

EFFECTIVE SEA SYSTEM AND CASE STUDIES

Ministry of the Environment Government of Japan

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Mitsubishi Research Institute, INC.,

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INTRODUCTION

In the last decade, development and adoption of SEA has been impressive. Formal provision for SEA has been made by a number of countries, mainly in Europe and North America. The arrangements and procedures of SEA are relatively diverse, although further standardisation may take place when the European Directive on SEA comes into force. Elsewhere, there is limited use of SEA, although increasingly borrowing countries are required to carry out sector or regional assessment for World Bank financed programmes.

However, elements of SEA are applied in some developing countries, and there are increasing demands for information on and training in this area.

Now it appears to be on the threshold a new phase in the evolution and expansion of SEA, catalysed by international legal and policy developments. These include: the transposition of the EU Directive into national legislation by 15 European Union member states and 10 accession countries; the finalisation of the SEA Protocol to the UNECE Convention on Transboundary Environmental Impact Assessment; and the implications of the *Plan of Implementation* agreed at the World Summit on Sustainable Development (which highlights the need for an integrated, inter-sector approach to decision-making).

In Japan, there has been a discussion of the need to introduce SEA during the preparation phase of the Environmental Assessment Law. The Basic Environmental Plan established in 1995 in Japan requires the government to examine a way to address environmental consideration into developing process of policy, plan and program. Ministry of Environment government of Japan has been conducting research work on SEA for several years and examining the appropriate way of implementing SEA in Japan. In addition to that, several local governments, such as, Tokyo metropolitan government and Saitama Prefecture, and Ministry of Land, Infrastructure and Transport have already introduced the idea of SEA into their environmental related plans and programmes. Japan is now in the process of implementing SEA.

The purpose of this report is to show what is the nature of SEA, the merits of SEA and the elements of SEA referring to several good experiences in European countries and North American countries. The report is aimed at helping readers understand SEA and to implement SEA in individual situations.

Chapter 1 of the report provides an overview of ideas on an effective and efficient SEA system. It introduces of SEA system, the relationship of SEA and the planning process, and information on what constitutes an effective SEA. Chapter 2 focuses on the methods and procedures for implementing SEA, such as: assembly and survey of information; environmental objectives; establishment of alternatives; scoping; analysis of environmental impacts and evaluation of their significance; mitigation; comparison of alternatives and reporting; reflection in decision-making; monitoring; and involvement of third party. Chapter 3 provides case studies.

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CHAPTER 1 TOWARDS AN EFFECTIVE AND EFFICIENT SEA SYSTEM

1.1. Introduction of SEA system

1.1.1 Definition of SEA

Currently, SEA (Strategic Environmental Assessment) is widely accepted in many countries as a tool to integrate environmental consideration into a decision-making process. It is generally understood as a process for assessing the environmental impacts caused by a proposed policy, plan and program. SEA should be recognized as a supportive method to conduct appropriate decision-making from the point of view of environment and sustainable development. An increasing number of countries and international organizations, such as the Netherlands, EU, World Bank (WB), have introduced SEA systems. World-wide, there are differences in the scope, comprehensiveness, and duration of SEA in relation to policies, plans and programs (Sadler and Verheem 1996). There is no single approach to SEA that can be applied to all cases and no internationally accepted definition of SEA. More importantly, the decision making context at the strategic level is very different at national versus regional level, at policy versus plan/programme level, in developed versus developing countries, in countries with a tradition of public participation versus countries that do not have such tradition, etc. SEA should be arranged reflecting differences in each situation of proposed policy¹, plan² and program³ (hereinafter PPPs). Table 1 shows several definitions or interpretations of the concept of SEA in literatures.

Table 1 Definition or interpretations of the concept of SEA

Source	Definition or interpretation
Therivel et.al.(1992)	Evaluating the environment impacts of PPPs and their alternatives.
Sadler and Verheem(1996)	SEA is systematic process for evaluating the environmental consequences of a proposed PPPs initiative in order to ensure that they are fully included and appropriately addressed at the earliest appropriate stage of decision-making on par with economic and social considerations.
Therivel and Partidario(1996)	The formalized, systematic and comprehensive process of evaluating the environmental effects of a policy, plan or programme and its alternatives.
Brown and Therivel(2000)	SEA is a process directed at providing a holistic understanding of the environment and social implications of the policy proposal. The intention of SEA is moving PPPs towards sustainable outcomes.
Partidario(2000)	SEA is to be conceptualized as a framework, which address environmental quality and environmental consequences. SEA is incrementally integrated into policy and planning procedures and practices.
Partidario and Clark(2000)	SEA is a systematic on-going process for evaluating, at the earliest stage of decision-making, the environmental quality and consequences of alternative visions and development intentions incorporated in PPPs, ensuring full integration of relevant biophysical, economic, social and political considerations.
World Bank(2002)	SEA is a tool for upstreaming environmental and social issues into development planning, decision- making and implementation processes at the strategic level.(interim operational definition)

Source: CSIR(2002)

¹ A general course of action or proposed overall direction that a government is, or will be, pursuing and which guides ongoing decision-making (Sadler and Verheem, 1996)

² A purposeful, forward-looking strategy or design, often with coordinated priorities, options and measures, that elaborates and implements policy (Sadler and Verheem, 1996).

³ A coherent, organized agenda or schedule of commitments, proposals instruments and/or activities that elaborates and implements policy (Sadler and Verheem, 1996).

According to these definitions, several factors which seem to be common elements for SEA can be identified.

SEA should be applied at policy, plan and programme level.

SEA should provide useful information before during decision-making process.

SEA stresses the importance of taking account of sustainability consideration as well as environmental consideration.

SEA provides the necessity to integrate environmental, social and economic consideration into strategic decision-making.

1.1.2 Historical development and current status of SEA systems

In Table 2, Sadler (2001) summarized the current evolution of SEA as part of the mainstream of EIA history and related it to three main phases of development. Firstly, the US National Environmental Policy Act (NEPA, 1969) is believed to be a first SEA system in the world. The procedural requirements in section 102 in the NEPA include provision for a detailed statement to accompany proposals for ‘legislation and other major federal actions’ significantly affecting the environment. After that, certain legal and policy precedents were established that related to the introduction and early implementation of SEA. Other than the USA, however, the role and scope of SEA was limited and restricted to a few countries, such as Canada, the Netherlands, and Australia, and to particular elements from 1970 to 1989, called the “Formative Stage” by Sadler.

The next period of development of SEA system was from 1990 to 2000, named the “Formalisation Stage. During this period, SEA systems were established in a number of countries and became more diversified. Some countries introduced SEA for PPPs that were separate from usual EIA legislation and procedure, for example in Canada and Denmark, or took the form of environmental appraisal of policies and plans as in the UK. Other countries addressed issues by reforming their EIA frameworks, such as Czech Republic and Slovakia, or incorporating SEA into resource management or biodiversity conservation regimes, such as, New Zealand and Australia.

Finally, in the last period, which is called the “Extension Stage” (from 2001 to now), SEA appears to be on the threshold of widespread adoption and further consolidation as a result of international legal and policy development. Important key factors accelerating this direction would be the new European Directive on SEA and the SEA protocol of the UNECE Convention on Transboundary EIA.

Table 2 SEA legal and policy benchmarks

Year	Contents
1970	<ul style="list-style-type: none"> ➤ US National Environmental Policy Act (NEPA;1969) requires “proposals for legislation and other major federal actions significantly affecting the [...] environment” to include a “detailed statement [...] on the environmental impact” (Sec.102 (2)(c)). ➤ California Environmental Quality Act modelled after NEPA and applies to activities proposed or approved by state agencies, including programmes, plans & staged projects (Guidelines Sec. 15165-15168).
Mid 1970's	<ul style="list-style-type: none"> ➤ CANADA Public inquiries and environmental reviews of major proposals considered policy issues (e.g. Mackenzie Valley Pipeline Inquiry, Canada, 1947-1977, Ranger Uranium Environmental Inquiry, Australia, 1975-1977).
1978	<ul style="list-style-type: none"> ➤ NEPA Regulations Issued by Council on Environmental Quality specify actions subject to programmatic EIS as those that can be grouped generically, geographically or by technology (Sec. 1052.4 (b)).
1987	<ul style="list-style-type: none"> ➤ NETHERLANDS EIA Act (amended 1994) applies to specified national plans and programmes, including all those fixing the locations of projects for which an EIA is

	mandatory.
1989	<ul style="list-style-type: none"> ➤ AUSTRALIA Resource Assessment Commission Act establishes independent inquiry body on resource policy issues (Commission disbanded in 1993, legislation retained). ➤ WORLD BANK Operational Directive 4.00 (amended 1991, 1999) refers to preparation of sectoral and regional EA (Annex A 6-8). ➤ UNECE (Espoo) Convention on EIA in a Transboundary Context (came into force 1997) calls on the parties “to the extent appropriate [...] [to] endeavour to apply” the principles of EIA to policies, plans and programmes (Article 2(7)).
1990	<ul style="list-style-type: none"> ➤ CANADA Environmental Assessment Process for Policy and Programme Proposals by Order-in-Council (amended 1999) applies to proposals submitted to Cabinet.
1991	<ul style="list-style-type: none"> ➤ NEW ZEALAND Resources Management Act is a landmark sustainability law combining policy, planning and regulatory functions into omnibus regime. ➤ UK Guide on Policy Appraisal and the Environment provides advice for central government agencies (updated by good practice guidance, 1994; amended 1997).
1992	<ul style="list-style-type: none"> ➤ UNECE pilot study EIA of Policies, Plans and Programmes recommends its application by member countries. ➤ HONG KONG Environmental implications of Policy Papers by decision of the Governor applies to proposals to Executive Council (later development plans).
1993	<ul style="list-style-type: none"> ➤ DENMARK Environmental Assessment of Governments Bills and Other Proposals by Prime Minister’s Office (PMO) circular (amended 1995, 1998 when it became legally binding); applies to draft legislations to Parliament and to strategic proposals on which Parliament must be consulted. ➤ EUROPEAN COMMISSION Environmental Assessment of Legislative Programme by Internal Communication applies to legislative proposals and other actions by Commission.
1994	<ul style="list-style-type: none"> ➤ UK Guide on Environmental Appraisal of Development Plans advice to local authorities on how to carry out their responsibilities under planning legislation. ➤ NORWAY Assessment of White Papers and Government Proposals by Administrative Order contains provisions relevant to environment but applies primarily to economic and administrative consequences. ➤ SLOVAKIA EIA Act contains requirement to assess basic development policies, territorial plans in selected areas and any legislative proposals that may have an adverse impact of the environment (Article 35).
1995	<ul style="list-style-type: none"> ➤ NETHERLANDS Environmental Test by Cabinet Directive applies to draft legislation, part of comprehensive review of enforceability, feasibility and impact on business.
1996	<ul style="list-style-type: none"> ➤ Proposal by European Commission for a directive on the assessment of the effects of certain plans and programmes (COM (96) 511); amended by COM (99) 73, hereafter SEA Directive.
1998	<ul style="list-style-type: none"> ➤ FINLAND Guidelines on Environmental Impact Assessment of Legislative Proposals by Decision-in-Principle applies to law drafting, also decrees, resolutions and decisions. ➤ UNECE (Aarhus) Convention on Access to Information, Public Participation in Decision Making and Access to justice in Environmental Matters provisions for public participation in Article 7 & 8, respectively, refer to plans, programmes and policies and to laws and regulations relating to environment; ➤ UNECE Declarations by the Environment Ministers of the UNECE region on Strategic Environmental Assessment (ECE/CEP/56) invites countries and international finance institutions to introduce and/or carry out SEA “as a matter of priority”
1999	<ul style="list-style-type: none"> ➤ AUSTRALIA Environmental Protection and Biodiversity Conservation Act introduces provisions enabling SEA of policies, plans and programmes. ➤ FINLAND Act on Environmental Impact Assessment Procedure applies to policy, plans and programmes. ➤ UK Proposals for a Good Practice Guide on Sustainability Appraisal of Regional Planning Guidance.
2000	<ul style="list-style-type: none"> ➤ Common Position adopted by the Council with a view to adoption of an SEA Directive

	(5865/00).
2001	➤ Decision to negotiate an SEA Protocol by the parties to the Espoo Convention for possible adoption at Fifth Ministerial Environment for Europe Conference (2003).
2002	➤ The Johannesburg agenda adopted in the Johannesburg World Summit on sustainable development in September 2002.

Source: Sadler (2001) updated

Countries and international organizations listed in Table 3 below have already made formal provision for SEA of PPPs. Regarding the scope of application, no country appears to provide a comprehensive scope of SEA coverage, namely, across all levels of proposed strategic action. Current SEA systems are mainly focused on plan and programme level, rather than policy.

Table 3 Selected examples of institutional framework for SEA

Country	Provision	Scope of application	Comments
Australia	Assessment Commission Resource Act (1989); Commission itself disbanded (1993)	Major resource issues referred by Prime Minister's Office	Public inquiry of ecological, social and economic aspects
Denmark	Prime Minister's Office circular (1993; amended 1995 and 1998 when requirement became legally binding)	Bills and other government proposals sent to Parliament or on which Parliament must be consulted	Minimum procedure, separate from project EIA
The Netherlands	Environmental Impact Assessment Act (1987) Cabinet Order (1995) for E-test	Applies to specified plans and programmes; referred to as strategic EIA (SEIA) Applies to law and regulation	EIA procedure applies in full
New Zealand	Resource Management Act (1991)	SEA elements provided by policy statements, regional and district plans, which govern consents	No separate provision for SEA; integral part
United Kingdom	Guidance of Policy Appraisal and the Environment (1991; amended 1997) Planning and Guidance Note 12 (1992; amended 1998) to local Proposed Guidance of Sustainability Appraisal of Regional Planning (1999)	Policies, plans and programmes developed by central government agencies Development plans prepared under town and country planning regulations	Process operate separately Non-prescriptive procedure of environmental appraisal
USA	National Environmental Policy Act (1969) and Regulations (1978)	Legislation and programmes --- actions that can be grouped geographically, generically or by technology	NEPA process applies; specific guidance on preparing generic and programmatic EISs
European Community EU	Council Directive on the assessment of certain plans and programmes (2001)	Plans and programmes in defined areas, including sectors and land use	Framework law, specifies minimum procedure to be followed by member states
World Bank	Operational Directive on Environmental Assessment (OD 4.00, Annex A 1989; amended as OD 4.01 1991, 1999)	Bank financed plan, programme or series of projects for a particular sector or region	Policy encourages use of sector and regional EA by borrowing country

Source: Sadler and Verheem, 1996 (updated)

1.1.3 Response to the EU directive

The European Community Directive on SEA, which is a framework law, is an important step for accelerating the introduction of SEA to all member states of the European Union. It sets out very general elements and procedural requirements and is now in the process of being transposed into national legislation. The 15 member states of the European Union and 10 accession countries are required to implement their SEA legislation by May 2004.

