

GEOS consulting

ZAKŁAD OCHRONY ŚRODOWISKA, 01-960 Warszawa, ul. Przy Agorze 16/17

*Adres do korespondencji: 03-289 Warszawa, ul. Ruskowy Bród 28, NIP 118 03 74 807; Regon 013136838
tel. (022) 7470029; tel.kom. 0501 082473; e-mail: geos.consulting@neostrada.pl*

Report on the environmental impact of the redevelopment and new development (modernisation) of the E 65 Warsaw–Gdynia railway line within the boundaries of Pomorskie voivodship.

Stage of the issue of a decision on environmental conditioning

NON-TECHNICAL SUMMARY

Client:

**PKP Polskie Linie Kolejowe S.A.
03-734 Warszawa, ul. Targowa 74**

Author team:

**Jacek Kaftan
Waldemar Madej**

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Report on the environmental impact of the redevelopment and new development (modernisation) of the E 65 Warsaw–Gdynia railway line within the boundaries of Pomorskie voivodship. Stage of the issue of a decision on environmental conditioning (2006)

NON-TECHNICAL SUMMARY

1. FORMAL AND LEGAL ASPECTS

The formal/legal basis underpinning the study was the commission extended by the Polish railway operator *PKP Polskie Linie Kolejowe S.A.* to the Warsaw-based firm *GEOS Consulting Zakład Ochrony Środowiska*, in respect of the compilation of a **Report on the environmental impact of the redevelopment and new development (modernisation) of the E 65 Warsaw–Gdynia railway line within the boundaries of Pomorskie voivodship**, which is to say along the stretch between km 236.900 and 328.120, in regard to the stage at which a decision on environmental conditioning is issued.

The work was based on the 2004 "Feasibility Study for the modernisation of the Warsaw-Działdowo-Gdynia stretch of the E65 rail line (*Studium wykonalności modernizacji linii kolejowej E65 na odcinku Warszawa – Działdowo – Gdynia*) - as drawn up by a team from Parsons Brinckerhoff Ltd., as well as the application regarding the determination of the location of a development in the public interest (*Wniosek o ustalenie lokalizacji inwestycji celu publicznego*) – as prepared by the *Torkon* consulting and implementation firm of Gdynia, and the environmental impact report for the redevelopment and new development (modernisation) of the E65 (*Raport o oddziaływaniu na środowisko przebudowy i rozbudowy (modernizacji) linii kolejowej E 65 Warszawa – Gdynia, na obszarze województwa pomorskiego*) – as prepared in February 2005 by the firm *GEOS consulting*; along with legal decisions and statutory provisions, materials obtained from the employer, site investigations and the authors' own data.

2. OBJECTIVE AND SCOPE OF THE STUDY, ADOPTED VARIANT

July 28th 2005 brought the entry into force of the Act of May 18th 2005 *amending the Environmental Protection Law Act and certain other Acts* (*Dziennik Ustaw Official Journal of Laws*, No. 113, item 954). The Act provides further regulation of proceedings in respect of environmental impact assessment (by virtue of Section VI thereof), necessitating a renewed launching of the procedure whereby environmental impact reports are drawn up.

By virtue of Art. 46, para. 1, point 1 of the *Environmental Protection Law Act* of April 27th 2001 (consolidated text: *Dz. U.* of 2006, No. 129, item 902), "the implementation of a planned undertaking capable of exerting a significant impact on the environment is only permissible on receipt of a Decision on environmental conditioning agreeing to the said undertaking's development, hereinafter referred to as the *Decision on Environmental Conditioning*". Such a Decision is issued prior to the obtainment of the Building Permit

Decision (issued under the *Building Law Act* of July 7th 1994, consolidated text: *Dz. U.* of 2006, No. 156, item 1118).

In accordance with § 2 para. 1, point 27 of the Regulation of the Council of Ministers of November 9th 2004 *determining the types of undertaking capable of exerting a significant impact on the environment and on the detailed conditions associated with an undertaking's qualifying for the drawing up of an environmental impact report* (*Dz. U.* No. 257, item 2573 with subsequent amendments), the planned modernisation of the railway line has been qualified as an undertaking capable of exerting a significant environmental impact, for which the requirement that an environmental impact report be compiled does therefore apply.

The objective in drawing up the environmental impact report has been to determine the environmental and spatial consequences of the undertaking of work to modernise the line, at the stages of the implementation of the development work and the later operation of the said line, as well as the presentation of the planned undertaking's environmental impact as regards what is set out in detail in Art. 52, para. 1 of the *Environmental Protection Law Act*.

The main aim of the development itself is to adjust the E 65 line to parameters laid down in the European Agreements on Main International Railway Lines (AGC), and on Important International Combined Transport Lines and Related Installations (AGTC). The justification for the modernisation of the line results first and foremost from the need to reduce journey times, to improve the quality of the service the line has to offer and to improve the state of the natural environment along the line and parallel National Road No. 7.

It was in the *Feasibility Study... (2004)* and the *Environmental Impact Report... (2005)* – drawn up at the stage location indications were being applied for – that the different options for the modernisation of the line (including as regards the use of different types of rolling stock) were first detailed and compared (see Table 2.1).

Table 2.1 Options for the modernisation of the E 65 Warsaw-Gdynia line

Option 0	Rehabilitation of the existing infrastructure and its adaptation to current and future needs as regards the magnitude of the operational functions in the context of carriage forecasts
Option 1	Modernisation and adaptation of the infrastructure to V=160 km/h for passenger trains and V=120 km/h for goods trains, as well as a loading of 225 kN/axis, in the context of forecasts as regards carriage and the future operational needs, assuming that traffic will involve classical passenger trains
Option 2	Modernisation of infrastructure as in option 1, with account taken of optimal solutions and scope regarding the modernisation of infrastructure for speed Vmax of up to 200 km/h, assuming the running along the route of tilting passenger trains at this speed

These options were also analysed from the point of view of their influence on the environment. Ultimately, Option 2 was adopted as the leading one when it came to any further considerations. The choice was dictated, not only by reference to environmental justifications, but also in relation to economic indicators and the national transport policy. For this reason, references in the report to the choice of variant for the undertaking should be taken as concerning either Option 0 or Option 2.

3. MATERIALS USED IN THE STUDY

The study has made reference to the instruments of Polish and EU law in force, as these set standards for areas directly or indirectly connected with the protection of their environment (a

detailed list of these being included in the 2006 *Raport o oddziaływaniu na środowisko...* (Environmental Impact Report). In addition, the work has made use of studies, documents, instructions in place in given economic sectors and so on (be these published or unpublished sources), as well as a large number of topographical and subject-related maps (first and foremost of a geological, hydrogeological and hydrographic nature), and the results of monitoring, mainly as regards water and air quality.

