

Advisory guidelines for the environmental impact statement on Amsterdam airport and surroundings

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ANNEX: Outline of the EIA procedure on Amsterdam Airport and surroundings

SUMMARY OF THE ADVICE

A mainport function for Amsterdam Airport (Schiphol) has been laid down in the Fourth National Physical Planning Programme Extra (VINEX). The mainport function has been further elaborated in the Plan of Approach Schiphol and surroundings (PASO). The decision-making process that has now been started with the help of environmental impact assessment (EIA) must structure the series of decisions that must enable the implementation of the proposed activities. This EIA has a phased approach. In the first stage, the so-called integral EIA, the decision-making takes place for a partial review of the National Structure Scheme for Civil Airports and a partial review of the Regional Physical Plan Amsterdam-Noordzeekanaal-area. The second stage concerns the implementation EIA for the change of the designation of Amsterdam Airport in the scope of the Aviation Act.

This advice for specific guidelines has been drafted to establish the contents of the integral environmental impact statement (EIS). Below the main points of this advice have been summarised.

Problem definition, objective and decision-making (section 2)

It has been stated in PASO and in the notification of intent for the integral EIA that the proposed activity must satisfy twin objectives, i.e.

- strengthening of the mainport function of Amsterdam Airport
- improvement in the quality of the physical environment in the area around Schiphol.

These two objectives must first of all be well defined. The Commission gives in the advice some proposals for a definition and elaboration of both objectives. All possible solutions must satisfy the twin objectives. Solutions that are somewhat neutral for one objective and strengthening for the other will also be counted among these. It must become clear which reference year must be observed as bench mark to measure an increase in the quality of the physical environment.

Both objectives must be viewed in relation to various macroeconomic scenarios that take into account diverse development directions for Schiphol and surroundings as a result of economic trends in and outside Europe, differences in rates, deregulation of aviation in Europe, developments in aircraft technology, etc.

As regards the spatial arrangement of Schiphol and surroundings it is of the utmost importance that it becomes clear which planning area will be observed for the partial review of the regional physical plan. In addition, it will also be necessary to involve the planned and desired developments in the area around the planning area in the statement of the problem on account of the large mutual relationship between such developments and those around the airport. It concerns in particular urban development locations (Haarlemmermeer-West) and infrastructure.

Both objectives must be confronted with each other in their spatial implementation. This means that the EIS has to address the following questions:

- can all anticipated and desired activities be accommodated in the area while keeping or improving the quality of the spatial structure?

- can these activities be realised without exceeding of the applicable environmental standards and with due observance of the environmental objective?

The Commission naturally assumes that the financial means will be timely made available to implement the 111 measures of PASO according to the demands of environmental quality and standards.

It must be explained in the integral EIS which implementation decisions must still be taken in addition to the implementation decisions ex Aviation Act. It concerns the developments at the landside of the airport and in particular urban development locations, highways, rail and metro connections, a pipeline for the supply of aviation fuel, a golf course, urban agglomeration green-structure, all together a large number of activities. The guidelines and the integral EIS must bring structure herein by classifying the projects and proposed activities according to their importance for the development of Amsterdam Airport into mainport.

Furthermore, the findings of the 'working group noise standard for night flights' are of great importance to the decision-making process on a strategic level on the basis of which in 1993 the government will adopt and implement a national standard for aircraft noise during the night (Measure 32 of PASO).

Proposed activity and alternatives (section 3)

All alternatives must satisfy both objectives. They must be related to the macroeconomic scenarios that depict the size in traffic movements, the number of passengers and the amounts of freight to be transported.

Alternatives can be discerned at the airside and at the landside of Schiphol. On the basis of current information it will be easier to formulate the alternatives at the airside than those at the landside. This is connected with the current lack of clarity about plans and projects concerning urban developments, infrastructure and green-structure around Schiphol.

At the airside the following alternatives will be possible:

1. No-action or zero alternative, maintenance of the current tangential four-runways-system.

This alternative does not seem to satisfy the twin objectives.

2. Four-runways-system alternative with additional southern use of the Zwanenburg runway and extension of the Kaag runway.
3. Four-runways-system alternative with turning of the Zwanenburg runway to the northwest and shutdown of the current Zwanenburg runway and realization of the possibility of southern use of the turned fourth runway and extension of the Kaag runway.

4. Five-runways-system alternative with three variants:

- parallel fifth runway
- turned fifth runway north
- turned fifth runway south

All variants of the five-runways-system alternative also entail southern use of the Zwanenburg runway and extension of the Kaag runway.

At the landside there are also alternatives possible that must be compatible with the alternatives at the airside.

This concerns particularly the new industrial sites near Schiphol and the new structure of the rural area around Schiphol which also influence the quality of the physical environment. The alternative most favourable to the environment cannot be indicated in advance but must be distilled from the impact of above-mentioned alternatives. The alternative most favourable to the environment must satisfy as best of all alternatives the environmental objective. It has become clear from the remarks by the public participation that this alternative must pay due attention to a share of rail transport as large as possible in the development of Amsterdam Airport and surroundings.

In the advice a number of measures are put forward that may play a role in the elaboration of the alternative most favourable to the environment.

Current state at the environment and autonomous development (section 4)

The study area is much larger than the planning area. Concerning noise the study area should observe the area within the 20 Kosten units¹⁾ contour and within the contours of the new national noise standard for night flying. Concerning air quality the study area can be restricted to the Dutch airspace insofar as it concerns the emissions of aircraft flying from and to Schiphol and to an area of approx. 10 x 10 kilometres with a maximum of 3000 feet height around Schiphol as far as immissions (affecting air quality) are concerned. With respect to the aspects of soil, groundwater and surface water the size of the study area is determined in section 4.1 of this advice.

With respect to the aspects of nature, landscape and outdoor recreation the entire area of the Haarlemmermeer polder with adjacent recreation areas (Spaarnwoude, Amsterdamse Bos, Westeinderplassen and Kagerplassen) must be counted as part of the study area.

The current situation concerns the situation as it existed in 1990 plus any on-going developments assuming that no new developments will be started affecting the mainport function of Amsterdam Airport.

The following aspects are discussed in the advice: current land use, noise hindrance, air quality, soil, groundwater and surface water, ecology, external safety, perceived environmental quality and perception of health risks.

Environmental impacts (section 5)

All environmental impacts must be differentiated according to the various macroeconomic scenarios and the alternatives. Detailing the environmental impacts will only be necessary in the integral EIS insofar as this serves to clarify how the twin objectives can be satisfied.

1 The Kosten unit (Ke) hindrance measure for aircraft noise gives a calculation of the average noise hindrance around an airport during one year corrected with the application of weighing the perception of noise hindrance during the day, in the evening and at night by means of so-called punishment factors (factor 1 during the day increasing to factor 10 during the night). The 35 Ke contour is the contour within which it is not allowed to build any new houses according to the Aviation Act. In the case of Amsterdam Airport an extra zone of an additional 5 Ke units (to the 30 Ke contour) will be observed in which no new housing will be allowed.

As far as the aspect noise is concerned it must be differentiated according to geographic spread of noise relative to the location of the various runways and the proposed use thereof, and relative to the location of roads and industrial sources. Geographic differentiation will not be necessary for the aspects of air, soil and water.

Reference is made to sections 5.3 through 5.9 of this advice for those environmental impacts that deserve full attention in the EIS.

The methods and models which are used in the impact prediction must be indicated as well as to which extent the environmental standards are met and the environmental objective is satisfied.

Comparison of alternatives, gaps in knowledge, post project analysis
(sections 6 and 7)

The differences in the impacts on the environment of the alternatives and variants considered must be clearly presented per environmental aspect. The comparison must also present the extent in which the various alternatives can satisfy the twin objectives. The same applies to the remaining gaps in knowledge and the meaning thereof for the decision-making process.

The post project analysis is an important part of this EIA. Through monitoring amongst others actual noise and air pollution levels it must be established in this analysis to which extent the predicted levels will agree with reality.

Summary of the EIS (section 8)

The essence of all main parts of the integral EIS must be summarised and conveniently arranged for a broad audience, including decision-makers and the public.

1. INTRODUCTION

It has been determined in the Fourth National Physical Planning Programme (Extra) that reinforcement of Amsterdam Airport (Schiphol) (together with the seaport of Rotterdam) forms an important part of the physical planning policy for the economic key area of the Netherlands. It concerns strengthening of the economic functioning of the airport in the region and the improvement of the accessibility thereof, within the restrictions dictated by the environment. In the decision-making process of the reinforcement of the mainport function of Schiphol the relation between economics and environment will be considered openly.

On account of the complexity of the environmental development and the problems of the environmental quality of Amsterdam Airport and surroundings the region has been designated as area in which an integrated, area-directed environmental policy must be developed and implemented. A *Plan of Approach Schiphol and surroundings (PASO)* had to be drawn up for this policy, in which, taking into account the environmental developments desired for this area, agreements had to be laid down about the measures to be taken and the necessary policy instruments in the fields of physical planning, environment, land reform and nature. Such measures and instruments will be necessary to realise in an adequate manner the environmental demands made by those functions upon the region.

The project *Schiphol and surroundings* started in September 1989 by means of a covenant of intent. In April 1991, a policy covenant was signed by the central government, the province of North Holland, the municipalities of Haarlemmermeer and Amsterdam, the N.V. Airport Schiphol (NVLS) and KLM (Royal Dutch Airlines), in which the signatories agree to the draft Plan of Approach (which was ready in December 1990) and pronounce the willingness to start with the legally prescribed decision-making processes to execute the plan.