The Directive itself applies to plans and programs but does not apply to policies. Much of the controversial discussion during the establishment of the directive was on whether policy should be included or not. The SEA Directive itself is very much modelled on the EIA Directive. It has similar key procedural requirements and is expected that many of the methods and tools and approaches that used in the EIA will be applied to SEA of plans and programs. Some of the key procedural requirements of the SEA directive relate to the type of information that needs to be in the environmental report and to the provision for public consultation and comments. It also requires decision makers to take the environmental information and the comments into account.

1.1.4 World Summit on Sustainable Development

The Johannesburg World Summit on Sustainable Development, held in September 2002, resulted in a Plan of Implementation, which recommended an integrated approach to environment and development decision-making. SEA itself is not explicitly mentioned but it is clearly understood to be one of the frontline tools for giving effect for that kind of intersectoral approach. The Plan of Implementation calls upon all countries to be pursuing this approach far more vigorously than they have to date.

1.1.5 Areas subject to SEA

Areas subject to SEA cover wide range of PPPs, including sector-specific policy, plans and programmes, spatial and land use plans, regional development programmes, natural resource management strategies, legislative and regulatory bills, investment and lending activities, international aid and development assistance, structural adjustment funds and operations, macro-economic policy and budgets and fiscal plans (UNEP, 2002). Most attention is given to proposed actions in specific sectors that are known or likely to have significant environmental effects, for example, energy, transportation and industrial development; and spatial plans, regional development programmes and resource management strategies. The scope of areas subject to SEA, however, differs in each system.

1.1.6 Institutional arrangements for SEA

Referring to several SEA frameworks in countries and international organizations, the UNEP Manual (2002) illustrated five types of SEA arrangements as the following Table 1.4. EIA-based SEA is carried out under EIA legislation or related procedure like in the Netherlands and Canada. Environmental appraisal type SEA is placed as one part of process of policy and plan appraisal relatively less formally. Others are dual-track system, integrated policy and planning system and sustainability appraisal.

Table 4 Characteristic of institutional arrangements of SEA

Type	Contents
EIA-based	SEA is carried out under EIA legislation (e.g. the Netherlands) or as separately administered but related procedure (e.g. Canada).
Environmental appraisal	SEA provision is made through a comparable, less formalized process of policy and plan appraisal (e.g. UK).
Dual-track system	SEA arrangements are differentiated and implemented as separate process (e.g. the environmental test of the Netherlands for legislation and EIA for specific plans and programmes).
Integrated policy and planning system	SEA elements are part of effects-based policy and plan-making (e.g. New Zealand).
Sustainability appraisal	SEA elements are replaced by integrated (environmental, economic and social) assessment and review of major policy and planning issues (e.g. Australia and UK sustainability plans.)

Source: UNEP (2002)

1.1.7 Elements of SEA

Up to now, considerable experiences with SEA practices have been gained in several countries. In many cases, procedures and methods used in SEA are similar to EIA, except for minimum approaches such as the Netherlands E-test. EIA-based procedures and methods still may need to be modified to take account of greater uncertainty about potential effects, compared to project-specific proposals. EIA and appraisal-based SEA processes are overlapping and include common procedural elements. For example, both processes include provision for scoping, consideration of alternatives and mitigation of environmental effects. They also diverge in certain respects; examples include explicit requirements for public involvement and information to be provided in an EIA-based SEA and emphasis on clarifying trade-offs and constraints in an environmental appraisal (UNEP, 2002). Table 5 compared procedures required in selected types of SEA.

Table 5 Comparison of procedure of different types of SEA

Policy SEA(E-test of the Netherlands)	EIA-based SEA(SEIA)	Appraisal-based SEA
<p><i>Screening/scooping phase:</i></p> <ul style="list-style-type: none"> Interdepartmental working group identifies proposals to be tested and issues to be examined. <p><i>Analysis/documentation phase:</i></p> <ul style="list-style-type: none"> E-test carried out by the responsible Ministry, with assistance of the Joint Support Centre, and results documented in an Explanatory Memorandum to the draft legislation. <p><i>Review/submission phase:</i></p> <ul style="list-style-type: none"> Joint Support Centre, in co-operation with the Ministry of justice, reviews the quality of the information in the memorandum to determine if the draft can be submitted to the Council of Ministers. 	<p><i>Screening:</i></p> <ul style="list-style-type: none"> Is to determine whether or not an SEA is needed and at what levels. <p><i>Scoping:</i></p> <ul style="list-style-type: none"> Is to identify key issues and alternatives, clarify objectives and develop terms of reference for SEA. <p><i>Identification and comparison of alternatives (including no action):</i></p> <ul style="list-style-type: none"> Is to clarify implications and trade-offs. <p><i>Inform and involve the public:</i></p> <ul style="list-style-type: none"> Is to identify the views and concerns held by stakeholders. <p><i>Analysis and evaluate the impacts:</i></p> <ul style="list-style-type: none"> Is to identify the significant effects of selected alternatives and measures for mitigation and follow-up. <p><i>Document the findings:</i></p> <ul style="list-style-type: none"> Is to provide the information that is needed for decision-making and/or to comply with legal requirements. <p><i>Review the quality of the information:</i></p> <ul style="list-style-type: none"> Is to ensure it is clear, sufficient and relevant to the decision being taken. <p><i>Carry out follow up measures</i></p> <ul style="list-style-type: none"> Is to monitor effects, check on implementation, and track any arrangements for subsidiary SEA or EIA 	<p><i>List the objectives of the proposal and summarize the policy issue, identifying possible trade-offs and constrain.</i></p> <p><i>Specify the range of options :</i></p> <ul style="list-style-type: none"> for achieving the objectives <p><i>Identify and list all environmental impacts, issues and implications</i></p> <ul style="list-style-type: none"> and consider mitigation measures to offset them <p><i>Assess their significance :</i></p> <ul style="list-style-type: none"> and importance in relation to other effects <p><i>Quality costs and benefits :</i></p> <ul style="list-style-type: none"> where possible and appropriate (i.e. without disproportionate effort) <p><i>Value costs and benefits:</i></p> <ul style="list-style-type: none"> using an appropriate method including those based on monetary values, ranking or physical quantities. <p><i>State the preferred option :</i></p> <ul style="list-style-type: none"> with reasons for doing so. <p><i>Monitor and evaluate :</i></p> <ul style="list-style-type: none"> the results, making appropriate arrangements for doing so as early as possible. <p><i>Consider how the appraisal :</i></p> <ul style="list-style-type: none"> will be publicized.
<p>Source: Verheem and Tonk (2000)</p> <p>Source: UNEP (2002)</p>	<p>Source: UNECE (1992)</p>	<p>Source: UK Department of Environment, Transport and the Regions (1998)</p>

The EC report on *SEA and Integration of the Environment into Strategic Decision-making* showed the elements and procedural requirements of SEA. These include:

- scoping, including identification of alternative options;
- production of environmental statement/report including identification, analysis and assessment of likely significant effects on the environment;
- participation and consultation, throughout the process including relevant authorities, the public and NGOs, etc.;
- taking into consideration the content of the environmental statement/report and the results of consultation during preparation and prior to the adoption of the plan/programme; and
- a non-technical summary that summarises the statement/report and the results of the consultation exercise; and monitoring.

1.1.8 Future direction

Recommendations on how SEA can be best integrated into policy making were made in the report of *SEA and Integration of the Environment into Strategic Decision-Making* (Sheate, et al,2001). The recommendations focus on the key issues emerging from the generic and the case study research and are divided into five types.

- Applying SEA at the most strategic levels of decision-making
- Promoting effectiveness of integration
- Public and stakeholder participation
- SEA and Sustainability Appraisal
- Undertaking SEA
- Guidance and Training

Current trends seem to be moving into a next generation process, that is, sustainability appraisal or assessment, namely, how we are able to consider environmental, social and economic impacts as part of one integrated process. The attempt is to identify whether a proposed PPP or a project is environmentally, economically and socially sustainable. UNEP (2002) summarized future direction of SEA development, noting that it might be used as a tool for assessing sustainability of PPP proposals. There is increasing discussion of the use of SEA as an instrument to review the sustainability of development proposals, rather than merely to minimize the environmental impact of PPPs. Future directions for SEA as a sustainability instrument can follow two avenues. One is that SEA is set as a process for environmental sustainability assurance of PPP making, checking that proposed actions are consistent with key sustainability measures and safeguards. The other involves repositioning SEA as a steppingstone or transitional process that leads toward sustainability appraisal or integrated assessment of environmental, economic and social effects of PPP proposals.

1.2. SEA and Planning Process

1.2.1 Approaches to SEA

Plans are not of one discrete type as some may be more policy orientated and others may have a focus upon a series of projects or land use change. Hence the individual SEA method should reflect the type of plan. Those that initiate projects as opposed to having a policy focus are best addressed by impact assessment techniques, while those with a policy focus may be better addressed through an appraisal-based, objectives-led approach. Clearly this also has an impact upon what is meant by consideration of

alternatives. Alternatives within a project orientated plan will need to be more framed than consideration of alternative policies where the scope for flexibility is a wider range.

Based on the specific features of proposed PPPs, the practical undertaking SEA may use three basis approaches:

- Impact assessment approach
- Objective-led appraisal
- Ad hoc approach

Impact assessment approach

Impact assessment approach focuses on the identification, prediction and evaluation of likely significant environmental effects of implementation of PPPs. This approach is based on extension of project-level EIA procedures and evaluation techniques and applies the following sequence of tasks⁴:

- When a draft PPP is prepared, it undergoes internal or public scoping to determine the key likely effects of implementation the proposed PPP. Scoping may determine new alternatives that should be considered within the SEA process. Based on the outcomes of scoping, prediction and assessment a SEA Report is prepared for the main alternatives of the PPP. The report describes the likely significant environmental effects of implementation of the each alternative of PPP as defined during the scoping stage. The SEA report also identifies possible measure to mitigate or offset negative environmental/health effects. It should also deal with the delivery of environmental objectives through enhancement measures. The SEA report is reviewed by relevant environmental and health authorities and by the public concerned. The purpose is to ensure the robustness of the recommendations for the final decision on the PPP.

Impact assessment approaches provide a good basis for rigorous analysis of effects of implementation of the proposed alternatives of the PPP. This approach can be applied only after the draft alternatives of the PPP have been formulated. By this time, in some countries, the planning authorities may have reached their internal agreement on the PPP and may be reluctant to fully consider alternatives proposed during the scoping stage. If this happens, SEA does not effectively guide generation of alternatives of PPP and deals merely with their mitigation and compensation measures. This highlights the need for SEA to be integral to the plan making process not a bolt-on.

Objective-led appraisal

Objective-led appraisal enables evaluation of consistency of the PPP with the relevant environmental/health (or sustainability) objectives for the given sector or region. This approach is inspired by analytical techniques applied in policy analysis and strategic planning processes⁵. Objective-led appraisal can be undertaken at the earliest stage of the PPP formulation and applies the following sequence of basic tasks:

- The SEA team identifies the key environmental and health (or sustainability) objectives for the given sector (in case of sectoral PPPs) or region (in case of regional PPPs). The planning team is informed about need to attain these objectives within the plan. The SEA team works in parallel

⁴ See for instance the EC/DG-TREN Study on Strategic Environmental Assessment of Transport Infrastructure Plans at

http://www.europa.eu.int/comm/transport/themes/network/english/bground_doc/index_en.html

⁵ see for instance the EC Working Paper for The Ex-Ante Evaluation of the Structural Funds Interventions,

http://www.europa.eu.int/comm/regional_policy/sources/docoffic/working/sf2000b_en.htm

with the planning team and checks consistency of the proposed PPP with the relevant environmental and health (sustainability) objectives.

- The SEA team firstly reviews consistency of the proposed objectives of the PPP with the environmental and health objectives and reveals possible conflicts or synergies between them. Based on this analysis, the SEA team may provide suggestions for possible reformulation of the proposed objectives in the PPP.
- The SEA team reviews the consistency of all initially proposed alternatives of the PPP with the environmental and health objectives. This analysis again reveals possible conflicts or synergies and may again provide inputs for development of new alternatives of the PPP.
- Public participation and consultations with relevant governmental agencies can be organised at each stage of this iterative process. Consultations should begin during the objective-setting stage since agreement on the final alternative of the PPP among key stakeholders is almost impossible unless they jointly agreed on the general objectives for the PPP.

Objective-led appraisal provides early input into formulation of strategic alternatives and facilitates active cooperation among the SEA team and the planning team. This approach, however, can be applied only if sufficiently well formulated environmental or health (or sustainability) objectives exist for the given sector or region. In some countries, this is not the case. This approach also enables only general evaluation of initial alternatives of the PPP and needs to be later complemented by detailed assessment of detailed alternatives of the PPP.

Recommendations for good practice SEA

Good SEA practice combines both approaches and builds on their strengths. Objective-led appraisal can be applied in early stages of PPP formulation. It facilitates early clarification of key environmental objectives for the PPP and helps in early reviews of possible strategic alternatives of PPP against these objectives. Objective-led appraisal also creates early links between the SEA and planning and becomes a key component of an effective SEA process.

Impact assessment is applied once the main activities in the proposed PPP become clear. This assessment complements earlier reviews by undertaking a rigorous qualitative or quantitative analysis of the main potential environmental and health effects for each alternative.

1.2.2 Important factors determining the influence of SEA on decision-making

Several important factors which determining the influence of SEA on decision-making have been identified. These include integration, tiering, timing, political will and use of information. Integration establishes clear links between SEA and proposed PPPs (the Ministry of the Environment and the Ministry of Transport and Communication in Finland, 2001).

At first, in an ideal case, integrating SEA into the process of preparation of relevant PPP would be a better approach. It may also mean that teams from both SEA and PPP actively take part in each other's processes or use other means of frequent exchange of information to ensure close contacts between those preparing the plan or programme and those carrying out the assessment. Poor integration may lead to mismatches and wasteful time and cost on unimportant studies.

Second, tiering emphasize the necessity of the links from the strategic level to the concrete project level and vice versa. Tiering is easiest and most effective when a policy, plan or programme proposal sets the framework or context for projects and activities that will be subject to EIA. In this case, the SEA report will help to pre-identify key issues for the EIA and assist screening and scoping, thereby leading toward

a more streamlined and focussed process. Box1.1 below summarized key points in tiering. A consideration of how SEA of PPPs linked to the project level is crucial. Poor integration between different levels may greatly reduce benefits of the assessment.

Box 1 Key points in tiering

- Look at the right issues at the correct stage in the vertical SEA-EIA process: this ensures that sufficient information exists to provide robust decisions that accommodate uncertainty.
- Understanding organizational structures is vital to the success of tiering: hence, many actors should be involved in SEA to ensure that it is accepted into project EIA.
- Tiering helps to focus on alternatives without forgetting the assessment topic.
- Tiering may not solve problems of timing the strategic discussion since there may be up to 20 years between SEA and EIA and new stakeholders and interests may enter the scene. It should, however, be ensured that EIA actually refers to SEA.