Emerging as particularly valuable was the information obtained in the course of the public consultations organised for April 2005 by the *Stowarzyszenie Sympatyków Komunikacji Szynowej* ("Rail Transport Supporters' Association"), as well as the *Stowarzyszenie Rozwoju Warszawy* ("Warsaw Development Association"), along with PKP Polskie Linie Kolejowe S.A. Further useful data were supplied through questionnaires sent out to selected Forest Districts and hunters' circles, *inter alia* as regards the distribution of important refuges for wildlife, the courses of local migration and dispersal routes for animals, the blackspots as regards collisions involving animals and changes in animal populations in areas close to the line.

4. A CHARACTERISATION OF THE UNDERTAKING THAT IS THE SUBJECT OF THE OPINION

The Warsaw–Gdynia line, as a first section in the E 65 international rail link running from Gdynia, via Warsaw and Vienna to Rijeka, is covered by the aforesaid AGC and AGTC agreements. The primary objective of both of these is to establish a cohesive and effective system for carriage by rail plus combined transport, in the countries of Central and Eastern Europe, as well as between these countries and the remainder of the European states.

The E 65 line was made subject to electrification in line with the following schedule: up to 1969, the Tczew – Gdańsk section, in 1972 the Warsaw – Nasielsk section, and in the years 1983–1985 the Nasielsk – Tczew section. Coinciding with the work on electrification was a renovation of the track surface, rail-traffic control installations and some of the platforms. Parts of the points on main tracks were in turn exchanged between 1995 and 1998.

While the Warsaw–Gdynia line formally has a 120 km/h speed-limit in place, numerous curbs on this have been introduced in practice, these reflecting the geometry of the route as well as the state of the surface. The 2005/06 timetable shows that the inter-city train takes between 234 and 247 minutes to cover the Warszawa Wschodnia – Gdańsk Główny section. The planned modernisation will see this train journey time cut to 163 minutes for the traditional stock, and to 133 minutes in the case of tilting trains.

The assumed technical parameters of the E 65 line within the limits of Pomorskie voivodship (once the modernisation work has been carried out) are as set out in Table 4.1.

Table 4.1 Planned technical parameters of the line within the limits of Pomorskie voivodship

Parameter	Figure
Maximum speed of traditional trains (km/h)	160
Maximum speed of tilting trains (km/h)	200
Maximum speed of goods trains (km/h)	120
Maximum axial thrust (kN)	225

Output of electric locomotives (MW)	6
Pantograph voltage (V)	2800
Length of station track (m)	750
Clearance gauge	UIC B

The adaptation of the line to the above parameters requires that built elements of railway infrastructure be redesigned, work in particular being done to correct the geometry of the route; to reconstruct the track-bed and track surface, the traction network and supply system, the installations controlling rail traffic the existing items of engineering infrastructure, buildings associated with transport and platforms; and to build flyovers, tunnels, bypass roads, traction substations, transmission lines and fibre-optic lines, as well as environment protection installations.

Table 4.2 presents the scope of the work foreseen for execution within Pomorskie voivodship.

Table 4.2 Approximate scope of work planned within the limits of Pomorskie voivodship

Redesign of stations	No.	15
Closure of stations	No.	1
Redesign of halts	No.	11
Dismantling of track surface	km	255.850
Construction of track surface	km	225.190
Construction of flyovers	No.	11
Construction of local crossings	No.	3
Building of pedestrian crossings	No.	10
Construction of traction substations and supply lines	No.	3
Redevelopment of section isolators as traction substations	No.	2
Redesign of crossings	No.	11
Construction of bypass roads	km	1.2
Redesign of traction network	tkm	235
Redevelopment of station traffic-control installations	stations	15
Redevelopment of linear rail traffic control installations	km	289.5
Redevelopment of non-traction lines (LPN)	km	117.24
Construction for ERTMS/ETCS	km	117.24
Construction of a diagnostic system for rolling stock	km	117.24
Construction of reserve Synchronous Digital Hierarchy (SDH) cable	km	117.24

5. A CHARACTERISATION OF THE NATURAL ENVIRONMENT

The part of the E 65 line running through Pomorskie voivodship in turn passes through the 5 poviats (county-level administrative units) of Kwidzyn, Sztum, Malbork, Tczew and Pruszcz Gdański, as well as the three cities enjoying poviat rights of Gdańsk, Sopot and Gdynia. From the geographical point of view the line lies within the large (sub-provincial-level) physico-geographical units of the Southern Baltic Lakelands and Southern Baltic Coastlands. Identified within these are the three lower-rank (mesoregion-level) units of the Hława Lakeland, Vistula Delta and Kaszuby Coast, each differing in relief and other environmental conditioning.

From the geological/structural point of view, the E 65 passes through a unit named descriptively as the Mesozoic cover of north-eastern Poland. With a nearly-full stratigraphic profile ending with Upper Cretaceous sediments, this structure is covered in a series of

Cainozoic (Tertiary and Quaternary) sediments. The former are formed from a sandy-alluvial series from the Oligocene, a sandy-alluvial-clayey formation from the Miocene, and a clayey-sandy series from the Pliocene. The Quaternary sediments (mainly sands, boulder clays and occasionally the alluvia left behind from ice-dam lakes) comprise formations from the Pleistocene - i.e. the sediments from the third and fourth glaciations in succession and the interglacial periods between them, as well as those from the Holocene.

The section of rail line under study passes through 2 of Poland's hydrogeological regions, i.e. the third (Mazury) Region, in which the utilised aquifers are located in Quaternary and Tertiary sediments (locally absent), as well as the fourth (Gdańsk) Region, in which the aquifer is in Quaternary and Cretaceous sediments, locally also Tertiary ones.

The Tertiary aquifer of the third (Mazury) Region is associated with Oligocene, Miocene and Pliocene sands characterised by the presence of a distinct discontinuity. The Quaternary aquifer is characterised by its marked diversity as regards the presence, extent and numbers of horizons involved. Designated here is Main Aquifer (GZWP) No. 210 of the so-called Iława Inter-morainic Reservoir (at km 207.4-245.6 along the route), this being characterised by good-quality water and a moderate or low level of threat posed from the surface.

In turn, the Cretaceous aquifer of the fourth (Gdańsk) Region is associated first and foremost with a series of sands and secondarily also marls and calcareous rocks of the so-called Gdańsk Trough. The resources of the aquifer are sufficient for it to have been identified as Main Aquifer (GZWP) 111 – of the Gdańsk Sub-Trough (at km 311.0-350.0 along the route). The waters there are of both very good quality and a low level of endangerment.

Also of major significance in the Gdańsk area is the Quaternary aquifer whose very varied associated relief and sediment genesis (within the Vistula Delta, on post-glacial plateaus and in the Kaszuby Proglacial Channel) in turn ensure very variable conditions as regards the presence of groundwater. The two Main Aquifers designated here are GZWP 112 of the Gdańsk Delta Area (a markedly threatened aquifer wherein the major intakes are in Gdańsk and Sopot), as well as GZWP 110 of the Kaszuby Proglacial Channel (in which the numerous intakes comprise ones of a municipal, industrial and public nature, alongside the private wells of individual users).