The *Integral version Plan of Approach Schiphol and surroundings* was ready in September 1991. In this Plan of Approach a coherent package of in all 111 measures has been laid down that must contribute during the two consecutive planning periods (from 1990 – 2003 and from 2003 – 2015) to the realisation of the twin objectives concerning mainport development and improvement in the environmental quality.

The decisions enabling this, relate to the following four developments:

- the development of the airport into mainport
- the continuous urbanisation pressure on the region (construction of houses, industrial sites)
- fitting in of new traffic and transport infrastructure
- the development of a coherent green-structure.

The decision-making process about a number of these developments must be supposed with EIA. It concerns the following decisions:

- a partial review of the National Structure Scheme for Civil Airports for the national Amsterdam Airport
- a partial review of the regional physical plan Amsterdam-Noordzeekanaal-area (ANZKG) for the spatial arrangement of the mainport development of Amsterdam Airport

- a change of the designation of Schiphol in the scope of the Aviation Act.

A coordinated EIA is executed for these procedures. The EIA for the first two strategic decisions (entitled *Integral EIA*) started with an announcement in various newspapers on September 5, 1991. The competent authority is made up by the following agencies:

- the Council of Ministers for the procedure of the partial review of the National Structure Scheme for Civil Airports
- The Provincial Council of North Holland for the procedure of the partial review of the regional physical plan ANZKG
- the Minister of Public Works (V&W) in conformity with the Minister of Housing, Environmental Planning and Environmental Management (VROM) for the procedure of the change of the designation of Amsterdam Airport ex Aviation Act.

The Provincial Council of North Holland acts on request of these agencies as coordinating competent authority. The initiators for this EIA are the Ministers of V&W and of VROM, the Secretary of State of Economic Affairs (EZ), the provincial board of North Holland and the NVLS.

The advice has been compiled by a working group of the Commission for EIA. The working group acts on behalf of the Commission for EIA and hence further in this advice will be referred to as 'the Commission'. The advice aims to demarcate which environmental aspects are important to the decision-making process in the light of both objectives of the PASO that also apply as points of departure for this EIA.

In the drafting of the advice the Commission took into consideration, on request of the coordinating competent authority, all written advices, comments and remarks received through the competent authority.

2. PROBLEM DEFINITION, OBJECTIVE AND DECISION-MAKING PROCESS

Environmental Protection Act, section .10, subsection 1, sub a:

An EIS shall contain at least: "*a description of the purpose of the proposed activity*".

Environmental Protection Act, section 7.10, subsection 1, sub c:

An EIS shall contain at least: "*an indication of the decisions in the preparation of which the environmental impact statement is to be drawn up, and a review of the decision previously taken by government bodies relating to the proposed activity and the alternatives described*".

2.1 General

This EIA is announced in the notification of intent as an integral EIA. This means that it serves as support for the decision-making about a large number of different, but mutually strongly connected proposed and desired developments for Amsterdam Airport and surroundings. These proposed activities are prompted on the one hand to find a solution for the current problems about

the use and the accessibility of the airport, both at the airside and at the landside, and on the other hand to safeguard the future development of the airport and surroundings within the context of a rapidly developing Europe. Traffic development at Amsterdam Airport led to aviation noise exceeding the fixed levels according to the zoning contours of the National Structure Scheme for Civil Airports; hence the necessity to lay down a new policy.

In the *Master Plan 2003* NVLS explained that, if a new policy is not laid down, the current developments will lead to capacity problems, to congestion of the airport both at the airside and at the landside, to damage to the competitive position of the airport and the depending industrial activities and to an imbalance in the coexistence of the airport with its surroundings on account of environmental impacts and space claims and the accompanying planning problems.

As far as the future is concerned Amsterdam Airport made it known in the Master Plan that the enlargement of the transshipment capacity until 2003 can be met within the current area with an approved zoning destination but that thereafter an extension will be required. Furthermore, an adaptation of the runways system will be necessary for solving the noise problem and for the solution of bottlenecks in the function of Schiphol as transit airport.

The accessibility of Schiphol at the landside must be improved as well; the airport strives for a 40 percent share therein of public transport.

In the Fourth National Physical Planning Programme (Extra) a mainport function has been laid down for Amsterdam Airport. The mainport function has been further elaborated in PASO with in all 111 measures. The decision-making process that has already been started with the help of the integral EIA must structure the series of decisions that must enable the proposed activities. In the notification of intent the types of decisions are described which must be taken with the EIA and in which order. First of all, the decisions on a strategic level must be made, followed by the implementation decisions. The strategic decisions entail the adoption of a partial review of the National Structure Scheme for Civil Airports for Amsterdam Airport and the adoption of a partial review of the Regional Physical Plan Amsterdam Noordzeekanaal Area (ANZKG). According to the notification of intent decisions must be made in the partial review of the National Structure Scheme about:

- intensifying the use of the airport
- the nocturnal use of the airport
- the construction of an extra runway
- relocation of activities to other airports.

The partial review of the regional physical plan ANZKG will include decisions about:

- new industrial sites near Schiphol for the mainport development
- physical arrangement of infrastructure (High Speed Railway, main roads structure, and underlying road network)
- new structure of the rural area around Schiphol (Urban agglomeration green-structure)

- extra exclusion zone for house building around the noise contour of 35 Ke²)).

When the decision-making process about these strategic decisions has progressed, a beginning must be made with EIA at the level of implementation. The notification of intent refers only to decisions related to the change of the designation of Amsterdam Airport according to the Aviation Act with respect to the following subjects:

- establishment of noise zones for both the situation with the four runways system until a fifth runway is operational, as well as for the future situation with a five runways system
- extension of the Kaag runway
- additional southern use of the Zwanenburg runway
- construction of an extra (fifth) runway
- enlargement of the designated airport area.

In the decision-making process the twin objectives included in the Policy Covenant of PASO dated April 16, 1991 and in the notification of intent apply to all decisions:

- the reinforcement of the mainport function of Amsterdam Airport
- improvement in the quality of the physical environment in the area around Amsterdam Airport.

The Policy Covenant of April 16, 1991 stipulates that *"if no coherent solutions are found for the development of Amsterdam Airport into mainport and for the simultaneous increase of the quality of the physical environment, the risk will be very large that both the mainport development of Schiphol in particular where it concerns the impact on the national income and the desired increase of the number of jobs, and the improvement in the quality of the physical environment in the vicinity of the airport in particular where it concerns noise and air pollution, will be seriously endangered"*.

This means for the integral EIS that must be compiled for the strategic decisions:

- the twin objectives are normative and that the mainport development must be verified against the principle of sustainable development as laid down in the National Environmental Plan;
- further demarcation is needed in a planning area and in surrounding areas of influence or areas of study with which an interaction exists both in terms of planning and environmental impacts;
- the strategic decisions must be followed by a number of implementation decisions for which EIA may be compulsory.

Although PASO, the accompanying partial studies and the notification of intent provide already a lot of information giving insight into the meaning of the foregoing for the drafting of the EIS, much still remains unclear needing further elaboration. The guidelines for the EIS and the EIS itself must give a

2 Kosten units = Kosten eenheden = Ke: see for an explanation footnote nr.1.

definite answer about this. Those guidelines must also indicate that the EIS itself must contain all information that is necessary to clearly define the statement of the problem and objective and mutual comparison of all alternatives.

2.2 Twin objectives

In PASO both objectives are separately elaborated. However, no confrontation takes place. Both objectives seem rather conflicting. The reinforcement of the mainport function of Schiphol will give rise to strong increase of the air, road and rail traffic resulting in more noise production and emissions of gases and particles. The increase of the accompanying nuisance and pollution can be influenced by taking measures but cannot be made undone.

The EIS must give information about the change in environmental pollution in particular where it concerns noise hindrance and pollution of air, soil and water, and about the spreading thereof across Schiphol and surroundings. This environmental pollution must be related to the notion 'mainport' and the inherent developments for the functions living, working and leisure activities and the connected development in mobility. In this respect, the EIS should refer to the Fourth National Physical Planning Programme (Extra) and the desired developments described in PASO.

Mainport development

PASO does not give a clear definition of what constitutes a 'mainport'. The presentation of absolute figures in terms of numbers of future passengers and tons of freight or numbers of flight movements per year does not seem to give sufficient insight into the mainport function.

The term mainport is always used in the various documents (PASO, Master Plan, Notification of Intent) in a relative meaning. In the introduction of the notification of intent it is stated that Schiphol must keep its current position as one of the most important airports in Western Europe and that this means that the development of Schiphol must keep at least pace with the largest Western European airports, in particular London, Paris and Frankfurt. The key function of Schiphol in intercontinental aviation plays an important role.

It seems therefore meaningful that the EIS does not only quantify the economic aspects of the desired growth of Amsterdam Airport (into 'mainport') in numbers of passengers, tons of freight and numbers of flight movements per year, but also in terms of a desired minimum share in intercontinental transport from and to Western Europe and in addition in aviation within Europe, with due observance of the impact of substitution through high speed railways³].

An optimistic and a pessimistic macroeconomic scenario must be taken into account while simultaneously estimating the consequences for Amsterdam Airport of deregulation of European aviation. In the pessimistic scenario must

3 The latter on account of the assumption that from the environmental point of view it is desirable to execute transport across distances shorter than 1000 kilometres in Europe between the most important population centres for an important part with high speed trains.

be indicated which critical values and factors determine the development of Schiphol into a mainport.