Source: Ministry of the Environment and the Ministry of Transport and Communication (2001)

Regarding timing, SEA and preparation of a plan or programme should be done simultaneously. Timing of the two processes is very important factor for having effective results from the point of view of integration of environmental consideration into decision-making. If SEA is conducted after key decisions on a PPP have already been made, it may be impossible to influence the plan or programme to have these taken into consideration SEA results.

Fourthly, the political will to carry out a SEA is critical. In some cases, even though the responsible authority is unwilling to carry out the SEA of a PPP, political pressure may promote conducting the SEA for the relevant PPP. Legislation of SEA may, in the long run, be useful in developing the political will to carry out SEA. Successful communication with the politicians raises awareness. It is important to promote SEA to politicians as a useful tool to reflect public inputs and views.

In addition to that, it is crucial for political will that politicians understand what the direct political benefits of SEA to them are. Specifically

- Well informed decision making leads to a better image to voters, leading to more votes at the next election.
- The necessary measures can be designed more effectively and to avoid unnecessary and costly mitigation or compensation measures, by having a good knowledge of the environmental and social implications.
- The unnecessary delay and costs in later stages of a PPP implementation can be avoided. If new issues are identified in those phases, it is more difficult to take these into account then it would have been in earlier stages.
- A good SEA contains a “consistency analysis” showing politicians if and how new PPPs may conflict with already existing ones. This may lead to more effective development of a region and better understanding of possible win-win options.

Fifthly, there are several important factors which should be considered regarding use of information as follows.

- **Communication** plays a major role in having influence on decision-making.

- **Concise and simple style with clear data sets and indicators** help the reader to build an overall picture and make choices on his or her own.
- **The transparency** can be ensured by references to supporting documents which provided deeper levels of detail.
- **Too much information is not good for understanding situation correctly.**
- **An open and transparent process** that encourages public participation is necessary for sustained will to use assessments.
- **The aims and objectives of the assessment** should be defined.

1.3. Information on effective SEA

1.3.1 Advantages of SEA

UNEP(2000) summarize the advantage of SEA. The necessity of SEA is simply that project level EIA on its own is not enough. Only a relatively small proportion of proposed actions and decisions are subject to EIA examination. Also, EIA is conducted at a relatively later stage of the decision-making process after the selection of major alternatives and directions of proposals are finished. This is the reason why SEA is conducted upstream in the decision-making process.

Main aims and objectives in conducting SEA can be summarized into three points, namely supporting informed and integrated decision making, contributing to environmentally sustainable development and reinforcing project EIA. Supporting informed and integrated decision-making would be achieved by identifying environmental effects of proposed actions, considering alternatives and specifying appropriate mitigation measures. Contributing to environmentally sustainable development would be achieved by anticipating and preventing environmental impacts at source, by early warning of cumulative effects and global risks and by establishing safeguards based on principles of sustainable development. Finally reinforcing project EIA could be implemented by prior identification of scope of potential impacts and information needs, by addressing strategic issues related to justification of proposals and by reducing the time and effort necessary to conduct individual reviews

There are several merits of conducting SEA. One is that SEA is a proactive tool to assess and prevent environmental damage caused by PPPs initiated by development agencies. Providing early warning of large scale and cumulative effects would be the main contribution of SEA to the decision-making process. For example, an SEA of a land use plan can take account of biodiversity losses associated with proposed developments, or an SEA of a national road building programme can address the implications for climate warming by CO2 emissions.

Second, SEA represents a more proactive approach than EIA to integrate environmental considerations into the high levels of decision-making processes. Sometimes, SEA requires broader and less detailed assessments compared to project EIA. Table 6 below summarized the comparisons between project EIA and SEA.

Table 6 Comparison of characteristics between project EIA and SEA

	Project EIA	SEA
Stage of assessment in the proposals	Take place at the end of decision-making process	Take place at earlier stages of decision-making process
	Reactive approach to development proposals	Pro-active approach to development proposals

Scope of impacts	Identify specific impacts on the environment	Identify environmental and sustainable development issues
	Limited review of cumulative effects	Early warning of cumulative effects
Range of alternatives	Consider limited number of feasible alternatives	Consider broader range of potential alternatives
Characteristics of assessments	Emphasis on mitigating and minimizing impacts	Emphasis on meeting environmental objectives, maintaining natural framework
	Narrow perspective, high level of detail	Broad perspective, lower level of detail to provide a vision and overall framework
	Well-defined process, clear beginning and end	Multi-stage process overlapping components, policy level is continuing iterative
	Focuses on standard agenda, treats symptoms of environmental deterioration	Focuses on sustainability agenda, gets at sources of environment deterioration

Source: CSIR (2000) amended in UNEP (2002)

1.3.2 Successful examples of SEA

The followings are examples from the Netherlands on successful SEA cases, which represent several merits of conducting SEA. The case studies are reported in Chapter 3.

First, the SEA for the National Spatial Plan for West Netherlands showed that a better alternative existed for the two models proposed by the government at the beginning of the planning process. It also indicated alternative locations for the realisation of new housing projects. The cost benefit analysis, that was part of the SEA, showed the need to design a new transport system for the region to ensure an overall positive cost benefit ratio.

Secondly, the SEA for the regional spatial plan (North Holland South Spatial Strategy Plan) showed that combining the principles underlying the four alternative models examined, actually gave the best overall score. Also, it showed how this combination model scored against the model that would be best from an environmental viewpoint and how the environmental and social performance of the combination-model could be improved by applying a phased implementation of this model.

Thirdly, the SEA for the National Waste Management Plan 2002 will help to make project EIAs for specific waste processing facilities much easier. In these EIAs, it will be sufficient to show that the environmental performance of the facility equals, or is better than the score of the minimum standards, as assessed in the SEA. For the EIA, the same methodology can be used as used in the SEA. Furthermore, for many facilities this assessment was already carried out in the SEA. A second success of this SEA was that, because of extensive public participation in the planning process, the final waste management plan was widely accepted.

Fourth the SEA for the National Plan on Drinking and Industrial Water supply developed much new methodology that could be readily used at the project level. This significantly reduced the workload at project level. This same conclusion can be drawn for the comparison of the environmental performance of alternative drinking water production techniques. At the project level, it is sufficient for the EIA to show how the proposed technology scores in comparison to those in the SEA.

Fifthly, the SEA for the National Electricity Structure Scheme clearly showed the overall environmental benefits of the alternative endorsed by most environmental NGOs, i.e. to use more gas-fired power stations instead of coal-fired power stations. The SEA showed the accumulated effect of all electricity generation in both a high and a low demand future scenario. On the basis of this outcome, it was decided that new power stations should be gas fired.

1.3.3 Advantage for the planners

According to the MER report (1999), SEA can lead to time and cost saving for EIA. It is relatively easy to understand that time reduction of implementation of project EIA may be expected by conducting SEA in advance. However, cost reduction may be a bit difficult to prove it. Land Use Consultants (1996) states that cost reduction may be a real benefit but it is difficult to measure.

Several authors state the benefits of implementing SEA as follows:

- SEA can be an important resource for project EIA levels. SEA will never replace project EIAs, but they strongly reduce the effort and resources involved in project EIAs (Therivel and Partidario,1996).
- Avoidance of subsequent delay was cited in interviews as an advantage in nearly half of the case studies (Land Use Consultants, 1996).
- In addition to that, there may be the possibility of making relevant plans or programmes understandable for other stakeholders.

1.3.4 The Criteria of Good-quality SEA

In 2001, the IAIA Board of Directors adopted the SEA performance criteria shown in table 1.7. It identifies a good quality SEA process as one that:

- informs planners, decision-makers and affected public on the sustainability of strategic decisions,
- facilitates the search for the best alternative and ensures a democratic decision-making process, which
- enhances the credibility of decisions and leads to most cost- and time- effective EA at the project level.

A good-quality SEA process is integrated, sustainability-led, focused, accountable, participative and iterative.

Table 7 A good-quality SEA process:

Is integrated	<ul style="list-style-type: none"> ● Ensures an appropriate EA of all strategic decision relevant for the achievement of sustainable development. ● Addresses the interrelationships of biophysical, social and economic aspects. ● Is tiered to policies in relevant sectors and (transboundary) regions and, where appropriate, to project EIA and decision-making.
Is sustainability-led	<ul style="list-style-type: none"> ● Facilitates identification of development options and alternative proposals that are more sustainable.
Is focused	<ul style="list-style-type: none"> ● Provides sufficient, reliable and usable information for development planning and decision-making. ● Concentrates on key issues of sustainable development. ● Is customized to the characteristics of the decision-making process. ● Is cost- and time-effective.
Is accountable	<ul style="list-style-type: none"> ● Is the responsibility of the leading agencies for the strategic decision to be taken. ● Is carried out with professionalism, rigor, fairness, impartiality and balance. ● Is subject to independent checks and verification. ● Documents and justifies how sustainability issues were taken into account in decision-making.
Is participative	<ul style="list-style-type: none"> ● Informs and involves interested and affected public and government bodies throughout the decision-making process.

	<ul style="list-style-type: none"> ● Explicitly addresses their inputs and concerns in documentation and decision-making. ● Has clear, easily-understood information requirements and ensures sufficient access to all relevant information.
Is iterative	<ul style="list-style-type: none"> ● Ensures availability of the assessment results early enough to influence the decision-making process and inspire future planning. ● Provides sufficient information on the actual impacts of implementing a strategic decision, to judge where this decision should be amended and to provide a basis for future decision.

Source: IAIA (2002)

1.3.5 Lessons and learned for effective and efficient SEA

Sadler and Verheem (1996) identified several factors that can contribute to the successful implementation and operational rules of SEA that would be identified based on lessons from international experience (also updated in UNEP, 2002).

- Factors of successful implementation of SEA :
 - Promote SEA as bonus not a burden.
 - Encourage creativity and innovation.
 - Tailor the approach to the requirements of decision-makers[provide start-up help and assistance].
 - Build a knowledge base through hands on experience.
 - Learn by doing when applying new methods and procedures.

Source: Sadler and Verheem, 1996, UNEP (2002)

- Operational rules :
 - Begin as early as practicable in the process of policy or plan formulation.
 - Keep in mind that the purpose of SEA is to inform decisions not to produce a study.
 - Provide the right information at the right time for decision-making.
 - Focus on the comparison of major alternatives.
 - Carry out an appropriate form of analysis- impact assessment or policy appraisal.
 - Use the simplest procedures and methods consistent with the task.
 - Look gain environmental benefits as well as avoid adverse impacts.
 - Review and document the outcome of the SEA process.

Source: Sadler (2001)

Sheate, et al, (2001) illustrated the contributing factors on the integration of environmental considerations into decision-making by conducting several case studies as follows.

Table 8 Contributing factors of the integration of environmental considerations into decision-making

Item	Contents
<i>Advocacy</i>	At its simplest level SEA plays an important advocacy role (Kornov and Thissen, 2000). It raises the profile of the environment and ensures that the decision-maker must at least consider the information that is provided through the environmental statement.
Awareness Raising	However, SEA also plays a more subtle awareness-raising role. It provides a mechanism within which the various actors involved in the policy process become exposed to environmental consequences.
<i>Co-ordination and Communication</i>	SEA represents a co-ordinating tool allowing different elements of sustainability to be identified and evaluated under a common framework, enabling more informed decisions regarding trade-offs to be made. Tiered SEA creates essential links between the different levels in the policy and planning hierarchy. SEA can create institutions or a framework within which different institutions can work together.
<i>Guidance and Training</i>	SEA can be the catalyst to guidance and training. The UK Strategic Defence Review SEA (for example) has led to five people in the Defence Estates Agency of the Ministry of Defence being put through postgraduate environmental management courses. The Yorkshire Forward SA has led to the development of guidelines for sustainability appraisal and provided the framework for

	developing the region's sustainable development framework.
<i>Information</i>	The data provided by SEA allows more informed decisions to be made regarding trade-offs between environmental, economic and social factors. A good baseline survey allows an assessment of significance based on the current situation to be assigned to each impact. Furthermore, SEA also helps set objectives, indicators and targets. The regular use of SEA should result in investment in appropriate environmental monitoring and the creation of standard baseline database resources.
<i>Accountability</i>	SEA creates an auditable trail, which helps increase transparency and accountability. The SEA Directive will expose policies to greater scrutiny just as EIA has exposed decisions at plan and programme level. This will inevitably lead to pressure building up to extend EA to the policy level. SEA provides something that can be audited. Equally, auditing and monitoring is essential to ensure effective SEA. Indeed ex post assessments tend to focus on auditing and monitoring.
<i>Catalyst for Further Mainstreaming Initiatives</i>	SEA tends to be evolutionary rather than revolutionary in that it can act as a catalyst for further institutional and organisational changes. Often this catalyst role is extremely important at 'kicking things off', particularly in the absence of formal or legal requirements. This catalyst role can be equally effectively undertaken by an ex post assessment as a proactive SEA.
<i>Education and Social Learning</i>	Effective SEAs need to both educate as well as provide the framework for collecting and analysing information. The challenge is to encourage strategic-thinking stakeholders to engage in the SEA process, and to 'lift the horizon' for those least willing or able to appreciate their own interests in the wider context. It can provide an appropriate forum for active social learning by all stakeholders.
<i>Selection of the Most Sustainable Option</i>	SEA encourages and facilitates the consideration of alternatives, and therefore allows the earlier integration of environmental consideration within the policy making cycle, and the selection of the most environmentally sustainable option(s).
<i>Monitoring and Quality Control</i>	SEA provides the baseline information and prediction of impacts necessary to undertake monitoring and ensure effective quality control. Quality control should ensure that methodologies are applied appropriately and rigorously.

Source: Sheate, et al., (2001)

Sheate, et al, (2001) also stated that above these factors are partly derived from the national systems and case study findings. Care is needed in extrapolating these to more generic applications. Then a suite of key success factors can be identified.

- Key success factors :
 - SEA needs to be a **transparent process** that allows environmental considerations to be highlighted.
 - Successful SEA assesses the impacts of **alternative options** rather than option alternatives.
 - **Widespread involvement of stakeholders**, policy makers and the wider public is crucial for successful SEA.
 - SEA needs to be a **systematic process** involving different institutions in a common reporting framework.
 - The most successful SEA generally occurs where there is a **legal obligation** to require it.
 - Successful SEA involves wide use and dissemination of **baseline and assessment information**.
 - An **independent body** that can review or audit the assessment process and content is needed to provide sufficient incentive to carry out SEA and accountability.
 - Successful SEAs have been **the start** rather than the end **of a process of integration**, and may be a catalyst for developing further guidance and training.
 - Successful SEA is an **active, participatory and social learning process for all parties**, in that stakeholders are able to influence the decision-maker, and the decision-maker is able to raise awareness of the strategic dimensions of the policy, plan or programme. All can learn from the process and from each other.
 - Successful SEA is a **continuing and iterative process** in which the decision-maker is constantly being updated with the consequences of the implementation of the policy.

- Successful SEA depends on **high quality and rigorous application** of assessment methodologies, whether qualitative, quantitative or both.