The area covered by the study is within the first-order drainage basins of the Vistula and the two coastal rivers, the Motława and Radunia. The area close to the E 65 line includes, not only the river systems, but also numerous fish ponds, drainage ditches, canals, clay pits, etc. Specific hydrological conditions shaped anthropogenically over several centuries now apply in the Vistula Delta region known as *Żuławy Wiślane*. Furthermore, in discussing water relations, mention must be made of the highly-important peatlands, marshes and wet meadows all forming source areas for rivers.

From the point of view of Poland's division into agricultural/climatic districts, the Pomeranian section of the E 65 rail line is in the Bydgoszcz District and the Gdańsk (2nd) District. The former is transitional between the cool and rather wet Pomeranian District and the warmer and dry Central District. In turn, the Gdańsk District – which takes in the Gdańsk coastal area – has Poland's most limited amplitudes for temperature year-round. Snow cover persists for just 50-60 days here, while the relatively low rainfall amounts on average to 600 mm a year. The growing season lasts 200-210 days. The influence of strong winds blowing off the sea makes itself particularly felt here.

The line under study generally runs across soils of two groups: pseudopodsolic fawn-coloured soils, brown soils and podsolic soils – associated with the sandy-clayey sediments of morainic plateaus and plains (in lakeland areas), and the peaty, peaty-muck, alluvial and muck-mineral soils present in wet valleys and depressions. The most precious soils of the latter type are those that have developed in the Vistula Delta area.

The largest forest complex – cut across by the line in the area between Susz and Prabuty – is that of the Iławskie (Iława) Forests, in which the habitats are dominated by mixed/broadleaved and mixed fresh/broadleaved forest communities (*LM* and *Lśw* respectively). There are also mixed/coniferous forests (*BM*), as well as alder or alder-ash forest in wetland or marshy areas. Along the Prabuty-Gdynia section of line, no more significant forest complexes are passed through. Only between Kamienny Potok and Orłowo in Gdynia is the line approached closely by the so-called *Oliwa Woods* forming part of the forest within the Trojmieski (Tri-City) Landscape Park. Forest habitats here boast rich oak-beech and pine-beech stands.

The area dealt with by the report has a rich fauna representing both the forests and the field-forest boundary habitats in Central and Northern Poland. Alongside commoner carnivore species like fox, badger and pine marten, there are also the more noteworthy beaver and otter (inhabiting clean bodies of surface water), as well as the wolves moving into the area from time to time from the lakelands further afield. Game animals in turn include roe deer and wild boar, as well as the less-abundant red deer.

While avoiding the areas subject to the most rigorous conservation measures, the Pomeranian section of the E 65 line does several times pass through Areas of Protected Landscape (of the River Liwa, Lake Dzierzgoń and Central Żuławy), as well as a single *Natura 2000* protected area – of the Lower Vistula Valley (PLB140003). The line also passes close to (within a kilometre of) the Lake Liwieniec Nature Reserve in Prabuty, the Zające Wzgórze NR in Sopot and the Kepa Redłowska NR in Gdynia, not to mention the aforesaid Trójmiejski Landscape Park and a further *Natura 2000* area – of the Bay of Puck (PLB220005).

6. LAND-USE STRUCTURE ALONG THE E 65 LINE

Most land adjacent to the section of the E 65 running through Pomorskie voivodship is classed as agricultural. The level of forest cover is actually rather low, at around 12.8% on average. These facts reflect the presence here of good soils that have been under cultivation for centuries, as well as the rather high level of urbanisation (in the Gdańsk agglomeration in particular).

Since the E 65 line has long been in operation, and since changes in the political map of Poland have even occurred since its establishment, the spatial structure in agriculture can be considered to have adapted to the transport system in existence, such that there is now no major problem with the line dividing functional or operational units.

7. THE E 65 LINE IN LOCAL PLANS

The E 65 Warsaw–Gdynia line in part finds reflection in the local physical development plans of towns, cities and local authority areas (gminas) through which it passes. The rail route in question is identified therein as an area designated for rail transport, with boundary lines designated.

The available local plans contain no information of any significance as regards the modernisation or redevelopment of the line of interest here. By virtue of the *Act of March 27th 2003 on planning and physical development (Dz. U. No. 80, item 717)*, most of these – having been enacted prior to January 1st 1995 – went out of force on January 1st 2004.

8. THE INFLUENCE OF THE E 65 LINE ON UNERGROUND WATERS

The protection of underground water should first and foremost encompass water intakes and their protective zones, main aquifers (GZWP) as well as utilised aquifers (UPW), where these lack natural insulation in the form of layers of limited permeability.

On the basis of an analysis of the locations and means of utilisation of GZWPs, UPWs and water intakes, it has been possible to identify sections of the route along which the threat posed to groundwater is high. These are between km 252.0 and km 256.5; between km 280.0 and km 286.5; between km 316.5 and km 326.0; between km 330.0 and km 341.0 and between km 344.0 and km 350.0). Waters beneath the ground along these sections will require particularly effective safeguarding against the pollutants arising in connection with the line's modernisation and operation.

The influence of work carried out at the stage of the modernisation of the line will vary in relation to local hydrogeological conditions prevalent along the route. Works carried out may give rise to indirect and direct changes, as well as to short- and long-term actions in relation to the nature of these works and their impacts.

At the stage of modernisation, the potential influence on the groundwater environment will mainly link with the anticipated redevelopment of line geometry, as adjusted to anticipated travel speeds of 200 km/h. With a view to impacts along the particularly sensitive stretches (protective zones around intakes and GZWPs) being minimised, reinforcement of embankment or line drains with elements of concrete ("Kraków Channels", etc.) or other materials (geomats, etc.) is indicated.

The influence of the E 65 line on the groundwater environment at the operational stage should be limited, providing that proper safeguards against pollutant infiltration have previously been applied. Efforts are particularly called for in intake areas, as well as source areas for rivers, etc. Where these lack sufficient natural insulation.

A separate group of threats is posed by more major accidents and emergencies theoretically capable or arising along the route through chance happenings. Information obtained from the *Zakład Linii Kolejowych* in Gdańsk shows that the last few years have brought no serious accidents or emergencies (within the meaning of the *Environmental Protection Law Act*) along the line being reported on here.

Should the plan for the line's modernisation be departed from, water relations in adjacent areas should not be changed initially. However, the ongoing decapitalisation of infrastructure is certain to ensure a gradual increase in the threat the railway poses to the aquatic environment.