Quantification of the impact of the two scenarios on the environment through various variants of use of a four- and a five-runways-system, and of the possibilities of substitution of air transport to transport per high speed trains as well as the possibilities of partial movement of activities to other airports enables assessment of the magnitude of environmental pollution.

Improvement in the quality of the physical environment

As yet the second objective concerning the *'improvement in the quality of the physical environment in the area around Schiphol'* is also not clearly described.

The EIS must elucidate whether the improvement in the quality of the physical environment aimed for in the area around Amsterdam Airport must be considered for the area in its entirety or that this improvement must be considered per residential or rural subarea. In addition, 'the area around Amsterdam Airport' must be defined as the area of study that will differ per environmental aspect on account of the range of influence (see section 4.1 of this advice about the current situation of the environment and its autonomous development).

Before it is possible to determine an improvement in the quality of the physical environment, that quality must be defined. A possible approach could entail the following:

- determination of certain environmental criteria per location or partial area as weighed combination of qualities for a number of relevant environmental aspects among which there should be in any case noise and air quality but also space occupation, soil, groundwater and surface water;
- aggregation of the qualities per subarea for the total area with weighing of the importance of the various locations or subareas for instance as function of the number of inhabitants or the economic interest of a subarea⁴;

Another approach may be found in a demand that the quality of the physical environment in the area of Schiphol and surroundings must improve for every environmental aspect or for a number of yet unspecified environmental aspects. In that case the Commission expects large problems with the air quality (and through the process of atmospheric deposition on crops and on the earth surface also on soil and water qualities). With the current technology (incineration of fossil fuels) it is almost inconceivable that an increase in mobility of people and freight will be coupled to a decrease of use of energy and air pollution.

In yet another way the notion about environmental quality can also be related to health (man and fauna) and surviving chances (fauna and flora, including aquatic life in ditches and lakes). In this connection, the environmental quality changes if the proposed activity leads to a change in the chance that the health of species is affected and/or that they disappear. This would entail the

4 This will be difficult to realise for the environmental components soil and water because the environmental pollution of soil and water is brought about through an accumulation of polluting materials and because polluted water may move to areas with other functions.

development of criteria such as for the number of people who experience serious noise hindrance or sleep disturbance or the use of the so-called red list of endangered animals and plants.

Apart from the question whether a definition of environmental quality can or cannot be presented as an aggregate of various elements, the EIS must in any case deal with the question what environmental quality covers for every environmental aspect separately. Concerning noise hindrance from air traffic this means for example that environmental quality is not only determined by the geographic distribution of the number of people who will experience serious hindrance according to the Ke method but also with the number of people who experience sleep disturbance from aircraft noise during the night. This does not only apply to occupants of houses but also to vacationists in boats, tents or recreational vehicles.

The noise levels of road and rail traffic and the test running of aircraft engines (which is considered to be industrial noise) must be expressed separately in dB(A). Adding both kinds of sound calculation (Ke and dB(A) calculations) is not yet possible; a suitable method is not (yet) available.

In the definition of the environmental quality for the most important air polluting compounds CO, NO_x, SO₂, VOM (volatile organic materials), PAH (polycyclic aromatic hydrocarbons) and the compound CO₂, which is emitted by the various sources (see section 5.4 of this advice) must be involved. Contrary to the emissions of sound all emissions of the various sources of air pollution can be added together per compound.

With respect to the environmental quality of soil and water the following can be remarked: soil and surface water are in particular polluted through dry and wet deposition and run off from precipitation falling on runways; groundwater is affected by polluted water infiltrating into the soil.

In order to be able to determine the nature and the spreading of the pollution the following three questions must be addressed:

- which materials fall in which concentration (as a function of the distance to e.g. the runways and the influence of wind direction) through dry and wet deposition on crops and on the earth surface (soil and surface water)?
- which harmful elements are present in these materials (grindings of tires and conventional and so-called carbon brake linings, deicing chemicals etc.) that flow with the precipitation from the runways (e.g. cadmium in tire grindings and copper in grindings of conventional brakes)?
- how harmful (concentration and toxicity) are these elements for the environmental quality?

Finally, a reference year must be selected as bench mark for the environmental objective. The year 1990 can serve for this purpose.

2.3 Spatial arrangement of the planning area

The notification of intent writes that the regional physical plan ANZKG in force for the covenant's area of PASO must be partially reviewed. The extent of the area is not indicated. During the location visit that the Commission paid on September 25, 1991 to Schiphol airport the province of North Holland explained that the partial review concerned will only include the airport site and the direct surroundings.

It is of the utmost importance that the guidelines for the EIS establish which planning area is observed for the partial review and account for this. In addition, the EIS is obliged to involve the planned and desired developments in the area around the planning area in the statement of the problem on account of the mutual connections between the developments at and around the airport. The best example hereby concerns the interaction between the airport and newly planned urban developments outside the planning area. It is a fact that at least a part of the planned and desired developments in the infrastructure have their origin and destination outside the planning area of the partial review.

With respect to the industrial sites the integral EIS must give insight into the needs for additional industrial sites and the capacity that can be accommodated in current physical plans. Which maximum distances to Amsterdam Airport, to the existing industrial sites and to residential areas play a role in the selection of new industrial sites? Which relationship will the planned industrial sites have with the airport activities?

In order to be able to investigate to which extent each of the two objectives can be reached, the following questions matter:

- can all anticipated and desired activities in the area be accommodated while maintaining or improving the quality of the environmental structure (living, working, recreating, mobility)?
- can these activities be realised without exceeding the valid environmental standards and with due observance of the environmental objective?

The Commission naturally assumes that there will be timely sufficient financial means available to execute the 111 measures of PASO according to demands of environmental quality and environmental standardisation.

2.4 Strategic decisions

In the first stage of the decision-making process about the development of Amsterdam Airport and surroundings decisions will be made about main lines with the help of the integral EIA. These decisions are of a strategic nature and must be followed by implementation decisions that, at least for a part, will be founded on the implementation EIA. In the notification of intent and also in section 3.1 of this advice it has been indicated which decisions of a strategic

nature^{5]} are involved. The formulation of alternatives at the strategic level will have to suit the following strategic options:

1. Maintaining the current tangential 4-runways-system
This is the situation of the zero alternative (see section 4 of this advice) that does not seem to satisfy the twin objectives.
2. Modification and intensification of the 4-runways-system
Intensifying the airport into a mainport can be realised at the airside with the necessary adaptations while using a 4-runways-system. Two alternatives can be distinguished:
 - use of the current 4-runways-system but with two-sided use of the Zwanenburg runway and extension of the Kaag runway. This is the alternative as meant in the notification of intent.
 - use of a 4-runways-system with a northwesterly turned Zwanenburg runway and closing down of the present Zwanenburg runway with the possibility of a two-sided use of the turned Zwanenburg runway and extension of the Kaag runway.
3. Expansion of the airport with a fifth runway
This possibility has been described in the notification of intent as the planning alternative with three variants:
 - parallel fifth runway (5P)
 - turned runway in a northern position (5GN)
 - turned fifth runway in a southern position (5GZ)PASO and the notification of intent prefer this option with a clear preference for variant 5P, expecting that this is the best solution to achieve the twin objectives.

2.5 Implementation decisions and other decisions yet to be made

In the notification of intent the matching is described between the integral EIA and the implementation EIA. The question where the integral EIA ends and the implementation EIA begins has not been completely answered. There is a chance that following a general integral EIA later during the implementation phase choices must be made that imply adjustment of the points of departure that were adopted in the integral EIA. There is nothing against that as experience teaches that such processes have rather an iterative/cyclic than a straight-lined nature. Looked at it this way it is a question of a developing decision-making process in which spatial arrangements and environmental aspects subsequently receive attention. The emphasis will later switch to further improvement of the infrastructure and landscaping after which the planning, implementation and management cycle is again gone through to process further adjustments. It will be good in this connection to pay attention to the relation between the plans with respect to the development of Schiphol both at the airside and at the landside and those for the wider surroundings.

5 A strategic decision can be defined as a decision that leads directly to deployment of an implementation route and that in case of postponement or non-implementation leads to more than marginal impact on the proposed objectives.

In the notification of intent only those implementation decisions are mentioned which must be subjected to EIA and that are necessary in the scope of the change of the designation of Schiphol according to the Aviation Act. It is noted that if the decision-making process about the future of Schiphol as a five-runways-airport is delayed a separate implementation decision can be made. This initial decision concerns the establishment of a noise zone for the four-runways-system including the extension of the Kaag-runway and the two-sided use of the Zwanenburg runway.

In addition to the necessary decisions according to the Aviation Act there are many other decisions necessary to realise the mainport function of the airport. Some of these decisions are EIA compulsory. The decision-making process about the Main Road Network of the Schiphol Region has already been realised with EIA. The decision-making process with EIA about the high speed railway Amsterdam – Schiphol – Rotterdam – Brussels is still pending. Other decisions with EIA that are important to the realisation of the mainport function will be made in the course of other procedures. It concerns in particular the urban development location Haarlemmermeer-West, roads, rail and metro connections, a golf course and urban agglomeration green areas in various structure plans (Haarlemmermeer and Amsterdam) and other partial reviews of the regional plan ANZKG.

The EIS must also state which non-compulsory EIA decisions must further be made. The supply of aviation fuel that now takes place per river-tanker must also take place by pipeline⁶. Each of these decisions must be related to the measures of PASO.