Source: Sheate, et al., (2001)

1.3.6 The relation between socio-economic assessment and environmental assessment

The integration of different types of assessment may increase the robustness of the environmental assessments. When various assessment practices are part of the normal procedure in, for example, economic planning or sector planning, it may be easier to introduce new elements, provided that the similarities to related systems are identified. This integration leads to a mutual exchange of information. For example, economic analyses may provide new views on sustainable development issues. By using economic approaches, the assessment can identify the losers and winners in the development and also contribute to a discussion on the weighing of different types of effects.

1.3.7 Duration and costs of SEA implementation

It is generally agreed that costs of implementing SEA vary considerably depending on the specific cases, country situation and decision-making system and the SEA approach chosen. It may be worth noting that relatively low-cost of implementing SEA may yield significant benefits from the point of view of strategic decisions. Factors evaluating the effectiveness of SEA would be costs and time for implementing SEA. From the perspective of cost and time effectiveness, short implementation time periods and low costs commonly believed to be factors of effective SEA in general. But in some cases it is not true. For example, SEA for the plan of supply of drinking water and industrial water in the Netherlands would be a bad example from the costs and time effectiveness point of view because it took several years to finalize it. However taking into consideration that the purpose of the SEA was to develop new methods and models for assessing existing natural values of moist and wet ecosystems, the competent authority may not believe that this SEA was a bad example. One important viewpoint evaluating the SEA would be whether a relevant competent authority believed that the time and costs were used effectively or not.

The EU published a report analyzing 20 SEA cases from Europe and that summarized the costs of SEA. The main costs arise from the use of internal staff time, payments for expert advice and consultant time, and publicity and publications. Of these costs, the staff and consultancy costs typically account for over 90 per cent of all SEA costs. Table 9 summaries the costs of cases (WB, 2002).

Some cases took only few days implementing SEA but others took six to seven years. Most cases, except for the Lower Colne Flood Alleviation (UK), North Jutland Regional Plan (Denmark) and the Transport and Environment (Denmark), generally took less than one year conducting SEA. Except for two cases in the EU report, the costs of SEA were less than five per cent of total cost of the PPP.

Table 9 Benefits, Costs and Time Period for 20 SEAs in Europe

No.	SEA Case	Costs (in per cent of PPP costs)	Time (period during which SEA was undertaken)
1	Lower Colne Flood Alleviation Scheme, UK	4%	3 years
2	River Thames Strategic Flood Initiative, UK	<0.1%	10 months
3	Hertfordshire County Council Structure Plan, UK	<1%	<1 year
4	Bedfordshire County Council Structure Plan, UK	2.5%	-
5	Lancashire County Structure Plan, UK	-	4-5 months

6	National Forest SEA, UK	-	1 year
7	Central Regional Council Structure Plan, UK	0.1%	5 month
8	Transport Options for Edinburgh Region, UK	0.02%	4 month
9	Government Bill on Energy Efficiency, Denmark	0.10%	Few days
10	Government Bill on Landowners Rights, Denmark	-	Few days
11	Government Bill on Telecommunications, Denmark	-	Few days
12	Fixed Bridge Ling (to Sweden), Denmark	-	6 months
13	North Jutland Regional Plan, Denmark	15%	2 years
14	Transport and Env. Action in Vejle, Denmark	10%	6-7 years
15	SEA in the Netherlands	-	-
16	Land Re-allocation in Flanders, Belgium	3%	10 months
17	High Speed Rail Network, Belgium	0.10%	6 months
18	NordRhein Westphalia Roads Program, Germany	4.7%	1 year

Source: EC (1996) compiled by WB (2002)

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Chapter2 TECHNICAL METHODS OF SEA

This chapter shows points of importance, past experience, and lessons according to steps in the SEA process. These are based on existing guidelines and the case studies contained in Chapter 3. In addition, methods and tools utilized in steps as well as useful data are explained.

2.1. Assemble and survey of information

2.1.1. How to select the information needed for alternative development

There are a number of studies and guidance materials on principles and elements of SEA good practice. Sadler (2001) presented step-by step guidance on application and use of procedures and methods in SEA good practice. This guidance, inter alia, summarises the importance of assembling environmental information. First, the general content of information to be gathered in a SEA may be specified in legislation or procedure. Second, useful sources of background information include state of the environment reports and sustainability strategies. For plans and programmes with a spatial dimension, the baseline can be recorded as environmental stock and critical natural assets. Key indicators are used to measure change in terms of global sustainability, natural resource management and local environmental quality.

2.1.2. Existing data and newly surveyed data

SEA is not yet as widely practiced as project EIA. Referring to several existing cases listed in chapter 3, most of these cases utilized only existing data and information for SEA rather than developing new data and information. To inform decision makers, appropriate environmental information presented in time as part of the planning process is particularly important. For example, in almost all cases in the Netherlands, new data were not needed. This is because in the Netherlands many high quality and comprehensive monitoring programmes exist at national, regional and local levels. Also, every two years an updated “state of the environment” report is produced. Another example is the Dutch Waste Management Council, that has as one of its explicit tasks the monitoring of waste processing capacity and technology in the Netherlands. Because all of this information exists, it is possible to carry out SEA on the basis of existing information in most cases.

This situation, however, does not always occur. For example, in the Dutch National Plan on the Use of Mineral Resources it was identified that much information was not available. Part of the SEA was to establish a research programme to make sure this information would be available for future updates of the programme. Nevertheless, even in this situation it proved to be possible to prepare a useful SEA on the basis of the existing information. Another example was the SEA for the National Spatial Plan west Netherlands, which the review of the SEA concluded that the social impacts and the international economic impact of alternative plans were not assessed in sufficient detail because the appropriate methodology not yet was available. The government was advised to start a research programme to solve this lack in knowledge for future plans.

Some cases produced new information for conducting SEA, for example, the SEA cases on the the Dutch Dinking and Industrial Water plan, the Comprehensive Planning of the Naissaar Island in Estonia, and the M4 South Wales Common Appraisal Framework in the UK (see chapter3). In the case of the Dutch Water plan, it was intended to show quantitatively the relationship between water production and nature values in the Netherlands. This required the development of a new model, which took some years. It has, however, been very beneficial in the years following the adoption of the plan.

In the Naissaar island case, the island was occupied by a former Soviet army base for the last 50 years and as a consequence a number of areas had been severely polluted. There was no civil population on

the island, and almost no available information for conducting SEA on current status of the environment. SEA was conducted accompanied by detailed field survey of the state of the environment.

The other example, the M4 South Wales appraisal, utilized modelling to analyze the traffic situations. In this case, an extensive amount of information on the environmental characteristics of the setting of the relief motorway was available to the study. Little information however was available at the outset for any of the new transport measures.

2.2. Environmental Objectives

Environmental objectives play an important role in early stages of planning and conducting SEA. They inform planners about environmental objectives that should be respected in elaboration of strategic alternatives within plan and help the SEA team to quickly analyze strategic alternatives. But there is no set of universally applicable objectives. They should be established through critical examination of existing environmental objectives and environmental pressures in the given sector. To set up environmental objectives, the first step is to map existing environmental pressures in the given sector or area and next to identify relevant environmental objectives and commitments. The third step is to select the most relevant objectives, namely, making a short list through consultation with planning authorities, environmental authorities and the public.

The Office of the Deputy Prime Minister of England has prepared draft guidance on implementation of the SEA Directive 2001/42/EC (Levett-Therivel Sustainability Consultants, 2002). This guidance recognizes the importance of setting objectives of SEA and considering possible SEA indicators, which represent ways of quantifying the environmental baseline, prediction and monitoring, although the EU Directive does not require the development of SEA objectives and indicators. They are presented as the key means by which environmental and sustainability effects can be identified, described, analysed, compared and monitored. Indicators are used to measure achievement of objectives or targets. The indicators in the guidance can be utilised in the monitoring and describing the baseline data. The internal compatibility of the SEA objectives also should be tested to clarify the tensions between different objectives.

2.3. Establishment of Alternatives

Formulation of alternatives in the SEA process is crucially important for integrating environment considerations into sector policy and plan making. The purpose of generating alternatives is to show the range of options open for decision-makers, depending on the type of plan assessed. To take into consideration an extreme option can be useful for providing the range of discussion. Another important point is that alternatives are just only assumptions for discussion and further elaboration will be conducted in the final phase of the relevant plan.

A good starting point for formulation of alternatives is to compare the different views of parties in the current situation, to hear their respective opinions and their proposals for improvement and to discuss the possible means for implementing each alternative. Secondly, building up basic strategies which satisfy the SEA objective would be useful. For example, in the SEA of the M4 South Wales Common Appraisal Framework in the UK, three basic strategies for assessment were established, namely, road building strategy; enhanced public transport strategy; and traffic /demand management strategy. The South West Area Multi-Modal Study in the UK is another example of the same approach (see Chapter 3).

There are several questions which should be considered in formulating alternatives. First, what is the scope of alternatives? Second, which number of alternatives should be considered? The third question relates to the role of the no-action alternative. Fourth, how to develop and select a best practicable environmental option (BPEO).

Firstly, it will be necessary to identify several alternatives, often differing widely in level and scope, when formulating alternatives. There are two types of alternatives, extreme and realistic alternatives. Which alternatives should be used depends on both complexity of issues and the purpose of plan. From the perspective of complexity, to use extreme alternatives may result in providing many options and may be useful to show range of possible options. On the other hand, a limited number of alternatives provided by a realistic approach can be used for enabling decision-making.

Table 10 Use of alternatives

	Use of extreme alternatives	Use of realistic alternatives
Purpose of plan	To decide in principle	To decide on what should happen in practice
Advantage and disadvantage	Advantage: more freedom for discussion and creativity	Advantage: clear and needs only one round of planning
	Disadvantage: needs a 2n round of planning	Disadvantage: Political pressure and less freedom

Source: Verheem

Secondly, regarding the question of how many alternatives should be considered in a SEA case, experience indicates that three to five alternatives may be suitable. Too many alternatives may make SEA difficult to implement and increase the costs of SEA.

Third, there is the question of the no-action alternative, sometimes called the baseline option or business as usual (BAU). At the strategic level, there is an opinion that ‘business as usual (BAU)’ is a more preferable term, which means keeping the existing plan or policy in place without modifying it. Most of the SEA cases employed no-action option or BAU option because it is a basic option and helped to show the alteration from the base line. In all cases, in principle, this will be a realistic alternative. For example, the BAU alternative for incineration capacity in the Netherlands is realistic. However, in most cases, it will not be the best option; for example, in none of the six Dutch SEA case studies listed in Chapter 3, did this prove to be the case. Typically, there will be a significant reason why a policy or alternative should be altered. For example, the existing plan may create serious environmental or social problems or may be overtaken by rapid technological or demographic development (e.g. growth of population that necessitates new housing area, as in the case of the SEA for the Regional Spatial Plan North Holland South). The BAU alternative will always be an important base line against which the other alternatives will be compared.

Fourthly, the best practicable environmental option (BPEO) helps clarify the environmental trade offs that are at stake, and the basis for choice. In defining the ‘best practicable environmental option’ trade offs within environmental issues can occur. For example, in many SEAs for spatial plans in the Netherlands, it is possible to develop a ‘best practicable option for nature’ and a ‘best practicable option for people’. The SEA should discuss these trade offs and show the main differences between alternatives that could be seen as ‘best’ from different environmental perspectives. . For example, in the SEA for the National Plan on the Use of Mineral Resources, the environmental pros and cons of alternatives for gravel mining in the Netherlands were simply listed in the conclusions of SEA (see Chapter 3). In the SEA of the Waste Management Plan of the Czech Republic, the green alternative, which was developed by local NGOs, was used (see Chapter 3).

2.4. Scoping

Based on the scope of environmental objectives set at the earlier stage of SEA process, environmental impacts in the SEA should be determined. Referring to the environmental objectives, it is also possible to maintain consistency with the overall aims of SEA. The important point at this stage is to employ a

focused approach to narrow the scope of environmental factors which should be studied and considered in the next, more detailed phase of SEA.

Sadler (2001) in his step-by-step guidance noted that EIA scoping procedure could be adapted to the different types of proposal subject to SEA. Modified EIA methods can be used to scope the environmental dimensions of specific PPPs, to identify inconsistencies in their objectives, issues that require attention and/or the potential impact of implementing the proposal. Where environmental considerations are generalised and less immediate (e.g. proposed immigration, fiscal or trade policies), appraisal methods can be used, such as environmental scanning to clarify the implications, and/or issue tracking to a stage when key impacts become clarified (e.g. immigration projections linked to housing demand, nationally or regionally).

Several cases listed in chapter 3 show good examples on the implementation of scoping in SEA process. For example, in the SWARMMS case, the issues and indicators used in the SEA were in the main derived from the governmental guidance on the process of SEA, called the GOMMMS.

2.5. Evaluation of Environmental Impacts and Analysis of their Effects

There are three questions regarding the assessment of environmental impacts. One, what degree of precision is possible in SEA? Second what type of methods can be utilised in SEA. Third, how to address questions of cumulative effects and uncertainty in SEA.

2.5.1. Precision in SEA

First the required degree of precision in SEA depends on how general or detailed the plan, programme or policy is. If a plan is very broad in its scope and its precise impact is difficult to gauge, a general qualitative description of foreseeable cause-effect scenarios is more useful than attempting a quantitative forecast of its impact. As to the question how quantitative the information in a SEA should be, one answer would be as little as possible. In most cases, qualitative information on the basis of expert judgement should be sufficient. Only in exceptional cases will it be necessary to quantify information. Levett-Therivel Sustainability Consultants (2002) indicated that quantification should be considered where effects are already close to a threshold, or where cumulative effects are likely, and, in other cases, a qualitative prediction may be appropriate. Qualitative assessments should always be supported by evidence, including details of how the analysis was carried out. Any data limitation should be documented, any assumptions clearly stated, and uncertainties documented.

In addition, methodologically, EIA-based SEA is more dependent on tried and trusted EIA methods and informed by scientific surveys and quantitative data and models (Sheate, et.al, 2001). Many effects can be predicted in a quantifiable manner and compared to thresholds using several prediction techniques, for example, GIS and computer simulation modeling which are extended from project EIA to SEA on issues such as waste and traffic management.

On the other hand, appraisal inspired SEA is more qualitative, based on expert opinion and subjected to sufficient public and expert scrutiny.

2.5.2. The type of methods utilized in SEA

Second, what type of methods can be employed in SEA? Examples of methods that can be used for impact analysis in SEA are shown in **Table 11** below. These include: extended use of identifications methods; use of matrices; computer modelling; geographic information systems; cost effectiveness analysis; cost-benefit analysis; multi-criteria analysis; aggregation methods; and life cycle analysis.