9. INFLUENCE OF THE E 65 LINE ON SURFACE WATERS

The degree of impact the line exerts as it is being modernised and then operated is *inter alia* dependent on the sensitivity of the aquatic environment to pollution and changes in hydrological conditions. In the vicinity of the E 65, the areas of particular sensitivity within Pomorskie voivodship include the wetlands, marshes and fens, as well as the watercourses, in the River Liwa Valley, around Lake Dzierzgoń and the Prabuty Marshes, and in the areas around Lake Dąbrówka in Dąbrówka Malborska, the Juranda Canal in Jurkowice, the ponds and stagnant lakes around the Malbork Kałdowo railway station, the *Małe Żuławy* area between Malbork and Lisewo and the Gdańsk part of the Vistula Delta area between Tczew and Gdańsk-Orunia.

Notwithstanding its running through areas with a dense hydrographic network that includes sensitive areas, the E 65 rail route is largely lacking in any regulated drainage and dewatering system. Only along short sections of track-bed are there any embankment drains lined with prefabricated concrete as the so-called "Kraków Channels". In general, precipitation and drainage waters discharge into surface waters and the ground without pre-treatment of any kind.

The modernisation of the line may disturb water relations and lead to a deterioration in surface-water quality in the immediate areas through which it passes. These changes could at times take on the character of permanent transformations, thanks to the redevelopment of track-bed drainage systems, excavation work, the introduction of piling as viaducts, bridges, culverts, etc, are built or remodelled, and so on. To minimise any impact, building works associated with the redevelopment of the drainage system should be preceded by site management as appropriate, along with a safeguarding of the aquatic environment in the line's immediate vicinity.

The system by which the track-bed is drained ensures rapid transfer of surface runoff and groundwaters away from the line area. The drainage channels will discharge to watercourses (receiving waters) greater amounts of water than was the case before the development work was carried out. As a result, the points of discharge from the ditches into watercourses or other bodies of water may suffer erosion. Furthermore, inappropriate culvert cross-sectional areas beneath the line may favour obstructions to flow.

Surface waters may be polluted by the operating of the line as rainwater or snowmelt runs off from the line, as well as flyovers and station areas. Then there are the problems of sewage from railway carriages passing directly into the groundwater environment. As well as spillages of hazardous substances following a rail accident or disaster.

Any failure to take further action as regards water and wastewater management will denote acceptance of the previous wastewater management conditions, as well as the technical state of long-exploited and in places damaged or even destroyed elements of sewerage. The said poor technical condition of installations and poor operating conditions thereof can only deteriorate further, ensuring an ever-greater potential threat to the aquatic environment.

The preliminary proposal is thus for two groups of installations to be applied in protecting surface waters from pollution: settling tanks, weirs and sluices (with separators in individual cases) and other installations in buildings determined precisely in building designs (valves, wells with siphoned outflow, etc.).

10. THE INFLUENCE OF THE E 65 LINE ON THE LAND SURFACE: SOILS, THE LANDSCAPE, PLANT COVER, ANIMALS AND PROTECTED AREAS

The planned undertaking is to go ahead within the scope of existing rail infrastructure, and only to a very limited extent on land adjacent to the subgrade and railway buildings whose occupation for the needs of development and operational activity is foreseen. With works employing the technologies now available, and with unutilised belts of land in the vicinity of both the line subgrade and railway buildings, development works on a line entailing the modernisation of hitherto-existing and long-used infrastructure are among the undertakings exerting only a very limited impact on nature and utilised resources of the land surface.

The land-surface (including soil-related) impact of the development at the building stage is very much linked to the technology applied to the substratum as works are carried out to built or develop buildings and installations. In turn, at the operating stage, the impacts mainly entail particulate emissions involving the metallic products of friction and corrosion in the subgrade, as well as emissions from buildings and installations functionally associated with the servicing of rail traffic.

A particular impact on soils and other land-surface or underground components of the environment in and around the development would involve more serious industrial accidents or emergencies posing an extraordinary threat beyond the normal scope of development and operating activity. This is the subject of risk analysis as regards different forms of degrading impact, which forms a part of further stages to the development of documentation on the planned undertaking.

Of major importance in limiting the unfavourable impacts of the E 65's modernisation and operation on the land-surface are: the limitation to the minimum of the amount of new land occupied (including temporarily by site installations and plant), the minimisation of the length of time works take, the rational management of wastes at both the line redevelopment and operational stages, the use of appropriate drainage measures and safeguards against erosion, and site restoration measures running in parallel with the works carried out and involving any land impacted upon by the activity engaged in as infrastructure is built and installations maintained.

Notwithstanding the need to remodel line curves along stretches several kilometres in length, the modernisation of the E 65 still imposes a much more limited burden on the landscape than would the *de novo* construction of such a route. Noteworthy in this particular case is the harmony existing between the managed land of the rail route, the buildings (stations, water-towers, signal boxes, gatemens' cottages and stores), and an environment enriched by multi-species planted greenery.

The presence of an electrified rail line across the landscape is signalled by the above-ground traction system. However, this is only of greater significance in plain areas of flat land, or in places where the line runs on high embankments. In these cases a certain landscape dissonance is to be noted, and such a situation does apply above all in the Vistula Delta area.

Since the line in question was first driven through forest complexes in the 1870s, it would be hard now to speak of the fragmentation and isolation of biotopes. Nor will the issue arise to any greater extent as modernisation work is carried out. Only minimal new areas of forest will need to be cut to make way for the corrected line geometry, since this will entail shifts in the track of several metres only. Within the boundaries of Pomorskie voivodship, forests are

passed through by around 1.3 km of the line, or just 1.1% of the total (117 km) length under study.

As the habitats prevailing are those of coniferous forest – which prevail along the E 65 as far as Mława, as well as broadleaved forest in the lakeland area – above all in the Ilawa and Susz areas, there are implications regarding the fire threat, especially in larger and more uniform (especially single-species) complexes of coniferous trees, and most especially since these are widely penetrated by people (with the line often tending to facilitate access). Information received from the regional branch of PKP PLK S.A. in Gdańsk shows that the E 65 does not at present represent a source of more significant conflict from this point of view.

The course of the E 65 line within the field can not at present be considered a more major obstacle to movements by animals. The amount of traffic on the line is at present rather limited, and the speed low enough to confine losses among animal populations. A certain obstacle for game animals might be posed by the sections of line running on high embankments, or in deep cuttings, but these account for only a very small percentage of the section of the route running through Pomorskie voivodship.

However, the Option whose implementation is recommended – assuming target travel speeds for passenger trains of 200 km/h – will pose a major threat to animals living close by, and engaging in seasonal migrations. Thus, to limit any unfavourable impact of the line on migration, it is proposed that preventative measures be applied, in the shape of acoustic and reflective scarers installed along selection sections of the line.