Finally, the work of a 'working group on standardisation of noise from night flying' is important to the decision-making process on a strategic level. On the basis of the findings of this working group the government will lay down and implement in 1993 a national standardisation for aircraft noise during the night (Measure 32 of PASO). The resulting standard is of crucial importance to the expansion possibilities of Schiphol.

3. PROPOSED ACTIVITY AND ALTERNATIVES

Environmental Protection Act, section 7.10, subsection 1, sub b:

An EIS shall contain at least: "*a description of the proposed activity and the manner in which it will be carried out, and of the alternatives which should reasonably be taken into consideration*".

Environmental Protection Act, section 7.10, subsection 3:

"The alternatives to be described in accordance with subsection one, under b shall in any case include the alternative which makes use of the best means available for protecting the environment".

6 The Commission for EIA has made an inquiry into the proposal for a pipeline for the transport of aviation fuel. At present, the technical preparations take place. It is expected that the pipeline will be ready for use by the end of 1993. Transporting aviation fuel by pipeline will reduce the number of tanker transports drastically thereby also diminishing safety risks from the transports passing through a number of population centres.

It appears from PASO and the notification of intent that the proposed activity includes a system of actions, measures and facilities that together must lead to the development of Amsterdam Airport into a mainport.

At the airside of the airport this concerns the following actions:

- intensifying the use of the airport
- the nocturnal use of the airport with a permitted growth of the number of night flights with 1000 per year
- the construction of a fifth runway or turning of the fourth runway
- the southern use of the Zwanenburg runway or of the turned fourth runway
- extension of the Kaag runway with 250 meters
- the relocation of certain activities to other airfields.

At the landside of the airport the following environmental measures and facilities are mentioned in PASO and the notification of intent, which must enable the continuous accessibility of the airport following the intensification and expansion:

- actual implementation of infrastructure concerning the main road network of Schiphol and high speed railway as well as the underlying road network
- connection of Schiphol to the high speed railway Amsterdam – Rotterdam – Brussels and a high speed railway Schiphol – Amsterdam – German border intending to provide an as large as possible substitution of aircraft movements by high speed train traffic for both passengers and for freight traffic
- development and implementation of a regional rail network, metro and express bus connections while limiting the growth of the automobility in the region Schiphol.

Finally, there are environmental measures and facilities that must stimulate the mainport development or at least do not impede development:

- the choice of location and implementation of new industrial sites and transshipment facilities near Schiphol for the mainport development
- the establishment of an extra zone around the 35 Ke contour in which urban development and house construction will not be permitted^{7]}
- the land use of the rural area around Schiphol

This construction of activities, technical actions and environmental measures and facilities must deliver the elements from which the alternative solutions for the mainport development of Amsterdam Airport must be compiled. Next, these alternative solutions must be confronted with the environmental measures that for the greater part have already been presented in PASO in order to be able to realise the environmental objective. It concerns the substitution of air by rail traffic, the furtherance of the use of public transport for passengers and commuters, the relocation of certain activities to other airports and environmental measures with respect to noise abatement (including night use of runways and insulation measures), air pollution (including airport-bound measures) and other environmental aspects.

7 The width of the zone must be elaborated in the EIS. In other words, which noise contour forms the outer border of this zone?

The guidelines and the EIS must indicate what has to be done if during the preparation of the alternative solutions it appears that it is not possible to harmonise the actions, technical interventions and environmental facilities and measures belonging to the realisation of the mainport objective with all measures and facilities that make up the environmental objective.

Three alternatives are mentioned in the notification of intent, i.e. the **planning alternative, the zero alternative and the alternative most favourable to the environment**. The planning alternative represents the development direction indicated in PASO for 2015.

The planning alternative and the alternative most favourable to the environment both execute the intentions laid down in the Fourth National Physical Planning Programme and PASO with due observance of realisation of the twin objectives. At the planning alternative the emphasis is on the mainport objective, whereas the alternative most favourable to the environment emphasises the environmental objective.

Under the zero alternative the situation must be described in which the execution of the plans currently in force is continued: the National Structure Scheme for Civil Airports and the Regional Physical Plan ANZKG 1987. This means acceptance of the present four-runways-system without southern use of the Zwanenburg runway and without an extension of the Kaag runway. Aviation noise production must be contained within the zoning contour of the National Structure Scheme for Civil Airports. The zero alternative allows the execution of the connection of Schiphol to the high speed railway Amsterdam – Rotterdam – Brussels as the decision-making for this activity has started already.

The guidelines for the integral EIS and the integral EIS itself must indicate to which extent this alternative is considered a realistic alternative or must be considered only as reference for the two other alternatives.

With respect to the planning alternative the notification of intent describes which variants are possible. It concerns in particular the location of the so-called fifth runway: parallel northwest of the Zwanenburg runway, turned northwest of the Zwanenburg runway or turned west of the Zwanenburg runway. The guidelines for the integral EIS must emphasise that these variants must be described in the EIS as full development possibilities indicating their contribution to the solution of the capacity problems and the noise hindrance problems of the mainport Schiphol, as well as the influence on the pollution of air, soil and water (amongst others on account of the distance to the terminals in the central part of the current four-runways-system) and the other environmental aspects. In the EIS the angle of rotation of the turned variants must be investigated in terms of yielding the least noise hindrance.

Other variants than those already mentioned with respect to the fifth runway are connected with the relocation of certain activities to other airports, the size of the substitution of aviation by transport per high speed trains and the time phasing and priority order in the execution of all anticipated and desired actions and measures.

It has been announced in PASO that 'general aviation' (taxi flights, test flights and training flights^{8]}) will be transferred to Lelystad Airport for the greater part in the first plan period. Furthermore, an investigation will be made into the possible transfer of passenger charter flights to other airports. Which regional or military airfields qualify for this purpose and when? Training flights must be executed on Flight Simulators as soon as that is acceptable from a safety point of view (TST= Total Simulator Training).

The environmental impact of the relocation of certain activities to other airports must be indicated in general terms in order to be able to investigate whether such measures will indeed achieve an improvement in the quality of the physical environment in the Schiphol region but additionally will lead to a deterioration of the physical environment in the vicinity of the relocated activity.

As regards the substitution from plane to high speed train the question can be asked which conditions must be fulfilled and facilities be created in order to attain the target number of 2 million HSL^{9]} passengers in 2000 and 10 million HSL passengers in 2015. The same applies to the possibilities increase the proportion of freight transport to and from Amsterdam Airport by rail.

In addition to the zero alternative, the planning alternative and the alternative most favourable to the environment there are other alternatives which are based on the intensification of the 4-runways-system as referred to in section 2.4 of this advice. This delivers in all the following alternatives for full elaboration in the integral EIS:

1. Zero alternative
2. Four-runways-system with southern use of the Zwanenburg runway and extension of the Kaag runway with 250 meters to the southwest or with the same or a longer distance to the northeast^{10]}.
3. Four-runways-system alternative with turning of the Zwanenburg runway as indicated in the notification of intent but with simultaneous closing down of the current Zwanenburg runway and possible southern use of this fourth runway as well as – single, possibly dual – extension of the Kaag runway.
4. Five-runways-system alternative with three variants, namely:
 - parallel fifth runway
 - turned fifth runway north
 - turned fifth runway south

8 According to ICAO Annex 14 'general aviation' is understood to embrace all aviation not carrying passengers, freight or mail against payment or rent as well as traffic at which an aeroplane is used for special services such as agriculture, construction, photography, inspection, observation and patrol, tracing and rescue, advertising, etcetera, etcetera.

9 High Speed Line (railway).

10 An extra long runway may yield extra advantages with respect to shifting noise contours away from population centres, optimising of points b, c, and e hereafter, increase of using the airport during the night, improvement of external safety and local air quality and less changes as regards the infrastructure. If an extra long runway results in the crossing of two runways precautionary measures must be taken in connection with internal airport safety.

All variants of the five-runways-system alternative entail a possible southern use of the fourth runway (Zwanenburg runway) and extension of the Kaag runway with 250 meters to the southwest or with the same or a longer distance to the northeast.

5. Finally, there is the alternative most favourable to the environment. The details of this alternative can only be determined following the description of the alternatives and their impacts on the environment. Perhaps this alternative can be constructed as a package of infrastructural, exploitation and policy measures.

In the scope of elaborating of the alternative most favourable to the environment, amongst others attention is asked for the following:

- to investigate, with due observance of safety demands, to what extent noise hindrance can be decreased through for instance:
 - a. optimising approach and take off flight routes and procedures, for which in particular Flight Management Systems (FMS) ought to be considered
 - b. selectively using the technical flight possibilities with respect to the course of the flight height during approach and departure
 - c. increasing options for take off and landing by means of increasing the availability of runways amongst others through their extension (choice with respect to meteorological circumstances and heavy aircraft by means of the operational security of ILS and of installing visual landing means
 - d. implementing current ILS systems for a larger angle of descent with due observance of the operational limitations of the aircraft
 - e. limiting the use of reverse thrust of aircraft engines during braking on (extended) runways and of the auxiliary engines during parking
 - f. adjusting or implementing regulations with respect to measures resulting from the previous and their enforcement
- to further reduce serious noise hindrance and sleep disturbance respectively through adoption of a microwave landing system (MLS) which enables a more oblique and steeper approach than currently feasible. If such a system can be used, could it be operational within one of the two planning periods?¹¹
- to prohibit so-called chapter 2 aircraft (according to the definition of the International Civil Aviation Organisation) using Amsterdam Airport before 2003 as indicated in PASO or to modify such aircraft to chapter 3 aircraft by applying 'hush kits'.
- to compensate values lost as a result of the construction of runways, taxi-runways and airport facilities, for instance by means of landscaping, nature conservation and nature development
- to put in place a sewerage system with pretreatment of precipitation falling on platforms and runways; pretreatment of waste water from washing sites
- to decentralize the travellers' and luggage check-in for decreasing space requirements within the airport area

11 Operational use of this system seems only feasible in the second planning period since the system is still in a development stage. Moreover no decision has been made as to the question whether MLS will become a world standard or not. At present only a few aeroplanes and airports are equipped with MLS by way of trial.