Table 11 Examples of some methods for EIA in SEA

Methods	Contents
Extended use of identification methods	In most SEAs, relatively simple and straightforward methods will be sufficient. Examples include: literature survey, case comparison, expert judgment, scenario development and model mapping. This last technique is reported to have been effective for SEA. Often, it has proven possible to sufficiently quantify environmental indicators by filling in each parameter of an impact network, based on data from literature, indicative calculations or expert judgment.
Use of matrices	Grid diagrams can be used to cross-reference a list of (sub)actions to a list of environmental impact parameters. Most SEAs make use of matrices in some form. The UK Guide on SEA for Structure Plans recommends them as the main tool, including their use for consistency analysis to identify potential conflicts between objectives in different policy sectors.
Computer modeling	In some countries, computer models are used to calculate the impact of strategic options on environmental indicators. For example, these have been applied to habitat supply analysis in Canada and the US, and to simulate the impact of tax policy on (national) energy use, and vehicle mileage and use of public transport in the UK.
Geographic Information System	These are especially useful in land use planning, routing studies and assessing cumulative impacts of several projects in the same area. Also, they may be used to support impact analysis, e.g., calculation of land occupation or measuring environmental impacts as function of distance to pollution sources.
Cost effectiveness analysis	Used to select the option which achieves a target or goal at least cost (environmental or financial). This is a useful technique in cases where actions are clearly constrained by existing (environmental) targets or objectives, for example, ambient air and water quality standards, emission limits under or resource harvesting allocations.
Cost-benefit analysis (CBA)	Technique in which as many impacts as possible are expressed in a unified value; the benefit-cost ratio is a basis for choice between the options reviewed.
Multi-criteria analysis (MCA)	This is an advanced form of CBA in which separate scores on a number of key evaluation criteria are given, rather than using one, unified value to express the significance of all impacts (as is the case in CBA). Using mathematical operations, combinations of weights and criteria scores provide a ranking of options. The advantage of MCA over CBA is that it allows for the joint analysis of both environmental costs and financial costs, even when the environmental costs cannot be valued in monetary terms. MCA does not necessarily lead to one, unambiguous solution; it generally leaves some freedom to decision makers. A specific form of MCA is the "goals achievement matrix" which helps in identifying how an action may potentially contribute to a set of specified (environmental) objectives.
Aggregation methods	Used to translate "groups of indicators" into one, composite indicator. The aim is to make the total amount of environmental information more manageable. In this process, results are often weighed against each other and "trade-off" choices are made. In principle, these are political decisions, and therefore, care should be taken in using aggregation methods for SEA. Usually however, some aggregation is needed and possible without generating controversy. Some methods are: <ul style="list-style-type: none"> • index methods – aggregation by valuation and weighed summation; • monetary methods – all impacts are translated into one unit; as yet, they are insufficiently developed for use in EA; • source methods- aggregation on an impact basis, for example, energy sources according to their contribution to the emissions of CO₂, air pollution sources according to their contribution to acidification.
Life Cycle Analysis	A standardized method taking into account the total "life cycle" of goods or services from use of natural resources, via production of goods to the treatment of waste. A standardized method is "scored" on ten environmental issues: human toxicity, aquatic ecotoxicity, soil ecotoxicity, greenhouse effect, ozone production, acidification, eutrophication, smell, use of space and use of natural resources. Scores are weighed against existing environmental problems in the area.

Source: Sadler and Verheem (1996)

Several cases listed in chapter 3 of this report exemplify the type of methods utilized. The SEA for the National Spatial Plan West Netherlands used mostly expert judgment, GIS, transport models and cost benefit analysis (including monetarisation). During the review of this SEA, however, it was concluded that many impacts could have been assessed more qualitatively. The second case, SEA for the National

Mineral Extraction Plan, used literature survey, expert judgment, a simplified form of Life Cycle Analysis (LCA), Multicriteria Analysis (MCA) and mapping. For the comparison of alternatives 'monetisation' and 'distance to target' methods were used. A third example, the Regional Spatial Plan for North Holland South, used most of all expert judgment. For transport, noise hindrance and risks models were used. Mapping was used to determine the use of space. Scenario analysis was carried out to find out how robust models were to accommodate possible unexpected developments in the future. Fourth, the SEA for the National Drinking and Industrial Water plan used literature survey, expert judgment, modeling for hydrological systems, the effect of ground water on nature, health risk to consumers and production loss for agriculture, multi-criteria analysis and sensitivity analyses. Fifth, the SEA for the National Electricity Structure Scheme used a mix of modeling (e.g. demand scenarios, noise effects, risk assessment), expert judgment and use of knowledge in existing literature. Sixthly, in the SWARMMS in the UK, some of the impacts are predicted in a qualitative manner while others are based on descriptions and expert judgment. For example, noise, air quality and greenhouse gases can be predicted in a numerical way using forecast changes in traffic flow. Finally, the environmental assessment of the A69 Haltwhistle Bypass in the UK was undertaken in accordance with the Department of Transport's Manual on Environmental Assessment.

2.5.3. The treatment of cumulative effects and uncertainty

The treatment of cumulative effects and uncertainty in SEA is the third question. If SEAs summarize the overall effects of all projects that could be a result of the plan, this can portray the resulting accumulated impact of the plan. For example, in the SEA for the National Electricity Structure Scheme, the overall greenhouse effect or effect on the use of resources of all power stations in the Netherlands was calculated. In the SEA for the Spatial Plan West Netherlands, the overall amount of loss of valuable area, caused by the realisation of new housing, industrial area and infrastructure, was determined. Typically, impacts are simply added, because currently there is not enough knowledge on synergy of impacts at the national level.

However, there are two exceptions in the cases cited. In the SEA for the Waste Management plan in the Netherlands, an LCA was carried out. In an LCA accumulation, including possible synergy, of effects, not adding impacts simply, is included. However, it should be realised that as yet LCA has many gaps in knowledge, including uncertainty about accumulated impact. The other example was the SEA for the National Plan on Drinking and Industrial water. In the SEA of this plan, the accumulated impact on ground water levels of all drinking and industrial water production in the Netherlands was calculated through prognoses and hydrological modelling. On the basis of the resulting information, a special model (the DEMNAT) was designed to show the accumulated loss or gain of natural values in the Netherlands because of changing ground water levels.

Other crucial questions are how to treat cumulative effects and uncertainty. In the case studies listed in chapter 3, several methods were used to deal with uncertainties. The first one is a simple listing of all uncertainties encountered and a discussion what these uncertainties meant for decision-making. Second, in many cases, sensitivity analysis was used to find out how the end results of the comparison of alternatives changed when certain assumptions were different or the weight given to specific effects was valued differently. For example, this approach was included in the SEA of National Waste Management Plan, the Policy Plan Supply of Drinking Water and Industrial Water and the National Plan on Production of Electricity in the Netherlands. A third method is scenario analysis to find out which models are most robust or flexible in the case of unforeseen events. This approach, for example, took place in the SEA for the Regional Spatial Plan North Holland South. Several scenarios for the future were developed, following which each of the alternatives was examined to see how easily they could be adapted to the new situation. In the M4 South Wales case in the UK, uncertainty and cumulative effects were addressed by adopting a precautionary principle where valued environmental resources were at serious threat and there was uncertainty as to the scope for mitigation. The uncertainty related to site selection for some of the measures also raised issues as to whether the environmental impact could be

avoided during project development. A three point risk scale of high, medium and low was applied for this purpose.

Regarding cumulative effects, three general conclusions may be drawn. First, scale is important. Secondly, most of SEAs are only aggregating the impacts that are likely to occur in general way. Third, except for spatial plans, most of SEAs do not appear to have very good track record of taking account of the synergy between their proposal and the other plans. In this regard, more effort should be made to improve SEAs. However, more importantly, depending on the time frame dealing with some of the impacts uncertainty may become higher.

2.6. Mitigation

A three step hierarchy for mitigation is becoming widely accepted, namely, first avoid, second reduce and finally offset adverse impacts, which can be employed, using specific measures and actions that are appropriate to their significance and specificity. A precautionary approach should be taken into account when information is incomplete but analysis indicates the risk or possibility of large scale, serious or irreversible environmental change. In low-threat situations, it is reasonable to think that standard mitigation could be considered to minimize impacts to “as low as reasonably practicable” (ALARP level) using available measures (Sadler, 2001).

As to differences in mitigation measures between the policy and plan level, this will depend on the specific kind of strategic decision taken, namely, whether it is very concrete or very abstract. The former example was the case in the National Plan on the Production of Electricity, in which concrete decisions were taken on fuel use for electricity production and the technology for electricity production. In that case, mitigation measures were also very concrete, for example, the use of low sulphur coal or extended use of heat recycling. This degree of mitigation was not possible in the case of the Regional Spatial Plan North Holland South, which focussed on choices of location, rather than on how to build houses on these locations. In this case, mitigation measures will be of a more abstract nature, for example, to first use the locations that score best from an environmental viewpoint, as was discussed in the SEA.

Other important points concern the kinds of mitigation measures that should be taken in SEA. There are two types of measures. One is offsetting measures that can mitigate impacts which are likely to happen in implementing a plan and which are also taken in project level EIA. For example, if important wetlands may be destroyed by constructing a road, this can be offset by wetland restoration in the other areas. The other types of measures are related to organizational and institutional matters. Institutional and organizational systems can be changed to adopt SEA recommendations. Improving institutional and organizational systems in the planning authorities may contribute to make the effective implementation of relevant plans or programmes and also the effective monitoring.

2.7. Comparison of Alternatives and Reporting

2.7.1. Comparison of alternatives

In this report, six methods are identified to compare alternatives. Firstly, quantitative assessment is conducted for comparison of alternatives, namely, listing all quantitative scores on all indicators, which everybody can look for what the scores are. Secondly, each indicator is ranked from one to five, with one representing the best and five the worst in qualitative terms. Third a matrix is produced to indicate the best and worst for each indicator. Fourth, an economic cost benefit analysis is carried out. Fifth, the impacts of PPP on specific areas are mapped in a visible way. Finally, computer modelling is used to predict the consequence of alternatives.

The National Spatial Plan for the West of the Netherlands is a good example of giving decision makers and the public sufficient information. Quantitative and ranking methods were utilized for this purpose (see chapter 3). The National Waste Management Plan and the Second National Plan on Mineral Resources in the Netherlands are good examples of comparing alternatives. The A69 Haltwhistle Bypass and M6 Widening Junctions 11-16, both from the UK, are other examples of comparison of alternatives. Matrices of possible specific environmental impacts of all alternatives were produced in both the Waste Management Plan of the Czech Republic and the Waste Management Plan of the Plezen Region in Czech Republic.

2.7.2. Weighting

Weighing of specific impacts for alternatives is always a political choice. For this reason, there is no such thing as ‘scientific correct weighing’. What is important is that all stakeholders involved in the plan or policy should have a say in applying weights to impacts. Ideally, this should lead to multiple weight sets reflecting the positions of all main stakeholders in the planning process. Although experts preparing a SEA often set weights, this should be carried out by politicians, representatives of groups in society, NGO’s etc. Of course, this participatory process may be steered and co-ordinated by the experts preparing the SEA report. Alternatively, these experts may suggest certain weighting sets in the report, then open these for discussion in a round of public participation. In other words, the check should take place in a discussion with the stakeholders. An adequate weighing is a correct translation of different views in society.

2.7.3. Reporting

The Environmental Report is a main output of the SEA process, and should document the whole process and the results. It must be prepared and made available to the public. The proposal should contain or be accompanied by a simple explanation of the SEA process and a summary of findings, for example, main impacts, desirable alternative, mitigation measures and outstanding issues. Using impact display and trade-off matrices would be helpful to focus on decision-making. In the SWARMMS in the UK, reporting of results was undertaken in accordance with the guidance presented in GOMMMS.

Levett-Therivel Sustainability Consultants (2002) proposes a structure for the Environmental Report.

Table 12 Possible structures for the environmental report

Structure of environmental report	Information to include
Summary and outcomes	<ul style="list-style-type: none"> ● Non-technical summary of the Environmental Report ● What DIFFERENCE has the SEA/SA process made?
Methodology used	<ul style="list-style-type: none"> ● Who carried out the SEA/SA, when, who was consulted, etc.
Background	<ul style="list-style-type: none"> ● Purpose of the SEA/SA ● Plan objectives ● Links to other plans, programmes and objectives ● Links to environmental/<i>sustainability</i> visions and problems ● Links to other plans and programmes ● Baseline environmental/<i>sustainability</i> data ● Difficulties in collecting data, limitations of the data etc.

Plan issues and policies	<ul style="list-style-type: none"> ● Significant environmental/<i>sustainability</i> effects of the preferred options; proposed mitigation measures ● How environmental/<i>sustainability</i> visions and problems were considered in choosing the preferred options ● Other options considered, and why these were rejected
Plan policies	<ul style="list-style-type: none"> ● Significant environmental/<i>sustainability</i> effects of the policies and proposals; proposed mitigation measures ● How environmental/<i>sustainability</i> visions and problems were considered in developing the policies and proposals
Implementation	<ul style="list-style-type: none"> ● Links to project environmental impact assessment, design, guidance etc. ● Proposed monitoring

Source: Levett-Therivel Sustainability Consultants (2002)

2.8. Reflection to the Decision-Making

Does SEA influence decision-making? The answer is “Yes”. There are two general observations on this issue. The first is whether information on the results of SEA is prepared and submitted to decision-makers in accordance with the requirements of SEA. When this criterion is met, it could be said that SEA is integrated into the planning process. However, it is difficult to say that a particular SEA is good or bad. Because SEA is not a separate process from planning, it is impossible to separate the effects of SEA from the contribution of the other factors.

The second point is whether the information from SEA contributes to and influences final decision-making. If one can find proof that environmental considerations are introduced into the plan as referred to in the findings of SEA, it can be said that SEA has influenced the final decision-making. But it is difficult to prove it by statement of politicians. Circumstantial evidence can only show that SEA appeared to be taken into account in the final decision-making. Several examples listed in chapter 3 show this relationship, including the SEAs of Comprehensive Planning of Naissaar Island, Estonia, the Regional Land-use Plan for Pisek-Strakonice, Czech Republic, the Energy Policy of Slovakia, SWARMMS in the UK; the National Spatial Plan for the West of the Netherlands, the National Waste Management Plan, the North Holland-South Spatial Strategy Plan, and the National Plan on the Production of Electricity (all from the Netherlands). For example in the SWARMMS case, it may be fair to say that SEA was important in related decision-making, although politicians only referred it as a report not as a SEA.

For all of these cases, it is difficult to confirm how results of SEA are reflected in decision-making. Under several SEA frameworks, such as the EU SEA Directive and the EIA Decree of the Netherlands, decision-makers are obliged to give reasons for decisions.

To improve the usefulness of SEA for final decision, it is agreed that early application to the starting phase of a planning process is particularly important. However, in this case, it is difficult to prove the effect of SEA on the final decision-making although it can have a crucial role in the evolution and final output of a plan.

2.9. Monitoring

Monitoring should focus on factors that can provide the most detailed indication of the implementation of the plan selected and its environmental impact. There are three main points regarding the conduct of monitoring at the strategic level. The first factor is the level of plan and programmes. Planning level monitoring is totally different from the project level, which is focused on the actual versus predicted

impacts during project implementation. For a plan on a high strategic level, it is difficult to monitor to check implementation of the plan and the change of the environmental baseline. For example, the National Spatial Plan for the West of the Netherlands case is a very high level strategic plan so that it was decided not to conduct monitoring because the plan did not have concrete actions or activities which could be checked. However, monitoring should be applied for the subordinate plans. Depending on the level of plan and the tool of monitoring, the appropriate way of monitoring should be decided.