Within the limits of Pomorskie voivodship, in the Prabuty area, the E 65 crosses the Liwa Ecological Corridor – a “branch” of the main E-W migration route for animals across Europe, known as the Northern Corridor. Indicated to limit losses of life among animals here are acoustic scarers along 2.0 km of line, as well as around half a kilometre of fencing in the vicinity of the crossing for animals (close to the border with Warmińsko-Mazurskie voivodship).

Together with the application of the above means and measures, it is also proposed that existing bridges and culverts be adapted to serve as underpass-corridors for animals. Bridge objects should have at least one “dry passage” and be sufficiently enticing to large animals. Culverts should have a dry pavement (above the level of the water), allowing small animals to pass through at any time of the year. Within Pomorskie voivodship, it is proposed that 8 bridges and 9 culverts along the E 65 should be adapted in this way.

In planning the modernisation work along the E 65 line, there is a need to minimise the potential negative influence of the route on protected areas. Within Pomorskie voivodship, the line basically “avoids” areas subject to the most rigorous protection, but nevertheless passes several times through Areas of Protected Landscape, as well as one *Natura 2000* area. The line also runs in the vicinity of (less than 1 km from) three Nature Reserves, one Landscape Park, and a further *Natura 2000* area.

On account of the distances and locations of Nature Reserves and a Landscape Park in relation to the E 65, as well as the nature and intensity of impacts anticipated for the planned undertaking, there is no risk any more major influence being exerted on the subjects of protection in these protected areas (these being forest plant communities first and foremost).

The influence of the planned modernisation work on *Natura 2000* protected areas has been the subject of detailed analysis in a separate *Aneks do raportu oddziaływania na środowisko*

modernizacji linii kolejowej E65 Warszawa – Gdynia in aspekcie oddziaływania na obszary Natura 2000. Measures to minimise negative impacts are proposed there, in each case in which the possibility of a more major influence on the subjects of protection in the given *Natura 2000* area proved identifiable.

The cited work took account of the impact of the planned undertaking, not only on single areas, but also on the cohesion and functioning of the whole *Natura 2000* network, including most especially the migration routes for larger animals linking these areas together. Used with this aim in mind was the study entitled *Projekt korytarzy ekologicznych łączących Europejską Sieć Natura 2000 w Polsce* ("A design for ecological corridors linking together the European *Natura 2000* network in Poland").

It needs to be stressed that the planned line modernisation, entailing *i.a.* reorganised water and wastewater management (the preliminary treatment of precipitation waters and runoff from the track-bed, the limitation of noise emissions and vibrations (through the construction of acoustic screening and application of anti-vibration mats, as well as the adjustment of the subgrade), reduced mortality among animals (through the installation of special deterrent scarers, the modernisation of the designated culverts to serve as passageways) and the reduced probability of serious accidents taking place (through the improvement of traffic control systems plus automation), will lead to the maintenance - and even the improvement - of natural conditions within both the protected areas, and the other land, through which the line runs.

11. THE INFLUENCE OF THE E 65 LINE ON AIR QUALITY

In the case of the E 65 line we are dealing with a line that is electrified along its entire length. Traction capable of producing fumes only takes place in station areas (as locomotives manoeuvre), or else involves service trains and draisines. However, more vehicles and machines producing fumes will be involved to a greater extent as the modernisation work is being carried out. Pollution from railway land is detailed in balances drawn up for air pollution due to transport nationally. The figures make it clear just how small the percentage due to rail transport is, when set against the burden imposed on the air by motor vehicles.

The line in question can largely be considered in relation to three main types of pollution: diffuse emissions associated with secondary particulate pollution from the track and adjacent land, low point-source emissions connected with the seasonal heating of buildings, and participation in the overall emissions from the power supply industry (since railways are major customers for electricity suppliers).

It can be concluded from the source documents constituted by reports on the state of the environment in the voivodship that, within the boundary lines surrounding PKP railway property, there are no cases of permissible concentrations of pollutants in the air being exceeded. Model calculations for the spread of pollutants in the case of the identified section of the E 65 at the level of Pruszcz Gdański likewise do not anticipate exceedance of standards for air quality at the stage of the modernisation and redevelopment of the rail subgrade beyond the limits of the rail area.

Likewise, an analysis of the influence of the Pomorskie voivodship section of the line on air quality suggests that this influence is a minor one. Indeed, the planned modernisation work (including the redesign of selected buildings closely associated with the line and its

operations) will combine with the changeover from coal-fired to electric or oil heating to further limit emissions from low-level sources.

12. WASTE MANAGEMENT

At the stage of the modernisation of the line, wastes will be generated in connection with site preparation, the closure or redevelopment of existing buildings and installations and construction of those that are planned, the management of green space, and the operation – prior to subsequent removal – of site facilities and machinery. In turn, the operations stage will see wastes generated as objects and installations are maintained, and as land in the belt to be developed is managed.

As sites are being prepared and the planned works conducted, the wastes generated in the largest amounts in terms of mass and volume will be those from the construction, renovation or dismantling of built objects and infrastructure, including wastes qualifying as materials for secondary use. Leaving aside hazardous wastes, the wastes produced in largest amounts will be aggregates and masses of earth, metal wastes and concrete wastes. Wastes capable of being classified as hazardous will in turn comprise old wooden sleepers containing preservative chemicals, as well as aggregates, masses of earth and other wastes contaminated with or otherwise containing hazardous substances.

If there is an efficient system of waste management at the implementation work stage (including as regards the equipment and fixtures on site and the machines used) which meets legal requirements for waste management in force, and if there is point-of-generation removal of wastes for reutilisation, then the impact of waste management on the different line sections being worked on will be nothing more than a transient one (being entirely connected with the time for which work along the given section or building is actually being carried out).

Direct impacts of wastes on the environment relate in particular to their dumping on the land surface, the amount of land taken by wastes in and around the development, or their disorganised management and harmful impact should hazardous or environmentally-harmful substances be liberated from them and then transferred elsewhere.

In the course of work associated with the modernisation, it will be necessary to collect and segregate all hazardous wastes in an environmentally-safe manner, in line with their properties and treatment options. Such wastes, including materials that have become contaminated or contain harmful substances, should be handed over consecutively to firms authorised to treat them, in amounts suitable for their organised transport, while certain types may also be gathered for the permissible amount of time before being taken away.

If the right operational and organisational solutions are applied, along with waste management and H&S principles as well as procedures for hazardous wastes – all in line with decisions issued for these, then activity connected with the planned undertaking within Pomorskie voivodship should not in normal conditions pose any threat to human life or health, or the state of the natural environment, as far as the wastes generated are concerned.

13. THE RISK OF EMERGENCIES ARISING

The idea of a serious accident or emergency is taken to mean an event, in particular a chemical release, fire or explosion taking place in the course of an industrial process, storage or transport, in which one of more dangerous substances is involved, with the result that a

threat to human life or health or the environment emerges immediately, or else after a certain delayed reaction. In the light of this, railway lines with their associated rolling stock carrying hazardous or dangerous materials qualify as capable of generating the threat of serious emergencies arising.

