow over the project that construction ceased. The permissible volume of groundwater allowed to leak from the tunnel, according to the Water-rights Court’s ruling, was exceeded throughout the whole construction phase, with little or no serious attempt being made to prevent it. When a controlling authority found that a requirement was not fulfilled during

the construction and instructed the NRA to do something to reduce the leakage, rather than attending to the problem, they appealed against the decision. During the decision-making process the NRA's own instructions were neglected. Indeed, the instructions regulating the use of chemicals were neglected, with disastrous result. If they had followed their own guidelines, Rhoca Gil would probably not have been approved for use.

These practical changes in method and approach came after the initial EIA documents had been completed. The EIA therefore quickly became obsolete. As there were (and still are) no legal requirements for the imposition of a supplementary EIA to take place should it prove necessary to change technique or equipment in the middle of the construction process, incidents such as that which occurred over the use of Rhoca Gil could, of course, not have been foreseen by the original EIA. This is a general dilemma in development and construction projects. The only insurance against mistakes such as occurred with Rhoca Gil is that an EIA monitoring team follows the project closely and has the right to stop further activities if they so desire, until a supplementary EIA is finalised and reviewed. In some cases concerning the project in question here changes may have been agreed where it was obvious that no adverse influence on the environment was to be expected. The monitoring team must comprise of experts in the planned fields of activities and on the environment. One drawback to this approach may be that the most qualified experts are probably to be found in competing companies and may therefore be deemed "hostile" by the contractors. If necessary therefore, such experts should be taken from the ranks of independent bodies or from international consultants not active in Sweden.

In the Hallandsås tunnel case, a monitoring team was appointed as the project began to go wrong (MGG, "the environmental monitoring team"). It should be noted however that it was the NRA who appointed this team, and it is legitimate to question whether this was acceptable, as the neutrality of the group could easily be put in question. Who then should choose the monitoring team? In the Swedish context no good answer to this has emerged, because unlike the Netherlands for example Sweden does not have a state body (EIA commission) to administer EIA questions. Instead we might use the State agency responsible for the Environmental Code – the Environmental Protection Agency, the State agency responsible for building and planning, – the National Housing Board or, in applicable cases the county administrative boards.

The political consensus favouring the project authorised every measure in turn (until the Rhoca Gil incident in 1997) outweighing at a stroke the actual facts of the case presented by the scientists. This is similar to the decision order in all major infrastructure projects initiated in the early 1990s. More often than not, the negative effects on the environment highlighted by the scientific community were simply ignored, because the project was deemed important for other reasons, above and beyond any environmental concerns. Large infrastructure projects create jobs and improve other conditions related to a progressive society, all of which are important political questions. It is difficult to weigh the importance of environmental concerns against those related to a growing economy, as they are often in conflict. It is clear however that the focus among those participating in the decision-making process is evidently not on issues related to the environment. According to the laws regulating the necessary permits needed in the Hallandsås tunnel case, the only requirement was to make an environmental impact assessment in accordance with the Water Act. With the new Environmental Code and the Railway Construction Act now in force, demand for EIAs has increased considerably. It is therefore essential in future that all necessary permits needed by a project have been preceded by an EIA, and that an independent monitoring team follows large projects, and those of special interest to the general public, thus increasing the importance of the EIA as a tool for quality assurance in the decision-making process.