The second is what should be monitored. There are three objectives: plan and accompanying actions; the implementation of recommendation of SEA; and impacts on the environment caused by the implementation of plan.

- (i) Regarding monitoring of plan and accompanied actions, there are three important points on strategic level monitoring. The first is to check whether the objective of plan is achieved or not. The second is to check whether actions by the plan are conducted appropriately or not. The third is to monitor the need to revise or establish a new plan, based on social problems which should be solved. If these social problems are improving, the plan may be contributing to improve social problems. On the other hand, if not, there is a possibility that the plan may be ineffective. However, in some cases it may be difficult to monitor a strategic level plan because the outcome of the plan will be realized several and more years later and the other factors which are influential will also change. The other approach to deal with the monitoring issue is to limit the time span of a relevant plan. After two or three years, a new plan and SEA may need to be conducted. The SEA schedule should be integrated into the planning cycle. In the case of the National Waste Management Plan, the monitoring of the SEA of the 2002 plan is scheduled to be the next phase of SEA, which will be conducted in 2006.
- (ii) Checking the implementation of the recommendations of SEA is easier to monitor.
- (iii) Regarding monitoring of impacts on the environment, one way to check the achievement of environmental objectives is to utilize indicators, which are consistent with environmental objectives. Monitoring should be designed to address for both direct effects on the state of the environment, such as the volume of emissions or the use of natural resources, and indirect effects that can be monitored by examining trends in production, consumption or decision-making as well as cumulative effects.

Thirdly, consideration should be given to the tools and data of monitoring. First, the focus should be on examining whether existing monitoring mechanisms are sufficient or not and newly developed data are needed or not. In addition, technological developments related to monitoring should be taken into consideration.

2.10. Involvement of Third Party

2.10.1. The scope of stakeholders

In EIA, stakeholders include the public, competent authorities and other ministries, local governments, NGOs, politicians and so on. The range of stakeholders is large. However, in most plans and policies it will be impossible to involve all citizens in an active way. In general, the public is less inclined to participate in a PPP process, compared to a project. Strategic issues, by definition, are higher level and long term and their perceived effects on people's interests may not be evident or of immediate concern (whereas a project, located in their locality will be seen very differently). Also, it should be realized that in the case of plans and policies of a more abstract nature (e.g. long term objectives, purpose,) the effects to the public will only be indirect and there will be little interest by the public to get involved.

Therefore, in SEA, often the general public is not involved, but rather representatives of stakeholders such as regional and lower authorities (including mayors), community groups and NGOs.

2.10.2. How to organize the public involvement

For stakeholders such as regional and local authorities, community groups and NGOs, active methods are applied, for example, workshops and small group meetings. These are sounding boards rather than holding public hearings. Passive methods may be used for the general public, for example, the notification to send in written comments or log on to a web site. In summary, in the case of policies and plans of an abstract nature, the following methodology is generally effective:

- direct mailing to representatives of regional and local authorities, community groups and NGOs
- for these representatives, organise workshops and small group meetings in various stages of the planning process: e.g. problem definition and alternatives development; impact assessment; comparison of alternatives; quality review of the SEA report
- website and possibility to send in written comments for the general public after sufficient advertisement of this possibility in mass media.

Public participation methods applied in the SEA are described in some cases listed in chapter 3. For example, these include the National Spatial Plan West Netherlands and the National Waste Management Plan in the Netherlands; the South West Area Multi-Modal Study (SWARMMS) in the UK; and the Comprehensive Planning of the Naissar Island, the Energy Policy of the Czech republic and the Energy Policies of the Slovakia in the East and Central Europe. For example, in the SWARMMS, extensive opportunities for public involvement accompanied the SEA, such as, producing newsletters, public questionnaires and exhibitions as well as topic based meetings and discussions with local authorities.

2.10.3. Merits of the public involvement

During public involvement, it is possible to share issues, information and interests in the relevant plan with stakeholders. This process is a means of gaining relevant information and views, including 'local knowledge' that can not easily be obtained from the public. These inputs help to clarify who gains and who loses as a result of a proposed PPP. Then areas of agreement and disagreement can be identified, and the SEA report will be able to reflect intent of stakeholders. This result helps to bring transparency to the SEA process and the final SEA may be easily accepted by the public.

Good examples from the perspective of public involvement may depend on how major stakeholders evaluated the process of the public involvement and whether their intent and comments were well reflected into the relevant SEA or not. The case of Naissar island, the Energy Policies of the Slovakia and the Energy Policy of the Czech Republic may be good examples (see Chapter 3).

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CHAPTER3 CASE STUDIES

3.1. National Spatial Plan for the West of the Netherlands

3.1.1 INTRODUCTION

3.1.1.1 Nature of the Plan

The objective of this new spatial plan was to design a spatial plan to further develop the western part of the Netherlands into an internationally competitive urban network, comparable to London, Paris and Frankfurt. Major element of this plan was the development of a new high speed public transport system, connecting the four main cities in that part of the country, to 'mould' these cities into one new 'super city', thus providing further chances for economic growth. This new city should also provide new space for housing and industry, and lead to a better situation for nature. Overall, the plan should integrate the following four elements:

- improvement of the business climate;
- a new high speed railway link between the major cities, i.e. a choice between a high speed train and a mono-rail;
- a new urbanisation policy, i.e. to find the best location for new houses and industrial area;
- further development of a network of natural and recreational areas based on the hydrological system in western Netherlands, including protection against flooding.

3.1.1.2 Role of the SEA

The SEA was meant to provide the environmental, social and part of the economic information, necessary to decide what plan would achieve these four objectives best (parallel to the SEA a broad 'welfare-cost-benefit-analysis' was carried out). To provide this insight the plan should describe a limited number of alternatives, describing the 'extremes' of possible choices. I.e. the alternatives should provide insight in available options and their consequences, rather than be realistic options for implementation.

3.1.1.3 Focus of this Case Study

This case study focuses on the methods applied in the SEA. This case study does not include the methodology used in the 'welfare cost benefit analysis'.

3.1.2 BACKGROUND: CONTEXT AND ISSUES

3.1.2.1 Social and Environmental Setting

The main choices that should be made in the plan concern the type of train – a conventional high speed train versus a monorail – the location of new infrastructure, the location of new area for housing and industry, the location of new nature areas and the location of areas for water retention. These last areas are part of the water management policy to prevent The Netherlands from flooding in times of high river water levels.

All these issues are interrelated. E.g. the construction of a new monorail would create new area for housing and industry development, because the surrounding of new stations is a spot where both people and offices like to be situated. On the other hand, the construction of new housing and industry area can interfere with the development or preservation of nature or the designation of area for water retention. Finally, an important part of the planning context was that some local governments have other ideas about suitable housing and industrial areas than the national government. E.g. national government may

want to concentrate housing areas in a limited number of regions, while local government wants the new housing areas to be evenly distributed over all municipalities. The plan, therefore, is controversial.

3.1.2.2 SEA/Decision Making Process

Under Dutch regulation an SEA for this plan at the time was not mandatory since the plan does not take formal decisions on locations or technology. Its main aim is to exclude options and to set out desirable 'policy directions'. Formal decisions will be taken in plans or projects following the plan and for those decisions EIAs and SEAs will be mandatory.

For the national plan it was decided to integrate SEA into the planning process voluntarily. This SEAs should 'as close as time permitted' follow to the formal Dutch SEA process. In practice this meant that the formal SEA process was followed with two exceptions:

- the assessment report was not published at the same time as the 'cabinet proposal' – as is the case in a formal SEA – but at the same time as the 'cabinet decision', in a later stage. Main reason for this was that the decision to do a voluntary SEA was taken rather late and for that reason it was not possible to complete the assessment report in time. The cabinet proposal in this case was the start of the SEA process (in formal SEA it is the end). Public participation on the proposal was also used as public participation on the required content of the SEA.
- no public participation took place after the publication of the assessment report. Again this was because of time reasons. Quality review of the assessment report was asked of the independent EIA Commission, that accepted to issue the advice within a couple of weeks, rather than the normal nine weeks that are available in formal SEA.

The decision making/SEA process looked as follows:

- Step 1: publication of the 'cabinet proposal' - i.e. the first draft of the plan – in December 2000. In March 2001 the 'starting note' for the SEA was published.
- Step 2: public participation on the cabinet proposal and on the required content of the SEA report.
- Step 3: publication of the SEA report, the quality review of the assessment by the independent EIA Commission and the cabinet decision in October 2001.
- Step 4: formal approval of the plan by the Parliament.

3.1.3 APPROACH AND METHODS USED

3.1.3.1 Information Assembly

The advantages and disadvantages of the alternatives were assessed in two studies: an impact assessment of the environmental and social impacts and an economic cost benefit analysis. These two studies were integrated into an integral impact assessment. An important element in the integration was to hire the same consultancy firm for both the environmental and the economic assessment. Overall responsibility for the environmental and social assessment was with the Ministry of the Environment; the Ministry of Transport was responsible for the economic assessment.

The SEA was carried out on the basis of existing information.

3.1.3.2 Development of Alternatives

Five models were developed by government that combined different choices on these alternative options:

- a ‘ring’ model in which the centres of the major cities (that are roughly situated in a ring) are connected by a high speed train; in this model only the major cities are connected and new housing and industrial areas are mostly situated alongside the ring and outside of the ring;
- an ‘inner ring’ model in which a monorail follows the inner flank of the ring of cities. Main reason for this model is that a mono rail is expensive and therefore should be as short as possible. In this model not the centres but the outer parts of the cities are connected. Also, this provides the possibility to connect some smaller cities with the mono rail. In this model new housing and industrial areas are situated to a large extent on the inner flank of the ring. Currently this space is a valuable landscape area.
- the same as model 1, but with an alternative set of housing and industrial locations, both within, on and outside of the ring
- a variation on model 3, with another set of housing locations both within, on and outside of the ring; this alternative was developed after consultation with regional and provincial authorities and reflected their preferences
- a model in which a monorail connects the centres of two of the major cities; new housing and industrial areas are situated both within, on and outside of the ring.

Below schematically models 1, 2 and 4 are given. The dark blue line is the intended routing of the new infrastructure line, the orange and purple areas are new housing and industrial areas and the two light grey areas in the middle are protected landscape areas.

Figure 1 Model 1

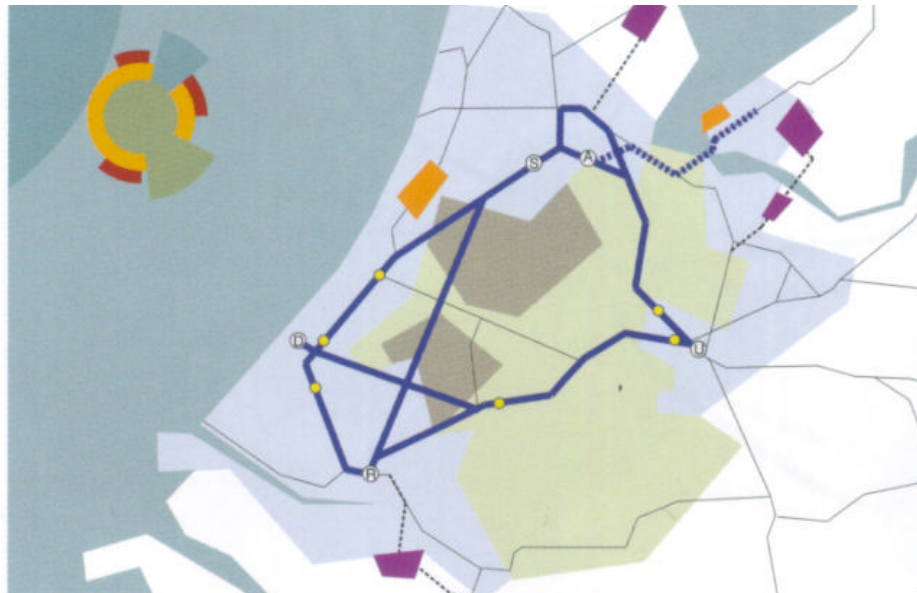


Figure 2 Model 2



Figure 3 Model 4



The alternatives developed were not meant ever to be implemented as such. Their main purpose was to give an overview of the possibilities. After insight was gained in the advantages and disadvantages of models cabinet could then decide on the model to be implemented. This model could, for example, be a combination of elements of all models.

All models were conceived in three steps. In a first step the 'green-blue basis' was described, i.e. the network of nature and water areas within which new housing, industrial area and infrastructure should be situated. Also, archaeological and historical elements were considered in this step. In a second step the existing and new infrastructure was projected on the 'green-blue basis'. In a final step the 'occupational elements' were placed within the 'green-blue' and 'infrastructure' network, i.e. the elements that flow from the use that humans want to make of land and water resources such as housing and working areas.

3.1.3.3 Selection of Issues and Indicators

One of the problems in the SEA was what issues and effects to concentrate on, given that four different policies should be developed at the same time, leading to a wide range of issues and effects. Only four months were available for the assessment, so scoping was critical. For this reason, it was decided to give priority to transport and housing issues and less to nature and water issues, under the assumption that none of the models would affect the existing plans for nature and flood protection.

Starting point for the effects scoping was the concept of 'Spatial Quality' as introduced in the Dutch 4th National Spatial Plan. This concept consisted of 7 elements: spatial diversity, economic & social efficiency, cultural diversity, social justice, sustainability, attractiveness & human scale and flexibility & robustness. To these 7 elements, the elements 'costs' and 'transport aspects' were added to get to an integral assessment.

For each of these elements indicators were found, mostly extracted from national policy documents. These were complemented with indicators suggested by NGOs during public participation. No indicators could be found for (parts of) the elements social justice, attractiveness and human scale. These were assessed on the basis of expert judgement. Since some indicators could be used for several elements care was taken that no double counts were made and indicators were used only once. Also, care was taken that in the environmental and the economic assessment the same indicators were used. An important factor in integrating the environmental and economic studies was that the teams responsible for them met on a weekly basis. The assessments started with a meeting in which all consultants were present to make an inventory of the links between all studies.