The counteraction of the problems brought about by serious emergencies first and foremost involves prevention of their emergence in the first place through appropriate preventative action, the pursuit of emergency rescue and/or salvage activity while such emergency situations persist, and the liquidation or removal of the consequences and effects of accidents that have already happened. The services responsible for rescue missions in the event of an accident giving rise to pollution of the environment are the Chemical Rescue Services of Poland's National Fire Brigade. In turn, the Environmental Protection Inspectorate has as its task the removal of the effects of an accident or emergency situation.

The level of threat in the case of a serious accident is dependent on a number of factors. Where the transport of hazardous materials is concerned these include: the amount of a chemical substance released to the environment, the length of time it remains there and its physical state and level of toxicity, the topographic and meteorological conditions, and the degree to which the area affected is urbanised. Most events capable of giving rise to serious rail accidents relate to poor technical condition of wagon fittings – especially on wagons that are older and in use for longer, as well as inadequate servicing and a failure to abide by shipment procedures.

The stations at which clearance of goods take place should have side lines on which wagons with dangerous materials may stand, and these should be accessible via roads. Information obtained from *Zakłady Linii Kolejowych* suggests that, within Pomorskie voivodship, side lines for such hazardous loads are present at stations in Prabuty and Malbork.

In the case of the line modernisation work targeting a train speed of 200 km/h (120 km/h in the case of goods), the problem of events classed as serious taking place intensifies, since any such event on the line has markedly greater consequences at the planned speeds than at those in force at present.

The rail line under consideration poses no threat to the environment as regards emissions of electromagnetic radiation. This is true of both the stage at which works are conducted and as installations controlling traffic, offering telecommunications and supplying power are in operation. A separate issue is that of radiotelephonic communications, wherein the electromagnetic radiation serves as a carrier of information. If this radiation is to be protected against, it will be necessary for the equipment involved to be used in such a way as to not exceed permissible emission values for electromagnetic fields.

14. INFLUENCE OF THE E 65 LINE ON THE VIBRO-ACOUSTIC CLIMATE

The modernisation work to be carried out along the E 65 route, as well as in the built-up areas of stations, will give rise to periodic acoustic disturbances resulting from the use of heavy construction machinery and the arrivals and departures of vehicles carrying materials. Bearing in mind the generally favourable location of the planned undertaking vis-à-vis residential areas, the noise emission at the stage of line modernisation can not be regarded as burdensome for the surroundings over longer periods of time, and does not therefore require resort to minimisation or abatement measures. The main recommendation would thus be that

the times of using heavy equipment be kept under supervision, with work at construction sites being organised appropriately.

By setting estimates of the exposure to noise against assessments of built-up areas and population sizes, it was possible to designate areas of potential acoustic conflict linked with the operation of the modernised line (see Table 14.1). The analyses carried out make it clear that the noise threat under Option 2 (which has been recommended for implementation) will be 66% greater than under option 0 as far as the area exposed to noise is concerned, and 21% greater when it comes to the numbers of people threatened.

Table 14.1 Areas of potential acoustic conflicts within Pomorskie voivodship

No.	Location	Category *	Notes
1	Prabuty	2	Possible inclusion in category 1
2	Mikołajki Pomorskie	2	Threat to scattered low-level construction
3	Malbork	2	Possible inclusion in category 1
4	Tczew	2	
5	Pszczółki-Pruszcz Gdański	2	
6	Św. Wojciech-Tri-City	1!	
In the cases of locations not associated with any remarks, the diffuse areas of built-up land are accompanied by larger concentrations thereof, for which more intensive means of protecting against noise are being proposed preliminarily.			

* 1 – significant conflicts, 2 – moderate conflicts

The areas of potential acoustic conflict identified and compiled in Table 14.1 have been analysed from the point of view of the noise protection measures applicable. The proposals are as follows: installation of acoustic screening (the traditional solution) along some 6.8 km of line, departure from screening in favour of the use of special vibroacoustic solutions involving the track-bed (these ensuring protection against vibration, as well as partial noise abatement) along c. 19.3 km of line, as well as the protection of individual buildings, e.g. by using windows offering a higher level of insulation.

Presented below (Table 14.2) are the locations and approximate lengths of the acoustic screens proposed for the section of the E 65 rail line running through Pomorskie voivodship.

Table 14.2 Proposed acoustic screening within Pomorskie voivodship

No.	Location	Approximate length of screening [m]
1	Gdańsk-Orunia	180
2	Gdańsk-Orunia	770
3	Gdańsk-Orunia	1350
4	Gdańsk-Orunia	650
5	Gdańsk-Orunia	1000
6	Gdynia	2850
Total		6800

Measurements were also made of vibrations in selected cross sections, on the foundations of residential buildings (within the framework of Phase 1 of the *Feasibility Study...*). The results of this preliminary research indicate no reason to anticipate more major problems linked with vibrations along the route. However, in the areas around stations (e.g. Malbork) and more

densely built-up urban areas, it is recommended that track-bed anti-vibration measures be applied.

15. LEGALLY-PROTECTED MONUMENTS

In referring to the influence of the planned undertaking on objects of built heritage it is necessary to stress that the modernisation of the existing rail line constitutes far less of a threat than any building of a new route from scratch would. The anticipated modernisation work linked with the rebuilding or building of items of engineering infrastructure should not have a significantly unfavourable influence on the monuments described in this chapter, on condition that appropriate standards are maintained as the planned works are implemented. More major changes in the course of the line, reaching 40 metres, will only be involved in the case of several curves between Gronajny and Malbork involving a total line length of some 3 km, in the vicinity of which there are no documented fixed items of built heritage (archaeological sites and zones included).

Where the scale of problems is concerned, the presence of a large concentration of important items of built heritage in a small area ensures that the Tri-City of Gdańsk-Gdynia-Sopot will present by far the greatest difficulties. In Gdańsk alone, the line cuts through two large areas entered on the Register of Monuments, i.e. Gdańsk town within the confines of the 17th-century fortifications and Oliwa with the Potok Oliwski watercourse. Here, any negative influence of the line may be very much limited (allowing buildings to both persist intact and go on serving their previous functions), if the state institutions responsible engage in the documentation and implementation measures in the name of enhanced protection that are being proposed.

Requiring special treatment are the items of railway architecture dispersed along the whole line, be these ones of the highest quality, like the stations in Malbork or Gdańsk, or less well-known ones built to meet the line's needs. These have merged into the landscape after more than a century of use, even if they have now lost their original purpose thanks to technological developments. They include water-towers, station buildings, railway-workers' estates and gatemen's cottages. Sometimes they now serve other purposes, their original stylistic features having been modified by successive episodes of redevelopment.