- to adopt measures with respect to air pollution as described in PASO e.g. measures directed at decreasing taxi distances and taxi times of aircraft, replacement of current types of servicing of vehicles with vehicles with electric traction, etcetera.

All above-mentioned alternatives are development alternatives for the airside of Amsterdam Airport. In order to enable those developments facilities are also needed at the landside for processing the increasing flow of passengers, freight, and commuters working at the airport or in its vicinity. These concern activities, interventions and measures that are mentioned in the beginning of this section. For all those activities, interventions and measures at the landside alternatives should be developed as well. Some alternatives depend entirely or largely on the nature of the alternatives at the airside, for instance the institution of an extra no housing zone around noise contour 35 Ke. For most other activities, interventions and measures the choices are still more or less open. These concern in particular the regional network of rail, metro and express bus connections and the underlying road network, the location of the new industrial sites and transshipment facilities and the development of the rural area around Amsterdam Airport.

A large part of the 111 measures that have been proposed in PASO anticipate these developments. A phasing in time and a designation of the priority order is necessary on the basis of transport scenarios and prognoses. In the integral EIS the alternatives at the landside must be developed, matching and coupling the alternatives at the airside. Of course the landside alternatives must also contribute towards achievement of the twin objectives.

There are alternatives for the location of industrial sites. In the site selection the following factors play a role:

- one or more sites depending on the need (see section 2.3 of this advice)
- relation with current airport-bound industrial sites
- opening up aspects and accessibility by public transport
- soil pollution and buildings to be removed, if any
- current land use
- sensitive objects and land allocations
- civil engineering and hydrological requirements, need for sand for foundations and landfilling
- transition zones to adjacent areas and landscape characteristics.

The development of alternatives with respect to the required infrastructure and green-structure can only take place after ordering and ranking the many potential projects according to necessity and influence spheres (see sections 2.3 and 2.5 of this advice).

Among the alternatives at the landside there also is an alternative most favourable to the environment that has to pay attention to the following aspects:

- share as large as possible for public transport in all transport movements, including passengers, freight and commuter transport (the Master Plan Schiphol has as target of 40 percent)

- compensation of values lost as a result of the construction of infrastructure at the landside and of industrial sites by means of landscaping, nature conservation and nature development
- compensation of recreation areas that as a result of the more intensive use of the airport have become less attractive or suitable for recreation activities
- limitation of space occupation by industrial and infrastructural developments
- development and maintenance of a soil quality management system (storage and transport of fluids; as regards industries: emission contracts, collection of chemical waste)
- measures to limit seepage, in particular during building activities; measures with which arsenic and saline groundwater will be barred from coming to the surface
- quality of sand for foundation and construction purposes as regards salinity if sea sand is used
- treatment and removal of polluted sludge dredged from water courses and drainage ditches.

4. CURRENT STATE OF THE ENVIRONMENT AND ITS AUTONOMOUS DEVELOPMENT

Environmental Protection Act, section 7.10, subsection 1, sub d:

An EIS shall contain at least: *"a description of the current state of the environment in so far as the proposed activity or the described alternatives may affect it, and the expected development in the said environment in the event that neither the said activity nor the alternatives are undertaken"*.

4.1 Demarcation of the study area

In chapter 2 of this advice attention was focused on the demarcation of the planning area. The study area for the integral EIS will be much larger than the planning area and will differ per environmental aspect. As regards the most important environmental aspects the following can be stated.

Concerning the aspect of noise hindrance the study area should not be limited to the 20 Ke noise contour. In connection with the health impacts from sleep disturbance and awakening reactions resulting from landing and take off movements during the night it is recommended to choose the area that is located within the new noise standard for night flying.

Concerning the aspect of air the study area in the integral EIS can be restricted to the Dutch airspace insofar as it concerns the emissions of aviation to and from Schiphol and to an area of approx. 10 x 10 kilometres with a maximum of 3000 feet¹²⁾ around Schiphol insofar as it concerns the air quality (immissions).

With regard to the atmospheric deposition on crops, soil, surface water and (indirect) groundwater the same limits can be observed as for air quality. For groundwater the demarcation depends on the groundwater system. The study

12 See report of the Committee on Aviation Environmental Protection (CAEP)/2-WP/10 April 1991

area must be chosen widely enough so as to include all areas where significant impacts may occur such as salination or pollution of water bearing layers from where downstream water is extracted for agriculture and horticulture. As regards the aspects of nature, landscape and recreation the entire area of the Haarlemmermeer polder with the adjacent recreation areas must be included in the study area.

4.2 Current state and its autonomous development

The description of the current situation and its autonomous development covers the situation in 1990 plus any ongoing developments but without any new initiatives. This description has primary the objective to serve as frame of reference for the environmental impacts of the alternatives.

In the description of the current situation of the environment the following aspects must be covered:

Current land use

- land use in the planning area (urban area, agricultural area, recreation area, etcetera) and the mutual relations between the functions and the relations with land use and functions outside the planning area
- development of land use on the basis of the physical planning policy in force in particular as regards residential areas, recreation areas and infrastructure
- the characteristics of the landscape of the planning area in terms of landscape types, the geomorphology, the visual-spatial structure (scale, openness, image determining elements) and cultural history
- the significance of the area for outdoor recreation in terms of specific recreation areas and recreative co-use of the rural area. Attention must be paid to the various recreation forms if possible with a quantitative indication of the significance of the planning area for the surrounding urban area and the future accessibility of current and new recreation areas. Attention must be given also to recreation areas in the direct vicinity of the planning area.

Noise hindrance

- what are the prevailing surrounding noise levels in the study area (air, road, rail traffic and industry?)
- the extent of noise hindrance and occurrence of sleep disturbance with the help of the Ke method (20 – 65 Ke contours) and the new noise standardisation for night flying.

Air quality

In 1989 the air quality in an area of approx. 10 x 10 kilometres around Amsterdam Airport was measured and reported. The study was commissioned by the Ministry for the Environment (VROM). A summary of that report will be sufficient for the description of air quality in the current situation. In addition, a study was completed in 1990 about the impact of various scenarios (among which the expected development) on air quality. The results have been published in an Annex *Local Air Pollution* of PASO. In this report it is stated

that a systematic analysis of the complaints about odour is still absent. According to this report about 10 percent of the population in the area bordering on the airport site experiences serious hindrance. The results of dry and wet deposition of air pollution are not known. Further study of both aspects is deemed desirable.

Also in view of the anxiety expressed by the population around Schiphol and in compliance with measure M51 of PASO, the Commission advises hence to survey the current situation and the expected development with respect to odour as a result of kerosene fumes and exhaust fumes. This can be done by means of presenting the geographic spreading of these fumes and gases in contours, within which the average per hour concentration of 1 smell unit/m³ per 50 hours per year (99.5 percentile) and 150 hours per year (98.5 percentile) respectively is exceeded. It will also be desirable to estimate the deposit of black smoke in built-up areas in the direct vicinity of Schiphol. For a description of the autonomous development of the air quality at and around Schiphol a summary of PASO report *Local Air Pollution* will be sufficient.

In the light of the current national emission objectives the emissions of CO, CO₂, NO_x, SO₂ and VOM (volatile organic matter) of aircraft in the Dutch air-space must be inventoried (hence also emissions above 3000 feet). As the development of Amsterdam Airport will have hardly any influence on the autonomous development in the number of aircraft crossing through Dutch air-space from and to destinations outside the Netherlands, the emissions of those aircraft movements do not need to be included in the EIS.

Soil, groundwater and surface water

In the integral EIS attention must be given to:

- the soil composition and the groundwater system (including a geotechnical schematization of soil and subsoil down to the water bearing layers and a characterization of the quality of groundwater and surface water)
- the drainage and discharge of the study area under current land use (partly agricultural, partly as airport) with attention for drainage depth, sewerage of platforms and runways, waste water treatment and surface water management)
- the discharge to the soil and surface water of environmentally harmful emissions arising from exhaust fumes of aircraft engines and from airport-bound traffic (through dry and wet deposition), and of materials in the runoff from platforms and runways (grindings of tires and brake linings, snow and ice-melting chemicals, aircraft deicing).

In this connection it is important to know whether the runways are serviced with a sewerage system and how waste water is treated and which strategy is used in combatting snow and ice problems.

In the long run materials are left behind on the runways that decrease the roughness of the runways. Therefore, the upper layer of the runways needs replacement from time to time. The EIS must describe this and the disposal of the resulting waste.

Ecology

The ecology must be described in general terms with the emphasis on ecological relations through air, soil and water. An exhaustive inventory and description of flora, fauna and vegetation will not be necessary for the planning

area. It is sufficient to present a map and/or description of the ecotypes which are present in the planning area as well as a description of those changes that will occur due to autonomous developments in the land use of the planning area.