For the comparison of alternatives in the SEA the following indicators were assessed:

Theme: Spatial Diversity

- change in amount of urban and rural areas
- change in surface area 'open' landscape
- change in surface area 'valuable' landscape
- change in surface area 'geomorphologically valuable' area
- change in surface area of green belts in-between urban areas

Theme: Economic and social functionality

- accessibility of new working area
- increase of working area
- accessibility of urban areas
- change in surface area for the production of flower bulbs (an important economic activity in the West of the Netherlands)
- change in surface area for greenhouses
- change in surface area for agriculture
- change in area with high ground water levels

Theme: cultural diversity

- change in surface area with high cultural-historical value

Theme: social justice

- new infrastructure in area problematic from a social viewpoint
- accessibility of working area via public transport
- accessibility of urban area via public transport

Theme: sustainability

- change in surface area with high natural value
- number of physical barriers in area linking nature area and in open zones

- impacts on the potential of area for the development of natural values
- change in CO2 emissions
- change in surface area suitable for water retention ('over-flow' area to protect against flooding)
- noise hindrance
- surface area of new urban areas
- change in surface area of 'environment protected' area

Theme: attractiveness and human scale

- new housing development in area susceptible to hindrance
- noise hindrance in existing urban area because of traffic
- accessibility of green areas from housing area
- change in quality of recreational areas
- change in urban quality of housing area

Theme: flexibility

- urgency of realisation of elements of an alternative (i.e. does the option to postpone exists?)
- possibility for a step wise realisation
- adaptability to changes in demographic developments
- adaptability to a decreasing attention for public transport
- adaptability to an increasing demand for luxury or bigger houses
- adaptability to a more decentralised government (making it harder to realise large scale developments that need co-ordination)
- adaptability to changes in economic development
- adaptability to an increasing demand to find new housing area within existing urban area

3.1.3.4 Impact Analysis

The study of the environmental impacts of urbanisation policies was largely based on a GIS analysis of the zones in which the different housing alternatives were projected. Main criterion were the amount of area that would be lost within zones because of the building of houses, industrial area and infrastructure.

A point of attention in the impact analysis was that the zones were chosen bigger than actually needed, because it is up to the regional authorities to decide on the exact location within this zone. This was taken into account in the impacts analysis the following way. E.g. for the indicator 'loss of valuable landscape area': if 40% of the zone was valuable landscape and the amount of area lost because of the model was 200 ha, the final score was $40\% \times 200 \text{ ha} = 80 \text{ ha}$.

For the study of the financial and transport effects it showed necessary to work out the five alternative models in more detail than needed for the other effects, otherwise impacts could not be assessed. To do this, within the wider zones specific locations and routes were chosen, just as examples.

The assessment of social impacts was mainly based on the results of transport models: improved accessibility of jobs and services for the less well off was used as the main indicator for social impact.

3.1.3.5 Comparison of Alternatives

To give decision makers and the public sufficient information, the models were compared and discussed in several ways. For this, three documents were prepared. In the first document the models are compared on each of the indicators in three different ways:

- a quantitative score per model on the indicator
- a ranking of the five models for the indicator
- a qualitative discussion of the results.

In this, no weighting of scores took place.

E.g. for the indicator ‘Effect on valuable landscape’ the area that would be lost was estimated on the basis of maps; the amount of area lost was described in ha. This led to the following quantitative results: model 1 1170 ha, model 2 1420 ha etc. In terms of ranking this meant: model 1 ranked 1, model 2 ranked 5, model 3 ranked 2, etc. This was complemented by a discussion of the results in words, e.g. ‘in all models valuable landscape is lost mainly because of housing projects. The area lost because of industrial area is the same in all models and is approximately 40% of the total area lost. The area lost because of infrastructure is very limited in all models etc’.

As examples, below the quantitative scores and ranking is given for the criteria ‘effect on valuable landscape’, ‘accessibility urban areas’ and ‘housing in area susceptible to hindrance’.

Table 13 Effect on valuable landscape

	Model 1	Model 2	Model 3	Model 4	Model 5
Valuable landscape area lost (ha)	1170	1420	1320	1410	1400
Ranking	1	5	2	4	3

Table 14 Accessibility urban areas

	Model 1	Model 2	Model 3	Model 4	Model 5
Number of inhabitants within 30 minutes travel time of city centres (x1000)	4451	4553	4214	4254	5764
Number of working areas within 30 minutes travel time of city centres (x1000)	2175	2360	2049	2069	2934
Total of inhabitants + working areas within 30 minutes travel time of city centres (x1000)	6626	6913	6263	6323	8698
Ranking	3	2	5	4	1

Table 15 Housing in area susceptible to hindrance (because of airplanes, trains, cars and industry)

	Model 1	Model 2	Model 3	Model 4	Model 5
Total area in which high hindrance is to be expected (ha)	1570	2470	2110	2050	2210
Number of new housing locations within area in which high hindrance is to be expected	2	2	2	2	2
Ranking	1	5	3	2	4

The second document would then, on the basis of the first document, discuss the models qualitatively as to their contribution to national objectives and ambitions for the western part of the Netherlands. Also, a one page summary matrix was given in which for each of the indicators the ‘best’ and the ‘worst’ model is described.

The third document is the cost-benefit analysis in which the effects are given from an economic viewpoint, i.e. monetarised as much as possible.

The models were only compared relative to each other, not to a 'zero-alternative'. Main reason for this was that the models were only examples and not realistic alternatives. Therefore, the absolute effect scores of the alternatives were not relevant in this stage of decision making.

3.1.3.6 Public Participation and Quality Review

The public and NGOs were involved early in the process on the basis of a document describing the preliminary ideas on models and effects to examine.

Experts were involved by organising seminars in two stages of the process. In an early stage experts were interviewed to discuss the methods to use in the assessment. In a later stage a symposium was organised to critically evaluate the results of the assessment.

The independent EIA Commission and the State Bureau for Economic Policy Analysis were asked to issue an advice on both the scope of the impact assessment in an early stage and the quality of the assessment in a later stage. The State Bureau was also asked to advice on the economic cost benefit analysis.

3.1.3.7 Monitoring and Follow Up

The SEA did not contain a monitoring and follow up plan.

3.1.3.8 Overview: what worked well and why

In its quality review the independent EIA Commission concluded that it was an impressive achievement to conduct such a complex SEA within 6 months. Also it was concluded that the SEA contained sufficient information to decide among a monorail and a high speed train. Sufficient environmental information also was present to compare the environmental consequences of housing locations within, on or outside of the ring of cities.

However, two relevant alternatives had not been examined: an alternative in which optimisation of nature and water issues was starting point and an alternative that would not aim at improving public transport between the big cities, but rather improve regional public transport in the west of The Netherlands.

As to the economic and the social assessments, the EIA Commission concluded that these contained serious flaws, but that this was only logical in view of the current state of the art in economic and social assessment at the scale of this initiative.

3.1.4 RESULTS AND LESSONS

3.1.4.1 Contribution to Decision-Making

The integral assessment showed that model 1 (high speed train, housing and industrial area on the ring of cities) was good from an environmental viewpoint, but inflexible and costly. The high costs were mainly associated with the new infrastructure that was needed to connect the many new housing area outside of the ring with the ring.

Model 2 (mono rail, housing and industrial area on the inner flank of the ring between the cities) was also very costly but on top of that also negative from an environmental viewpoint. An important element of this is the negative effect to the valuable landscape area in between the cities.

Overall, model 4 (high speed train, but alternative housing and industrial area that generally were situated closer to the ring than in model 1) showed to be the best model overall. However, all models, including model 4, scored very negative in the cost benefit analysis.

3.1.4.2 Outcome

Cabinet decided to choose for model 4, but – because of the large economic deficit – with a modified transport model, that should be economically more profitable. This new model consists of a combination of three public transport systems: a high speed railway system between the major cities, a metro-system between medium sized cities and light rail and buses between small towns.

3.1.4.3 Conclusions for SEA Good Practice

The impact assessment was a success in a sense that in a short period of time a large amount of relevant information was gathered and presented to decision makers and the public. However, in the case of a new assessment for a similar plan some things would be done differently. First of all, the difference between alternative models on some aspects was rather evident and should not have been examined quantitatively. A qualitative assessment on the basis of common sense would have been sufficient. On the other hand, on some key issues the models should have been compared in more detail.

Secondly, the concept of ‘Spatial Quality’ as used in the SEA is not a very suitable starting point for impact assessment. Firstly, because it leads to too many indicators if one attempts to find indicators for all 7 elements. Secondly, because there is too much overlap between the indicators for the 7 elements.

Thirdly, the assessment started too late. Decision making had already progressed considerably. It would have been more effective had the SEA as a ‘quick scan’ been applied in an earlier stage, instead of a detailed assessment in a later stage. Earlier application would have opened possibilities for dialogue with decision makers and NGOs on multiple stages during the process rather than at one point, as was now the case.

Finally, a lesson learned is that it is very effective to build on SEA experience gained earlier. The success of the assessment was only possible because a comparable assessment already had been carried out earlier for the 4th National Spatial Plan (the approach was copied) and the fact that there is over 15 years of experience with the process that was followed; it was copied from the mandatory EIA process in The Netherlands.

3.1.5 REFERENCES

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3.2. Second National Plan on Mineral Resources

3.2.1 INTRODUCTION

3.2.1.1 Nature of the Proposal

This plan sets out the objectives and measures for a sustainable use and extraction of the available mineral resources in The Netherlands. The plan sets out the policies on sustainable use of mineral resources, effective compliance of economic needs and the spatial impacts of extraction. Also, the plan sets out the specific regions in The Netherlands where minerals may be extracted, in which zones within these regions⁶ and how much minerals may be extracted within this zone in the period 2000 – 2025. It was decided to determine zones and amounts for the extraction of gravel, coarse sand, fine sand and shells. Extraction of other minerals does not lead to environmental or other problems in The Netherlands.

3.2.1.2 Role of the SEA

The SEA was meant to deliver the environmental information needed to take the strategic decisions included in the mineral resources plan.

3.2.1.3 Focus of this Case Study

This case study focuses on the methodology used in the assessment of alternatives for the use of some of the scarcest minerals and location and depth of sand extraction.

3.2.2 BACKGROUND: CONTEXT AND ISSUES

3.2.2.1 Social and Environmental Setting

Mineral resources such as sand, gravel and clay are essential for the multitude of construction projects that takes place in The Netherlands, such as houses and other buildings, dykes and other waterworks, railroads and highways. The extraction of these resources, however, leads to many spatial and environmental problems in a densely populated country such as The Netherlands. Problems include loss of valuable nature area, landscape and historical elements. Also, the amount of available minerals is limited. On the other hand, positive impacts may be gained by giving depleted extraction locations a new function, such as nature or recreation area. For this, however, the extraction sites should be situated on the right spot for nature or recreation purposes.

3.2.2.2 SEA/Decision Making Process

For this plan an SEA was not mandatory in The Netherlands. As an experiment it was decided to carry out a voluntary SEA in an early stage, i.e. before the formulation of the draft plan. The results of the SEA were integrated in the draft plan itself (rather than be a separate document as is the case in formal SEA processes). April 2000 the independent EIA Commission was asked a scoping advice on the content of the assessment before it preparation and a quality review after the publication of the draft plan. Informal public participation took place during the preparation of the draft plan; formal public

⁶ It was decided that at the national level it would not be effective to decide on precise locations where extraction was allowed to take place. This should be a responsibility of regional authorities. It would be more effective to delineate in each province and in the North Sea the zones within which extraction in principle is allowed.

participation took place after its publication in July 2001.

3.2.3 APPROACH AND METHODS USED

3.2.3.1 Information Assembly

The assessment was carried out on the basis of existing information. For lacking information a research programme was developed to make sure for a new plan in the future sufficient information would be available.

3.2.3.2 Development of Alternatives

The EIA Commission advised to specifically compare the environmental performance of the following alternatives:

- for use of the most scarce resources: alternative options to minimise the use of these resources
- for sand: compare extraction on land locations with extraction on water locations, both salt water (North Sea) and sweet water (IJssel-lake and Marker-lake) and distinguish between shallow and deep extraction at these locations.
- for course sand: alternatives for the spatial distribution of sand extraction in The Netherlands, i.e. how much sand each of the provinces is allowed to extract, including what distribution would be the best from an environmental viewpoint.

For each of these topics the Commission suggested approaches and methodology.

The first two points of the advice by the Commission were followed, although in the SEA it was concluded that much information was not yet available. For this information an extensive research programme was integrated in the plan, to be carried out during the implementation of the plan. As to the spatial distribution of course sand extraction, it was decided not to develop alternatives because under the prevailing conditions for sand extraction (e.g. extraction in nature area or build environment was forbidden) it was expected that alternatives would score equal on environmental effects (see below).

Alternatives to minimise use of scarce resources

As to alternatives, to start with for most minerals it was explored which possibilities existed for reducing demand by making more effective use of them. Furthermore, an inventory was made of possible materials that could replace the minerals and an estimate was made of how much of this alternative material would become available in the future. Because gravel and course sand are the most scarce minerals in The Netherlands, for these two minerals specific alternatives were compared on their environmental consequences⁷:

- Use of gravel:
The alternatives were aimed at preventing or minimising the negative environmental effects of gravel extraction in the Netherlands: use of energy, loss of land space, emissions during extraction and hindrance during extraction. The following alternatives were compared:
 - extraction in The Netherlands
 - import from Germany
 - import from the UK (British part of the North Sea)
 - import from granite from Scotland

⁷ Shells are scarce too, but for choices in the extraction of shells a separate SEA was carried out.

- re-use of construction and demolition waste
 - artificial gravel from dredge spoil
- Use of course sand:
In recent years more and more resistance has grown against large scale course sand extraction on land, mostly because of the loss of land space, inter alia leading to effects on valuable ecosystems and hindrance to living areas (noise, smell, etc.). For that reason, the alternative of using sand from waste material was examined. This alternative, however, also had negative environmental consequences, mostly related to the need of cleaning this material (pollution is 'washed' out of it), that takes energy and water and generates waste residue. Positive and negative impacts of both alternatives were compared in the SEA.

Alternatives for location and depth of sand extraction

As for the extraction of gravel and course sand, resistance against extraction on land is growing in The Netherlands. An alternative could be to extract in water locations, such as lakes or the North Sea. However, many of these locations are protected nature area. The negative consequences of extraction on land should be compared against those of extraction in water. Also, it should be examined whether the negative effects of extraction could be mitigated by extraction to a greater depth, this way minimising the surface area in which extraction takes place. Deeper extraction, however, may lead to more severe impacts on a smaller area over a greater length of time. All in all, the following 6 alternatives were examined in the SEA:

- North Sea: shallow extraction; deep extraction
- Lakes: shallow extraction, deep extraction
- Land locations: shallow extraction, deep extraction

3.2.3.3 Selection of Issues and Indicators

See below under impact analysis.

3.2.3.4 Impact Analysis

Alternatives for scarce mineral resources

To start with, for all minerals a literature search was made to find out which alternatives existed for the use of gravel, sand and shells. For example, reference was made to an already existing study about sustainable alternatives for non-renewable mineral resources. In this study, especially the use of sustainably produced wood for construction purposes is mentioned as a good option. Also, for all minerals estimates were made as to how much material would become available in the future that could be an alternative for mineral extraction, for example through re-use of waste material.

For gravel and course sand the environmental consequences of alternatives were specifically compared using the following methodology.

Gravel

The six alternatives were compared by using a simplified form of Life Cycle Analysis. This means that, instead of the normal 10 environmental themes, alternatives are compared on only 4 themes: use of energy, use of space, emissions and hindrance:

- energy: this theme was assessed quantitatively. However, a complication was that in existing literature very differing amounts of energy needed are mentioned for the extraction of a ton of gravel. This meant that the end results had a high uncertainty.