The best course of action would be to produce an inventory of these buildings, and to have prepared – by the relevant services – documentation of a historical and conservatorial nature allowing revitalisation programmes to be drawn up. The project as prepared generally does not foresee renovation work in station and other buildings, with the exception of those directly connected with the running of traffic along the line. It can only be hoped that these will not undergo complete decapitalisation and be eliminated from the landscape.

In the immediate vicinity of the E 65 line there are also 52 archaeological sites constituting traces of old settlement preserved in the ground beneath the layer used today). In accordance with the conservatorial recommendations issued, any change in the land use applied up to now, and any development activity associated with earthworks at the sites or within the zones, are to be agreed with the Voivodship Conservator of Monuments, and be preceded by exploratory archaeological digs or else be under archaeological supervision.

16. PUBLIC CONSULTATIONS - PROTECTION OF THE INTERESTS OF THIRD PARTIES

The participation of the Polish public in questions of spatial planning and environmental protection as broadly conceived is provided for in provisions of Sections IV and V to the *Environmental Protection Law Act*. The ensuring of access to information on the environment is among the obligations of authorities, which must make it available to other bodies, experts and the public at large. The facilitation of access to data on the environment and the undertaking itself has to be seen as an important way in which the public participate in the final decision taken as regards the modernisation of the E 65 line.

In the initial stages of the proceedings concerning the issue of a decision establishing the location of a development of public utility for the redevelopment or new development (modernisation) of the E 65 Warsaw–Gdynia line within Pomorskie voivodship, the Voivod of Pomerania issued notification, with the aim of this being announced in all the local authority areas (gminas) lying along the rail route in question. In response to the notification, the Voivod and the Investor both received numerous remarks and concepts, *inter alia* concerning the closure of crossings, the siting of access roads, the siting of flyovers crossing the line and issues relating to the noise threat.

In connection with the planned modernisation of the E 65 line, the *Stowarzyszenie Sympatyków Komunikacji Szynowej* ("Rail Transport Supporters' Association") and *Stowarzyszenie Rozwoju Warszawy* ("Warsaw Development Association") joined *PKP Polskie Linie Kolejowe S.A.* in running public consultations on the planned development over the days 4th to 25th April 2005. With the aim of reaching as large a group of inhabitants as possible, information on the consultations was posted online, while polling research was also carried out among passengers on trains travelling along the E 65. A further primary element of the public consultation process comprised two public debates held in Malbork and Gdańsk.

At the stage of collecting materials, the team of authors met with representatives of the state administration (the Department of Environmental Protection at the Voivodship Office), as well as of the local authorities in selected gminas and towns. Talks at the Ministry of the Environment were also held, in respect of the potential threats to the natural environment arising from the planned line modernisation, and the possibilities for these to be counteracted. The authors also wrote to relevant Forest Districts so that these might indicate animal migration routes and provide information on rail collisions involving animals.

17. MONITORING THE ENVIRONMENT

Monitoring is the systematic tracing and analysis of the state of the environment at designated points and within a scope determined by substantive considerations. The primary aims of monitoring in the vicinity of rail infrastructure should be: to register, verify and forecast trends to changes in the environment, to supply the information needed to rationalise management of technical infrastructure and environmental resources, to gather information on the state of the environment, tendencies towards change and transformation, interlinkages and relationships and changes in the properties of individual components, *inter alia* with a view to use in current or planned economic activity.

The manager of a main rail line is obliged to engage in the periodic measurement of levels of substances or energy in the environment that have been introduced there as a consequence of the said line's utilisation. This reflects provisions set out in Art. 175 of the *Environmental Protection Law Act*, as well as in the delegated legislation thereto, i.e. the Regulation of January 23rd 2003 *on requirements as regards the making of measurements of levels of substances or energy in the environment by the manager of a road, rail line, tramline, airport or port* (Dz. U. No. 35, item 308).

In accordance with this Regulation, the monitoring of environmental quality at the stage of a main or first-order line's being operated must entail the periodic measurement of noise levels. Irrespective of these legal provisions, the need to protect surface and ground waters as a rail line is operated makes necessary the checking of the technical status of installations serving in the discharge and preliminary treatment of runoff from the track-bed, as well as from station areas.

18. AREAS OF RESTRICTED USE

A legal basis for the establishment of areas of restricted use is provided by the *Environmental Protection Law Act*. In the case of linear objects (motorways, expressways, national roads and main rail lines) that constitute a source of noise above limits in force, there may be areas in which – notwithstanding the use of appropriate environmental protection measures like acoustic screening, anti-vibration mats and the planting of greenery – non-compliant vibroacoustic impacts are measured.

The report drawn up and model calculations carried out suggest – with a high degree of probability – that the given undertaking will not necessitate any establishment of areas of restricted use. However, final confirmation of this suggestion will only be possible once monitoring with a view to project implementation has been commenced with, and representative results from studies carried out on the modernised line are obtained.

19. COMPARISON OF THE OPTIONS CONSIDERED

From the point of view of the environmental influence and influence on inhabitants of the considered options for the modernisation of the E 65 line, it was Option 2 whose implementation was deemed least likely to be favourable, on account of its having the greatest potential impact (most especially at the building stage). The most favourable was in turn considered to be Option 0 (see Table 19.1).

Equally, however, it is Option 0 that may in the near future pose the greatest potential threat to the environment, *i.a.* because of the lack of a proper means of draining the route, as well as the limited scope of the modernisation, unable to guarantee full resolution of matters of noise and vibration levels failing to comply with standards in place.

Should Option 0 be adopted, it would be necessary to count on the imposition of an obligation that conditions in place along the E 65 line be brought into (or maintained in) compliance with environmental standards – something else that would incur additional costs. Were the existing state of affairs to continue, particularly as regards the drainage of items of engineered infrastructure and the noise threat, tangible damage to the environment would be induced.

Furthermore, the selection of Option 0 would entail consideration being given to further curbs on numbers of passengers using the railway, as well as a decline in carriage of freight resulting from the line's low-level competitiveness when set against motor transport. The result would be the shifting of the environmental losses (so-called cumulative costs) to National Road No. 7 (Warsaw-Gdańsk).