External safety

In the integral EIS the following distinction must be made:

- safety of residential and industrial areas including the airport area
- aircraft safety during landing, take off and taxiing
- safety of road traffic
- safety with respect to supply and distribution of aviation fuel

Despite the fact that in the area of risk analysis in aviation no acknowledged method is available, risk analyses and studies about safety levels can be executed. Acknowledged methods are also absent for assessing safety for road and water traffic. At present the Ministry of Public Works is conducting an extensive study on *Safety, traffic and transport on water*. This study includes both the safety of shipping itself as well as the safety of the area through which shipments pass. The methodology may be (at least partially) suited for the assessment of external safety in aviation. Risk analyses of the current situation of Schiphol must be performed for the three categories mentioned above. The resulting (actual) safety levels must be verified against the desired or required levels.

Experienced environmental quality and perception of health risks

Many persons in the vicinity of Schiphol complain about hindrance, risks and disturbance as a result of airport use. This appeared already from the many reactions to the notification of intent at the start of the integral EIA.

Aviation and related activities around Schiphol mean for various groups involved a certain measure of hindrance, disturbance of daily life in and around the house, anxiety about health risks and/or (agricultural) operational risks, and possible stress as a result of the environmental quality being totally affected. It is important to obtain a clear and objective insight into these feelings. This should cover more than what has been described in social-medical research about sleep quality in connection with noise hindrance and about health impacts due to exposure to toxic matters. Also the pattern of complaints¹³ as reported by the Commission on Noise Hindrance Schiphol (Annual Report 1990) does not give a representative and complete picture of the feelings of anxiety due to its focus on noise produced by aircraft.

Hence, an objective description must be given of the manner in which the various parties involved experience and judge developments in the quality of the environment around the airport, especially with respect to the impact of various kinds of hindrance in daily life. Aspects that matter include noise, odour, air pollution, space occupation and crowding, quality of life in and around the (whether or not insulated) house, influences on business and education activities, mobility potentials and limitations, and the quality of outdoor

13 Most complaints are about the forced interruption of conversations, being forced to close windows, infringement on private life, disturbance during the night, hindrance from training flights and deviations of departure and approach routes of aircraft.

recreation. In the integral EIS a start can be made in presenting an inventory of pertinent research already performed around Schiphol and experiences gained in other countries.

In addition, a description¹⁴⁾ must be given in the EIS of real and perceived health risks in relation to the airport activities as experienced by the population groups concerned in terms of sleep disturbance, health impact of air, soil and water pollution, and the use of sedatives and medicine.

5. ENVIRONMENTAL IMPACTS

Environmental Protection Act, section 7.10, subsection 1, sub e:

An EIS shall contain at least: *"a description of the effects which the proposed activity or the described alternatives may have on the environment, and an explanation of the manner in which the said effects have been determined and described."*

5.1 General

Impacts on the environment may be temporary or permanently or even only perceivable in the long term. The expected kinds of impact on the environment must be considered in their mutual relation if possible.

The impacts on the environment per alternative and variant will preferably be described in an absolute sense. This is important for a quantitative comparison of the alternatives.

All environmental impacts must be differentiated according to the various development scenarios and alternatives. Noise impacts must be differentiated geographically according to the location and use of the various runways, the road and rail infrastructure and industrial activities. Geographic differentiation will not be necessary in the integral EIS for the aspects of air (with the exception of odour), soil and water. The environmental impacts manifest themselves as far as noise and air is concerned almost immediately, but the impacts on soil and water will only be discernible after accumulation (soil and surface water) and with delay (groundwater) and hence only after some time. This distinction must be expressed in the approach of describing the impacts.

14 The pertinent data can be collected in a theoretically well founded and methodically carefully elaborated field research in which respondents from various groups involved are questioned about their experiences, perceptions and judgements, partly by means of prestructured, individually performed interviews, partly by means of open depth-interviews for which a special coding scheme is used. Such a research could be performed by an independent agency, against the background of social-psychological notions as regards environmental quality, risk assessment and dealing with environmental stress factors. On account of the importance of the causality question ("To which extent are the reported experiences, observed health risks and the like related to the airport activities?") it is essential that in the field research also control groups from outside Schiphol are involved. It is also important that the questioned groups are classified or discerned according to their position as regards various noise contours. An eye must be kept on the nature of the involvement in airport activities of the respondents.

Which methods and models will be used in the EIS in making any predictions? What is the degree of reliability that can be attributed to these methods and models? Which variance in the prediction results can be expected as a result of uncertainties and inaccuracies in the methods? In case of uncertainty about the adversity of impacts, the worst conceivable situation must be observed.

5.2 Priorities and degree of detail

The integral EIS will be compiled to provide a basis for the strategic decisions by supplying information about the impacts on the environment. The detail of the description of these impacts will vary per aspect. Details will only be necessary in the integral EIS insofar as this serves to clarify how the twin objectives can be reached. Details are furthermore necessary if important differences in environmental impacts per alternative can be expected. This is certainly the case for noise hindrance, external safety and odour.

The degree of detail is less demanding for air quality because most information is already available in the PASO report *Local Air Pollution*.

An exception must be made for the dual use of the Zwanenburg runway and the extended Kaag runway when a separate decision must be made for these activities. The impacts on air quality from these interventions have not yet been described.

Per alternative the degree of the environmental impacts will differ between the various development scenarios (see section 2.2 of this advice). The EIS must explain these differences.

The emphasis in the description of the environmental impacts must lie with those kinds of impacts that are irreversible. Any possible positive impacts in the form of e.g. compensation elsewhere of values in the planning area that will be lost, must also be indicated.

5.3 Noise hindrance

The EIS must describe the noise hindrance associated with each alternative. The noise hindrance must not be restricted to the indoor situation but should include also outdoor situations such as recreation in gardens, parks, outdoor sport accommodations, camping sites, water sport areas and recreative co-use in the rural area.

The noise situation of Amsterdam Airport is governed by two different Acts:

- the Aviation Act for the noise hindrance from all aircraft movements
- the Noise Hindrance Act for all other activities on the airport area

Noise hindrance at the airport is caused by arriving and departing aircraft, and by traffic and industrial activities. Therefore, the sources of noise production must be identified.

In addition to houses, offices, school buildings, old peoples' homes, hospitals, nursery homes, cemeteries, recreation sites and houseboats must be regarded as sensitive destinations and institutions under the jurisdiction of the two Acts.

Predictions will be necessary (for the proposed activity and for every alternative considered) in terms of:

- a. the expected noise hindrance, described with the help of:
 - Kosten units (Ke) giving an indication of the average nuisance experienced
 - peak values in dB(A) caused by night flying. These can yield insight into the occurrence of sleep disturbances and health risks. On the basis of these peak values contours must be calculated encompassing areas where more than a certain percentage of the inhabitants wakes up or experiences sleep disturbance as a result of traffic noise.
- b. the number of people exposed to noise levels exceeding threshold values in Ke-units and dB(A). Numbers should also take into account any future housing developments.

This means in particular:

- calculation and indication on maps of the Ke contours from 20 through 65 Ke for all alternatives, with indication of any uncertainties.
- calculation of the peak value footprints resulting from night flights for the levels from 50 – 90 dB(A), taking into account the distribution of flight routes.
- on the basis of peak levels calculation and indication on maps of the contours for the 10 percent awakening threshold and the 90 percent zero reaction.
- calculation and indication on maps of the contours for traffic noise: 40, 50, 55 and 60 dB(A) 24-hours-values.
- calculation and indication on maps of the contours for industrial noise (including testing of aircraft engines): 40, 50, 55 and 60 dB(A) 24-hours-values.
- counting the number of houses and other sensitive destinations as indicated before, within the contours from 20 through 65 Ke, within the various contours for the 10 percent awakening threshold and the 90 percent zero reaction related to sleep disturbance and within the contours for traffic and industrial noise. In order to translate the numbers of houses within the various contours into numbers of people seriously hindered and numbers of people experiencing sleep disturbances, the empirical relation in the Kosten method must be used^{15]} respectively the percentages of persons either experiencing awakening reactions or sleep disturbance.

With the help of the above calculations and contours the following insulation regimes must be determined per alternative:

- an insulation regime on the basis of the Aviation Act covering the area within the 40 Ke contour

15 The empirical relationship in the Kosten-method is as follows: percentage of persons seriously affected by aircraft noise is the Ke value minus 10. Thus along the 35 Ke contour 25 percent of the people is seriously affected and along the 20 Ke contour 10 percent.

- an insulation regime for bedrooms on the basis of the 10% awakening threshold and the 90% zero reaction contour concerning night flying

It is recommended to indicate in the EIS what the associated costs of the various insulation regimes are.

Apart from noise hindrance inside houses and buildings people participating in outdoor activities also are effected by noise from aircraft, traffic and industry. The integral EIS must indicate these impacts indicatively. Attention must be paid to recreation activities in gardens, parks, recreation areas, camping sites, marinas and the rural area.

In the planning area there are many houseboats particularly in the area south of the Zwanenburg runway. The Aviation Act and the Noise Hindrance Act do not include standards for houseboats. The question arises whether there are any mitigating measures which can alleviate the noise hindrance for houseboats.

5.4 Air pollution

As it has been already stated in section 5.2 it is sufficient if the integral EIS presents an inventory of the emissions of the most important air polluting compounds, i.e.:

- carbon monoxide (CO)
- nitrogen oxides (NO_x)
- sulphur dioxide (SO₂)
- volatile organic matter (VOM)
- black smoke
- polycyclic aromatic hydrocarbons (PAH)

From the point of view of environmental-political considerations it will be advisable to also include the emission of carbon dioxide (CO₂) in the inventory.