Table 19.1 Comparison of the potential influence of the options being considered for the modernisation of the E 65 line, in terms of their impact on components of the natural environment

No.	Type of potential impact	Option "0"	Option "1"	Option "2"
1.	Influence on groundwater	+	++ ^{a)}	++ ^{a)}
2.	Influence on surface waters	+++ ^{b)}	++	++
3.	Influence on the land surface, including:			
	3.1. soils	-	++	++
	3.2. the landscape and protected areas	+	++ ^{c)}	++ ^{c)}
	3.3. plant cover	+	++	++
	3.4. animals	+	+++	+++ ^{d)}
4.	Influence on air quality	+ ^{e)}	-	-
5.	Influence on the acoustic climate	+++	+++	++++ ^{f)}
6.	Social conflicts	++	++	+++ ^{g)}
7.	Risk of an emergency arising	++++	++	++
8.	Material goods and monuments	++	+	+
	Total no. of pluses "+" :	19	21	23
	The higher the value obtained, the greater the potential impact on the environment			

"-" non-significant influence; "+" limited influence; "++" significant influence; "+++" major influence; "++++" very major influence

^{a)} – a greater influence due to new land occupied (including in sensitive areas);

^{b)} – in connection with the lesser scope of the work anticipated, the occurrence of a greater number of potential places of pollution threat has to be foreseen;

^{c)} – a greater impact induced by more land being occupied, including in sensitive areas;

^{d)} – the scale of the influence on animals is increased by the greater speeds trains will be travelling at;

^{e)} – this option is associated with a large number of coal-heated buildings remaining in use;

^{f)} – notwithstanding the application of solutions, an increase in the area threatened by non-compliant noise levels is likely, thereby raising the numbers of people affected by noise and vibrations;

^{g)} – the closure of crossings at track level will increase distances to fields; combining with factors like increased noise levels to generate local conflicts.

20. PROPOSED MEANS OF MINIMISING THE IMPACTS OF THE E 65 LINE MODERNISATION ON THE ENVIRONMENT

The proposed means of minimising (abating) the undertaking's impacts on the natural environment as presented below (see Table 20.1) represent a synthesis of those discussed previously in detail – in the report on solutions and proposals. They accord with the legislation in force in Poland, as well as the procedures linked with the legal solutions finding application across the EU.

20.1. Public consultations

The success of the development depends in large measure on public acceptance. Assuming particular significance in these circumstances is the proper preparation of public consultations at the level of the gmina (local authority area), in particular as regards amendments to local plans and the procuring of land, as well as such detailed solutions as the closure of particular crossings and laying out of access roads (such consultations have been run, but are the subject of a separate report).

20.2. The minimisation of impacts on the groundwater environment

- application in the line and station drainage systems of installations safeguarding ground and surface waters, in the form of embankment ditches reinforced with concrete elements (as in Kraków Channels, etc.) or other materials (e.g. with geomats), grassy embankment ditches, settling tanks and wells with siphoned outflow, cut-off sluices and valves;
- the introduction of new rolling stock (including passenger carriages with closed sanitary installations); the repair and ongoing maintenance of stock already in use (including the repair of any leaks from hydraulic systems);
- the regulation of water and wastewater management from railway buildings as part of the modernisation work (entailing connections to local sewerage, the use of sealed septic tanks, the construction of separate systems for stormwater and sanitary drainage);
- the introduction of new de-icing agents (less harmful to plants and the groundwater environment);
- the use of non-persistent (biodegradable) herbicides;
- the introduction of proper procedures as regards earthworks, preventing the filling-in or silting-up of watercourses, as well as the washing-away or destruction of banks;
- the proper supervising and use of equipment at the operational stage;
- the minimising of the area of new land occupied, most especially where forest or farmland is involved;
- land reclamation and rehabilitation following development.

20.3. The minimisation of impacts on plants and animals

- minimisation of the unnecessary cutting of trees and shrubs;
- the use of renaturalising and augmentation planting;
- the use of non-permanent (biodegradable) herbicides;
- the adaptation of identified items of engineered infrastructure to serve as crossings and underpasses for animals, in order that their migration corridors might be maintained;
- the installation of acoustic animal-scarers, with a view to animals being repelled from selected sections of line.

20.4. The minimisation of impacts on the landscape and protected areas

- limitation to a necessary minimum of the land in protected areas occupied;
- restoration of land in the vicinity of redesigned or reconstructed items of engineered infrastructure (bridges and flyovers);

- the restoration of sites at which crossings and buildings have been closed down;
- the return to a state of order and tidiness – as necessary – of sites in the vicinity of the railway (stations included).

20.5. The minimisation of impacts on Natura 2000 areas

in connection with the need to maintain the River Liwa Ecological Corridor:

- the building-on of a single course (line underpass) each to the bridge over the River Liwa and that at Prabuty, with a view to these being adapted as crossing points for animals;
- the confinement of fencing along the line to sections around 100 metres long guiding animals to the line underpasses;
- the installation of acoustic scarers;
- the modification of the “Kraków channels” to prevent small animals from falling into them.

in connection with the protection of the Lower Vistula Valley Area (PLB040003):

- the maintenance of the ecological corridor function (*i.a.* through non-introduction of additional infrastructure into the valley, the use of appropriate bird-repelling paints on elements of the bridge and its illumination to make it more obvious to birds at times of impaired visibility);
- the sealing of the surface of the bridge over the Vistula at Tczew and the treatment of precipitation runoff and infiltrating waters using such preliminary treatment facilities as separators, settling tanks, etc.;
- the limitation of noise emissions and vibrations, through remodelling of the track bed.

20.6. The minimisation of impacts on monuments

- the heeding of conservatorial requirements as all modernisation works close to items of built heritage (above all of railway architecture) are being carried out;
- the halting of further decapitalisation in relation to heritage station buildings and other elements of railway architecture (organisational activity independent of the project being implemented);
- agreement with Voivodship Conservator of Monuments of development activity connected with earthworks in the vicinity of archaeological sites.

20.7. The minimisation of impacts on the air

- abatement of emissions from low-level sources in connection with a change in means of heating from coal-fired to electric or oil in selected buildings (signal boxes and gatemen’s huts)
- the introduction of new and ongoing repair of the rolling stock in use, as well as the employment of anti-dust measures in respect of materials carried (by way of closed wagons, tarpaulins, etc.).

20.8. The minimisation of impacts as regards waste management

- the devising and implementation of a programme for the management of wastes, including hazardous wastes;

- the introduction of principles preventing wastes from being generated;
- the selective gathering of wastes with a view to their being recycled more readily;
- the separation of soil and earth into topsoil, uncontaminated earth, rubble and so on
- the application of reuse, e.g. of sleepers, rails and chippings.

20.9. The minimisation of impacts on the vibro-acoustic climate

- limitation of noise at the construction-work stage (proper organisation of working time and the utilisation of efficient equipment);
- use of high-quality rolling stock in a good state of repair;
- use of protective installations in the shape of acoustic screening, anti-vibration mats (e.g. in the Sopot area), joinery-work with a high degree of acoustic insulation;
- compliance with the provisions of local plans delimiting construction lines in the vicinity of railways;
- pursuit of monitoring in support of implementation work and possible verification of the safeguards employed in the light of the results obtained.

Table 20.1 Proposed means by which to minimise the E 65 line's impact on the environment within Pomorskie voivodship

Acoustic scarers (along one side)	Protective fencing (along both sides)	Settling tanks	Other protection installations	Acoustic screening	Ant-vibration mats	Planting or renaturalisation of green space
2.0 km	0.5 km	6	91	6.8 km	19.3 km	17 sites