The emissions of the various alternatives and variants must be calculated for:

- aviation (landing and take-off within Dutch airspace and taxiing/engine testing at the airport)
- road traffic in the planning area
- rail traffic with destination Schiphol on the basis of average emissions per passenger kilometre
- energy and heat generation for the airport
- energy and heat generation for houses and business activities.

The emissions must be estimated for 1990, 2003 and 2015. The EIS must indicate which influence the measures of PASO will have on the emissions. Total emissions of all compounds must be matched against the various national emission standards and objectives.

With respect to odour the contours must be indicated per alternative and variant, within which the average per hour concentrations of 1 smell unit/m³ in 50 hours (99.5 percentile) and 150 hours (98 percentile) per year respectively will be exceeded. Also the number of inhabitants living within these

contours including those persons who are expected to take up residence in new housing developments within these contours must be assessed.

5.5 Soil, groundwater and surface water

The integral EIS must present a description of the changes in the groundwater system due to the proposed developments.

Temporary deep drainage during construction activities and the permanent lowering of the groundwater table to accommodate new land uses may cause the potential intrusion of saline water from the Pleistocene aquifer into shallow groundwater and surface water bodies. This may also extend to areas outside the planning area. Apart from these impacts the EIS must deal with the possible impacts that drainage may have on groundwater-dependent ecosystems.

The integral EIS must pay attention to the impact on the quality and the management of surface water bodies and their ecological values through dry and wet deposition of exhaust gases of aircraft engines and of road traffic and through runoff of precipitation on runways and industrial sites (carrying e.g. grindings of tires and brake linings, snow- and ice-melting chemicals for aircraft, deicing).

These impacts will occur in particular as a result of the enlargement of the airport area and as result of an increase in the number of aircraft and traffic movements.

In general, the impacts on soil, groundwater and surface water must be described in terms of their influence on water supply for agricultural uses and ecosystems.

Other points of attention concern:

- impacts of necessary earth moving and other engineering measures on the soil profile and salinity problems from sea sand used in construction and foundation
- the possibility of soil pollution from industrial activities and from storage and transport of aviation fuel and other fluids harmful to the environment.

5.6 External safety

A risk analysis must be made for all alternatives and variants with respect to the safety of

- residential and industrial areas, including the airport area
- aircraft during landing, take off and taxiing
- road traffic insofar as this is influenced by aircraft movements

The analysis must look into the potential influence of the occurrence and frequency of smog on the safety of air, road and rail traffic.

The safety of the transport of aviation fuel must also be included in the analysis. At present the transport takes place with river tankers and in the

future also by pipeline. The safety levels must comply with safety standards for the transport of hazardous fluids.

5.7 Health and perception of health risks

Both noise (in particular during the night) and air pollution can have impacts on public health. It appears from most reactions from the public in the scope of this EIA that the anxiety about health impacts is strongly present among the population in the vicinity of Schiphol. The EIS must pay attention to possible (cumulative) health impacts, among which that of sleep disturbance.

Insofar as knowledge and measurements are present it must be indicated whether there is a chance that those living in the immediate vicinity of Schiphol (can) experience odour problems under extreme meteorological situations. This means that the contours of the smell unit/m³ must be indicated in a map as 99.5- and 98- percentile values (see section 5.4 of this advice).

If the prevailing hindrance, disturbance and risk factors in the whole of airport activities have been identified in a field research with respect to the current situation as indicated in section 5.2 of this advice, it will be possible to make estimations of the experienced environmental quality and the perceived (whether or not alleged) health risks in connection with the future, strongly increasing activities at and around the airport. The EIA process will enable an improved communication between the airport management, the provincial government and the (other) groups involved, possibly through a formal contact group, to address the question what actually is or will be done to reduce hindrance, disturbance and risks to acceptable levels. The field research recommended in section 5.2 of this advice is already directed towards meeting and registering the feeling of anxiety among the population living in the vicinity of Schiphol.

5.8 Ecosystems

In addition to the ecological values which are directly affected as a result of a change in land use and through disturbance in the construction stage and the use stage, ecosystems are indirectly affected by impacts on the groundwater and surface water as mentioned in section 5.5.

The impacts can be described on a general level (ecotypes, ecosystems) for the planning area as a whole.

A more detailed description is required for those areas where physical changes are planned.

5.9 Landscape

The proposed activities will affect the geomorphology, the cultural-historical elements and the structure of the landscape through change, destruction and dissection of area-, line- and dot elements. If there are any elements of

archaeological interest in the planning area, the EIS must describe which measures can be taken to record and preferably to preserve such elements.

5.10 Other impacts

How many houses must be removed in turning the fourth runway to the north-west or for construction of the fifth runway? Will the cemeteries along the Vijfhuizerweg also have to be removed in order to enable the construction of the fifth runway (variants 5P and 5GN)? Which infrastructure must be moved or adjusted in the implementation of the various alternatives?

It is known that the contents of aircraft fuel tanks are emptied in flight emergency situations. Are there any rules and regulations dictating aircraft crews what to do in these circumstances? How often does such a situation occur on average? What is the impact on inhabitants and on the environment?

Will the dropping of kerosine and oil products on greenhouses affect the intensity of sunlight entering the greenhouses? Which impacts can be expected on the use of marinas and recreation areas in the surroundings of Schiphol through noise nuisance, air, soil and surface water pollution?

6. COMPARISON OF ALTERNATIVES

Environmental Protection Act, section 7.10, subsection 1, sub f:

An EIS shall contain at least: *"a comparison of the expected developments in the environment, as described under d, with the described effects of the proposed activity on the environment and with the described effects on the environment of each of the alternatives considered."*

The alternatives must be mutually compared in their ability to meet the twin objectives.

The environmental impacts of all alternatives must also be compared per environmental aspect. The following reference levels must be observed:

- the current situation of the environment in the years 1985 and 1990
- environmental standards in force (emission as well as immission/quality and exposure standards)
- new environmental standards which are being developed for noise hindrance from night flying and for external safety.

The zoning contours of the SBL must also be used as reference for noise hindrance.

7. GAPS IN INFORMATION / POST PROJECT ANALYSIS

Environmental Protection Act, section 7.10, subsection 1, sub g:

An EIS shall contain at least: *"a review of the omissions in the description referred to under d and e, due to lack of the necessary information."*

Environmental Protection Act, section 7.39:

"The competent authority that has taken a decision, in the preparation of which an environmental impact statement was drawn up, shall investigate the effects of the activity concerned on the environment, either during or after its completion."

Important gaps in knowledge and information that remain in the impact prediction must be listed in the EIS. This will enable the decision makers to obtain a complete picture about which important information is not (yet) available. A gap in knowledge that is known to occur, concerns the calculation and presentation of the cumulative impacts of noise hindrance from different sources (aircraft, road, rail and industrial noise). The EIS must indicate how important the various gaps in knowledge are for the decision-making.

The gaps in knowledge can be seen as subjects of continuous study and must be included in the evaluation programme that will be drawn up by the competent authority. This programme includes what is already measured and monitored at the airport in a standard fashion.

The results of the evaluation are important to check the actually occurring impacts against the prediction. The execution of the evaluation will allow for possible correction measures. The Commission recommends that already in the EIS indications are given about the evaluation programme.

The airport has announced that a noise registration system (NOMOS) will be set up. When this system becomes operational it is important that periodically the approach and take-off routes are registered three dimensionally with the recording of date, time and type of aircraft. The system will permit enforcement of the rules and regulation and help in identifying measures that can reduce noise levels. The registration of routes is also important for a better understanding of the safety situation at the airport.

Concerning the proposed field research in section 5.2 of this advice with respect to the 'experienced environmental quality and perception of health risks' it is recommended that such investigation is repeated at fixed intervals (for instance once per five years) to detect developments in people's perception about the airport activities.

The Commission further refers to the advice that the chief inspector for environmental hygiene intends to publish in the scope of this EIA. The Commission has learned that the chief inspector will ask attention for the evaluation of various health aspects.

The performance of investigations and field research for some of the above-mentioned aspects must be combined as much as possible.

8. EIS STYLE AND PRESENTATION

Environmental Protection Act, section 7.10, subsection 1, sub h):

An EIS shall contain at least: *"a summary providing sufficient information for the general public to be able to evaluate the environmental impact statement and the effects on the environment of the proposed activity and of the alternatives described therein"*.

In the summary of the EIS the essence of every chapter must be presented. It is recommended to do this mainly in the form of maps, figures and tables.

Furthermore it is recommended:

- to keep the EIS concise;
- to give the maps a well readable topographical basis and to provide them with clear legends and topographical names;
- to clearly justify the choices relevant in the writing of the EIS;
- to account for possible deviations from the guidelines;
- to record background data (as the baseline for conclusions, predictions and choices) not in the EIS itself, but in appendices;
- to include in the EIS an explanatory list of terms, a list of abbreviations used and a literature list.

ANNEX

Outline of the EIA procedure on Amsterdam Airport and surroundings

Outline of the EIA procedure on Amsterdam-Airport and surroundings

Introduction

The international airport Amsterdam (Schiphol) is the fourth biggest airport in Europe. The number of passengers who make use of the airport either as point of departure or arrival or for a flight-transfer has grown steadily over the years and substantially over the past few years (e.g. between 1990 - 1993 from 15 to 20 million passengers annually). In order to achieve sustained growth of the airport maintaining its position in the league of leading airports in Europe, a few strategic and executive decisions need to be made. In support of these decisions environmental impact assessment (EIA) must be carried out as the airport is located adjacent to densely populated areas as well as outdoor recreation areas which will be seriously affected by the planned expansion activities.

Before the start of the EIA two objectives were adopted as prerequisites for the formulation of alternatives and the decision-making:

- the airport has to develop into a so-called mainport, thereby stimulating the economic development and employment in the Netherlands which heavily depends on distribution services;
- the environmental qualities in the area around the airport are not allowed to deteriorate and preferably must improve.

These two objectives are basically conflicting. The EIA has to demonstrate whether there are alternative developments which can satisfy both objectives in a harmonious and compatible manner.

The EIA-procedure started with the publication of the notification of intent in September 1991. The specific guidelines were established in February 1992. The EIS was published in January 1994. The decision is expected to be made in 1995.

Advice for specific guidelines

In the advice for specific guidelines the Commission for EIA asked for a specification of the two objectives. The first objective about the mainport principle needed specification in terms of two to three development scenarios and a definition of those characteristics that constitute a mainport. Concerning the second objective, the Commission proposed to select and define a small number of environmental indicators delineating environmental quality. Three possible approaches were presented. In addition, the advice focused attention on the (ongoing) development of a noise standard for night flying and the need for a standard for the external safety around the airport. Concerning external safety, no standard exists, also not abroad in Europe, North America or elsewhere. The advice further drew attention to another controversial matter: the assessment of real and perceived public health risks in relation to airport activities (the incidence of respiratory diseases, cancer, ailments caused by toxic substances, et cetera).

The advice proposed to investigate two series of alternatives: those alternatives which optimize the use of the present set of four tangential runways and those alternatives proposing to expand the take-off and landing facilities with a fifth

runway (see figure 1 showing the preferred alternative). At least one of the alternatives must be able to meet the two objectives.

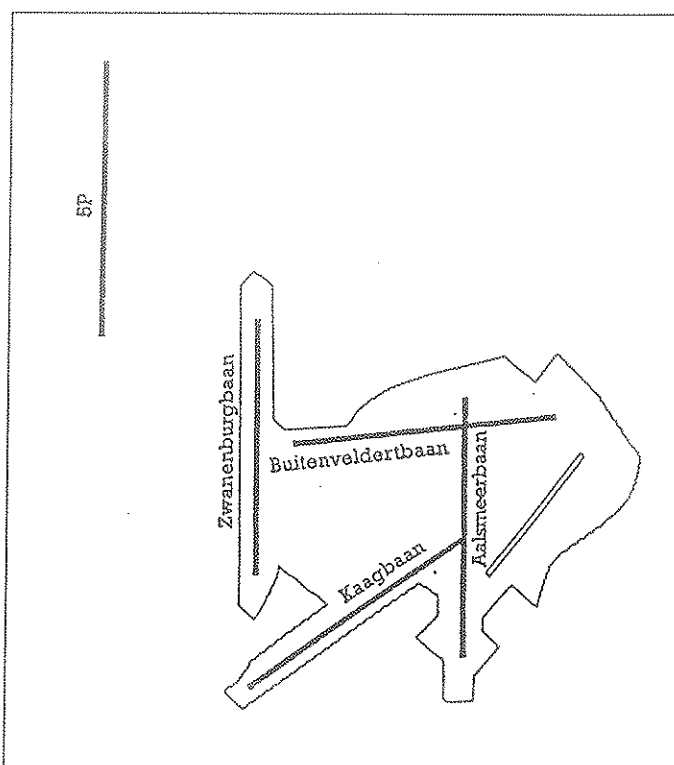


Fig. 1: The preferred alternative including construction of a fifth runway (5P)

Specific guidelines and alternatives

The specific guidelines for the EIS followed the advice of the Commission fairly closely. The guidelines indicated that the mainport principle would be developed in a separate study about the economics of the airport assuming several development scenarios. The scenarios form an input in the preparation of the EIS.

The objective pertaining to environmental quality was elaborated as follows. The improvement of the environmental quality in the area around the airport is characterized by four governing environmental aspects, i.e. noise, external safety, air quality and odour. The objective is formulated in such a way that the noise situation around the airport must improve whereas the situation concerning external safety, air quality and odour will not be allowed to deteriorate. The year 1990 is chosen as baseline. Each of the four indicative criteria is quantified in terms of numbers of dwellings and people within certain noise contours, external safety contours and within areas where air quality standards and certain odour concentration are exceeded.

The guidelines indicated that new standards would be developed for noise from night flights and external safety for specific use in the EIS.

The specific guidelines followed the recommendations of the Commission for EIA in the designation of alternatives.

EIS

The EIS utilized as an input the so-called European Renaissance scenario which occupies the middle ground between a pessimistic scenario (Business as usual) and an optimistic growth scenario (Balanced growth). The European Renaissance scenario predicts that in the year 2015 Amsterdam airport will accommodate 38.6 million passengers and handle 2.1 million tons airfreight with 432.000 plane movements. The development will create 126.000 new jobs. The mainport principle is based on the assumption that in the near future international flights will be serving only a limited number of main airports (mainports). Intercontinental air passengers will first have to take regional flights to the nearest mainport for transfers onto intercontinental flights.

The EIS reports that only two of the four indicative criteria: noise and external safety, differ substantially between the various alternatives. Air quality and odour appear to be non-discriminating criteria. In the EIS more alternatives are developed and elaborated than required by the specific guidelines. The preferred alternative (see figure 1) that was indicated as such at the start of the EIA still comes out on top as it satisfies the mainport objective and most of the indicative criteria that characterize the environmental quality objective. However, there are other alternatives which perform better relative to the environmental criteria although they are more costly than the preferred alternative. There appears to be no alternative that can meet all environmental criteria.

Standards have been developed for noise from night flights and for individual risk around airports. There is no standard for group risk. The study into a potential relationship between health and airports does not yield significant correlations with the exception of sleep disturbance and related health problems from night flying.

The EIS presents most of the required information set out in the specific guidelines in a clear manner with lots of tables, diagrams and maps. However, due to its complexity the amount of information is overwhelming and the non-specialist can easily lose track in determining the significance of the information.

Review

The review of the EIS is still ongoing as the decisions will only be made in 1995. However, the following preliminary conclusions can be drawn:

- The EIS presents good quality information on a large range of alternatives and environmental impacts. The approach in the EIS with adoption of the two main objectives has worked well as it enables reviewers to compare alternatives on the basis of quantitative criteria. Nevertheless, there is a real risk that the results related to the various environmental criteria are interpreted in such a way that they suit the decision-makers best. Some of the critical remarks about the EIS are directed at such potentially subjective interpretations.
- The EIS shows that all alternatives satisfy the objective that Amsterdam-Airport will develop into one of the four to five mainports in Europe. However, all alternatives do not satisfy all criteria set for the objective concerning the environmental qualities in the area around the airport. At best there is one alternative that only does not meet three of a total of fourteen environmental criteria. The preferred alternative (the proposed activity) does not satisfy five environmental criteria.

The EIS shows that all alternatives are able to meet the criterion set for local air pollution. This could only be achieved by assuming that increased air pollution from aircraft emissions (due to a large increase in aircraft movements) will be offset by a considerable decrease in emissions from cars and lorries thanks to improved technology and strict emission standards for combustion engines.

The competent authority must explain in the record of decision why no alternative has been developed which can meet the environmental objective on all criteria.

- It appears that different assumptions have been adopted as inputs for the calculation of noise and external risk contours. The difference in approach is not explained. Uniform application of inputs is needed and hence additional calculations must be made for external risk. There is an indication that if this is done another environmental indicator will yield a deterioration instead of an improvement over 1990.
- At the request of some local governments and environmental pressure groups still another alternative is investigated and will be reported on. If this alternative scores well on the mainport objective and better on the environmental quality objective, it will be added to the EIS.
- During the review Parliament debated the new noise standard for night flying and lowered the standard from LAeq 27 dB(A) to LAeq 26 dB(A). This implies the calculation of new contours for noise from night flying. Consequently, the cost of isolating houses and buildings will rise accordingly.
- The pressure for developing a standard for group risk is rising. This is related particularly with an accident that happened in October 1992 whereby 50 residents in an Amsterdam suburb were killed when a Boeing 747 crashed into an apartment building.
- There are two methods for assessing the number of persons who experience serious disturbance from air plane noise. There is a large difference between the numbers obtained from the two methods. Only the lowest number is used as indicator for environmental quality. The difference is not explained neither is the rationale given to formally adopt the method yielding the lowest figure as environmental indicator.
- In the Netherlands a new calculation method has been developed to assess cumulative noise levels from various sources, i.e. by aircraft, trains, cars, lorries and industry. This new approach has been applied in the EIS at the Amsterdam Airport for the first time. It appears that the greater part of noise nuisance is caused by aircraft taking off and landing.
- In the calculation of noise contours for night flying an assumption is made for the level of noise absorption by constructing materials diminishing noise levels reaching bedrooms. However, the assumption is substantially larger than the value for noise absorption which was observed in an EIS for a regional airport that was carried out a few years ago. The assumption for a larger degree of noise absorption yields much smaller noise contours for night flights. The difference in assumption is not explained. Moreover, in the calculation of noise levels in bedrooms it is assumed that bedroom windows are closed during the night. Most people in the Netherlands however, like to sleep with windows slightly opened. The assumption of opened bedroom windows was also made in the EIS for the regional airport.