- use of space: this theme too was assessed quantitatively in square metres. It was acknowledged, however, that this in fact is an inappropriate indicator for the assessment, since extraction does not only have an effect on the amount of surface that is lost, but may also affect the quality of area, e.g. hydrological systems or archaeological values. However, it was concluded that too little information or methodology is available to assess these effects in a life cycle analysis.
- emissions: mainly because of leaching of toxics from re-used construction material. This effect is assessed qualitatively, because of too little knowledge of how much toxics are emitted from this material. In the qualitative assessment the following methodology is used. The final score is calculated through the following equation: $Z \times (A+B+C)$. In this equation:
 1. Z = the pollution of the material (0 = not polluted; 4 = heavily polluted)
 2. A = degradation of organic pollution (0 = total degradation; 4 = no degradation)
 3. B = reduced leaching because of physical isolation or chemical immobilisation (0 = reduction as in natural materials; 4 = no reduction)
 4. C = chance of increased leaching because of human influence (0 = no chance; 4 = big chance)
- hindrance: mainly because of noise and dust. It was estimated how many square kilometres would suffer from noise and dust because of gravel extraction. Then this figure was multiplied by an estimate of how many people on average live on a square kilometre in the different countries. The figures used were 20 for Norway and Scotland, 0 for the North Sea and 400 for the Netherlands and Germany.

In addition to this it was assumed that if construction waste or dredge spoil (dried) would not be used to replace gravel it would be used for other purposes (construction material) or be deposited (dredge spoil). The environmental effects of this were also taken into consideration in the Life cycle analysis.

Course sand

The alternatives are compared by making an inventory of the extent to which the following environmental impacts occurred over the total life cycle of materials: use of energy, water pollution, soil pollution, use of resources and production of waste. As was stated in the SEA the methodology resembles a Life Cycle Analysis, but cannot be seen as such. Main reason for this was that the necessary knowledge to perform a real LCA is not available. In particular the classification factors for the theme 'use of space'. Since this theme was very important in the case of extraction, a proper LCA was not possible. The same was true for the impacts and effects of waste deposits (e.g. because of leaching out of toxics).

The scores that were found in the 'LCA-ish' study carried out were normalised in two different ways: firstly by monetarising the scores and secondly by means of the 'distance-to-target-method', in which the measure for the score is the amount to which it contributes to objectives laid down in policy documents. It appeared that especially monetarisation is a very suitable method. In monetarisation especially the use of space appeared to heavily influence the final scores of alternatives

Choice of locations and maximum depth of sand extraction

Impacts were assessed qualitatively. For each indicator it was discussed whether the effect of an alternative was 'limited' or 'big', whether it was 'local' or 'over a longer distance' and whether the ecosystem would recover in a 'short' time (i.e. less than 10 years), a 'long' time (more than 10 years) or 'never' (irreversible). These classifications were then assigned values:

- limited impacts 1 point; big effect 2 points
- local impact 1 point; longer distance effect 2 points
- quick recovery 0,5 point, long recovery 1 point, irreversible 2 points

Only for the aspect 'energy' a quantitative assessment was carried out, because this was easy to do on the basis of existing knowledge (i.e. the amount of energy it would take to extract a ton of minerals and to transport this amount per ship to the nearest harbour). The quantitative scores were then translated into a score on a 6 point scale by normalising against the highest score.

The assessment was carried out on the basis of expert judgement, that in its turn was based on a large number of already existing studies. To enable the assessment, it was necessary to make a large number of assumptions. These were explicitly listed in the assessment, e.g. assumptions such as 'excavation on land will only take place in rural areas', 'deep excavations on land will eventually leave lakes with either a nature or a recreation function', etc.

Assessment took place on the following aspects and sub-aspects:

- A-biotic aspects:
 - geology
 - geomorphology: coastline and sea
 - quality of the sea bottom
 - ground water: quantity and quality
 - surface water: quality, visibility, stratification and quantity
- Biotic aspects:
 - Flora: phytoplankton, algae, sea weed, water plants
 - Fauna: bottom fauna, fish, birds, mammals
 - Ecosystems
- Visual and historic aspects:
 - Landscape
 - Culture and history
 - Archaeology
- Environmental aspects
 - noise
 - air emissions
 - use of energy and water
 - use of space

The assessment resulted in a matrix giving scores for each of the alternatives per aspect (in the case of multiple sub-aspects the average of the scores was used). These scores were then the basis for a multi-criteria-analysis, in which scores were multiplied by 'weight factors'. For this, 4 sets of weight factors were used, each set reflecting a different preference:

- no preference: each score is equally important
- human preference: most important are the scores that affect human directly or that humans can easily notice
- nature preference: most important are the scores that affect plants and animals

- conservation: preference on keeping resources and existing values intact as much as possible; most important are the scores on e.g. geology, bottom quality, landscape and energy.

After multiplication, scores were then added up to get a final score per alternative, after which alternatives could be ranked.

As an example, below the scores are given on three criteria ('surface water', 'flora' and 'landscape') and the overall scores and ranking after weighting:

Table 16 Some examples of scores on criteria

	North sea deep	North sea shallow	Lakes deep	Lakes Shallow	Land deep	Land shallow
<i>Surface water:</i>	<i>2.6</i>	<i>1.4</i>	<i>1.9</i>	<i>0.6</i>	<i>3.7</i>	<i>0.8</i>
• quality	3	3	0	0	-	-
• visibility	2.5	2.5	2.5	2.5	2.5	2.5
• stratification	5	0	5	0	5	0
• quantity	0	0	0	0	3.5	0
<i>Flora:</i>	<i>0.8</i>	<i>0.8</i>	<i>4.2</i>	<i>4.2</i>	<i>5</i>	<i>5</i>
• algae/plankton	2.5	2.5	2.5	2.5	-	-
• sea weed	0	0	5	5	-	-
• water plants	0	0	5	5	-	-
<i>Landscape</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>6</i>	<i>6</i>

Table 17 Overall scores according to different weight sets

	North sea deep	North sea shallow	Lakes Deep	Lakes shallow	Land deep	Land shallow
No preference	45	43	55	57	81	88
Human preference	55	56	70	77	126	141
Nature preference	80	80	111	117	162	179
Conservation	113	107	123	128	174	188

Table 18 Overall ranking according to different weight sets

	North sea deep	North sea shallow	Lakes Deep	Lakes shallow	Land deep	Land shallow
No preference	2	1	3	4	5	6
Human preference	1	2	3	4	5	6
Nature preference	2	1	3	4	5	6
Conservation	2	1	3	4	5	6

Spatial distribution of sand extraction

Politically it was decided to apply the following preconditions for the distribution. Firstly, the amount of sand to be extracted should as much as possible be evenly distributed over all regions. Secondly, each region should as much as possible supply its own demand. Thirdly, the 'relative effort' it takes to extract a certain quantity of sand in a region should be taken into consideration. I.e. if geomorphologic or other reasons make it easier to extract sand in one region as compared to another, the first region

should supply more sand. Fourthly, urban areas and protected areas, e.g. for natural or archaeological reasons, were exempted beforehand.⁸

The methodology used to determine the zones within extraction in principle is allowed, consisted mainly of mapping the area in which extraction is not allowed (e.g. protected nature or archaeological area and build environment). The remaining area then makes up the zones.

An environmental assessment was not part of the methodology used to determine the amount of sand a region might extract. For this the following argumentation was given. Firstly, environmental effects would above all take place in the case of extraction in urban or protected areas. However, extraction in these areas was exempted beforehand and thus effects would not occur. Secondly, the other main environmental effect would be the effects of transportation of the sand. However, because one of the starting points is that each region should as much as possible produce its own sand, this means necessary transport is already minimised. Because environmental issues were thus minimised, they were regarded as less relevant and therefore no attempt was made to look at alternatives that would score better from an environmental viewpoint.

3.2.3.5 Comparison of Alternatives

Alternatives for gravel production were compared in three different ways:

- for each alternative the quantitative scores were given on each of the five aspects assessed;
- alternatives were ranked relative to each other for each of the five aspects assessed;
- each alternative was discussed qualitatively inter alia on the basis of the above mentioned scores and rankings.

Alternatives for course sand were compared on their quantitative monetary scores and their relative 'distance to target score'. Scores were given in a separate document. In the SEA only the scores on one of the most important aspects was given – use of space – and a qualitative discussion was given of the overall results for each of the two alternatives.

Alternatives for depth and location of sand extraction were compared in matrices.

3.2.3.6 Public Participation

Public participation took place as part of the mandatory planning process, but only in a later stage of the process. In an earlier stage NGOs and regional authorities were consulted on their opinion as to the content of the new plan (but not of the SEA): five discussion meetings were organised with groups of approximately 15 people from both governments, industry, environmental NGOs and universities. During that same stage everybody could give a written opinion.

⁸ An exception is made for protected areas in seas and lakes. Here extraction is allowed under certain strict conditions. A major environmental reason to allow this exception is that extraction in water locations typically does not create any hindrance to people, while extraction on land in many occasions does. Also, extraction in water typically does not change the function of the area (it remains water), while extraction in land does (because of the extraction land may for example change into water).

3.2.3.7 *Monitoring and Follow Up*

In the draft plan it is concluded that extensive development of new knowledge is necessary to support the implementation of the final plan. In the plan an overview is given of necessary research projects and the state of the art of this research. Five types of necessary knowledge development were distinguished and under each of these five headings a large number – approximately 100 – of specific studies and monitoring plans were mentioned. The types were:

- research to support general policy development for mineral resources
- research aimed at the efficient use of mineral resources
- research on primary resources
- research on secondary resources
- research on renewable resources

3.2.3.8 *Overview: what worked well and why*

In its quality review the independent EIA Commission drew the following conclusions:

- the alternatives for location and depth of course sand extraction had been correctly assessed
- the Commission criticised the decision not to look at the environmental consequences of setting the amount of sand that as a maximum could be extracted per region. Firstly, because extraction outside of protected area will have environmental effects too and therefore the argument that environmental effects will not occur because protected area are exempted is not valid. Secondly, because extraction outside of, but close to, protected area can still have effects on these area through hydrological relations, especially ground water. Thirdly, that the alternative of concentrating extraction in a few, greater locations within the allowed zones had not been assessed.
- the assessment of alternatives for gravel extraction is of insufficient quality. In addition to the four themes, the alternatives should also have been judged on nature and landscape effects.

3.2.4 *RESULTS AND LESSONS*

3.2.4.1 *Contribution to Decision-Making*

Gravel

Compared to extraction in the Netherlands, the SEA showed that the alternatives scored as follows:

- extraction in Germany scored equal
- extraction in the British part of the North Sea scored worse on energy but a lot better on hindrance
- use of granite from Norway or Scotland scored worse on energy but better on hindrance and a bit better on use of space
- re-use of construction material scored slightly better on use of space, emissions and hindrance
- artificial gravel scored a lot worse on energy but a lot better on all other themes.

Course sand

The re-use of sand from waste appeared to be much better from an environmental viewpoint than the extraction of new course sand. The most negative impact of re-use is the deposit of pollution washed out of the waste in order to get usable, clean sand. This means that waste containing much fine sand is less usable, since it is especially this kind of sand that is often polluted.

Locations and depth of sand extraction

It was concluded in the assessment that sand extraction in all cases has serious environmental effects. The precise type and nature of these effects cannot be judged at this strategic level, because it will depend on the specific local circumstances. However, in general the following conclusions may be drawn:

- extraction in the North sea will have the least effect, extraction on land the most effect, with extraction in lakes in between
- it is not possible to distinguish between shallow and deep extraction in the case of water locations; it all depends on how important it is judged that in the case of shallow extraction a lot bigger surface area is needed per ton material than in the case of deep extraction. In the case of land locations deep extraction scores better.

A warning is made that the results have a high level of uncertainty. More definite conclusions may only be drawn when the exact extraction locations are known. However, since existing policy is in line with the conclusions found so far, there does not seem to be a need to change the policy. Indeed, the results seem to indicate that a further shift from extraction on land to extraction on water is justified.

3.2.4.2 Outcome

The SEA influenced the draft plan considerably. However, what the draft would have looked like without the SEA is hard to say. The assessment was fully integrated into the draft.

3.2.4.3 Conclusions for SEA Good Practice

It proved to be ineffective to do an SEA of all decisions that were made in this plan. An important role of the SEA was to determine the decisions for which the SEA would have most added value. For this, the following three criteria were used:

- decisions that limit or steer follow up decisions in plans at lower level or on projects, and
- for which alternatives exist that from an environmental viewpoint potentially are better, and
- of which the environmental effects can in some way be estimated, qualitatively or quantitatively.

An important extra beneficial effect of this SEA was that it generated much information that will be very useful in SEAs for follow up plans or at project level.

3.2.5 REFERENCES

- The Netherlands EIA Commission, 2001, '*Review Advice on the Integral Impact Assessment of the Deltametropolis*', The Netherlands EIA Commission, Utrecht, The Netherlands.

3.3. SEA of the North Holland-South Spatial Strategy plan

3.3.1 INTRODUCTION

3.3.1.1 Nature of the Proposal

This strategy plan is a first step in the development of a spatial plan for the southern part of the province of North Holland (in the middle of which the Dutch capital of Amsterdam is situated). The central objective of the plan is 'to maintain and strengthen the function of the area as 'economic driving force', at the same time respecting the demands of a good living environment, accessibility of the area and water management'.

3.3.1.2 Role of the SEA

The SEA should support decisions in the plan on the most desirable development for this part of The Netherlands.

3.3.2 BACKGROUND: CONTEXT AND ISSUES

3.3.2.1 Social and Environmental Setting

In this area 2 million people are living and it is expected that in the period until 2020 this number will grow with another 180.000 (resulting in a demand of 100.000 to 150.000 new houses). The area is part of the so-called 'Delta-metropolis', i.e. the area in which the major economic development of The Netherlands is situated, including the Dutch major airport (Schiphol). In addition to the growing demand of new housing and industrial area, the region faces problems of traffic congestion.

3.3.2.2 SEA/Decision Making Process

For a strategy plan an SEA was not mandatory under Dutch SEA regulation. It was decided to carry out SEA on a voluntary basis, following all the legal requirements. This led to the following process:

Sep 1: publication of a starting note in May 2001 in which the objective to establish a strategy plan is explained

Sep 2: public participation; everybody that wants to do so can give its public comments on the required content of both the SEA and the plan.

Sep 3: advices of environmental and nature agencies and the independent EIA Commission are given on the required content of both the SEA and the plan.

Sep 4: preparation of the SEA and the plan;

Sep 5: publication of the SEA and the draft plan in April 2002

Sep 6: public participation; everybody that wants to do so can give its public comments on the quality of both the SEA and the plan.

Sep 7: advices of environmental and nature agencies and the independent EIA Commission are given on the quality of both the SEA and the plan (agencies) or just the quality of the plan (Commission).

Step 8: adoption of the plan by the Provincial Government

3.3.3 APPROACH AND METHODS USED

3.3.3.1 Information Assembly (including use of existing data, types of studies carried out)

Since the plan is an integral plan, aiming at both economic, social-cultural and environmental objectives, it was decided that the SEA should be an integral assessment. This assessment was carried out on the basis of existing information.

3.3.3.2 Development of Alternatives

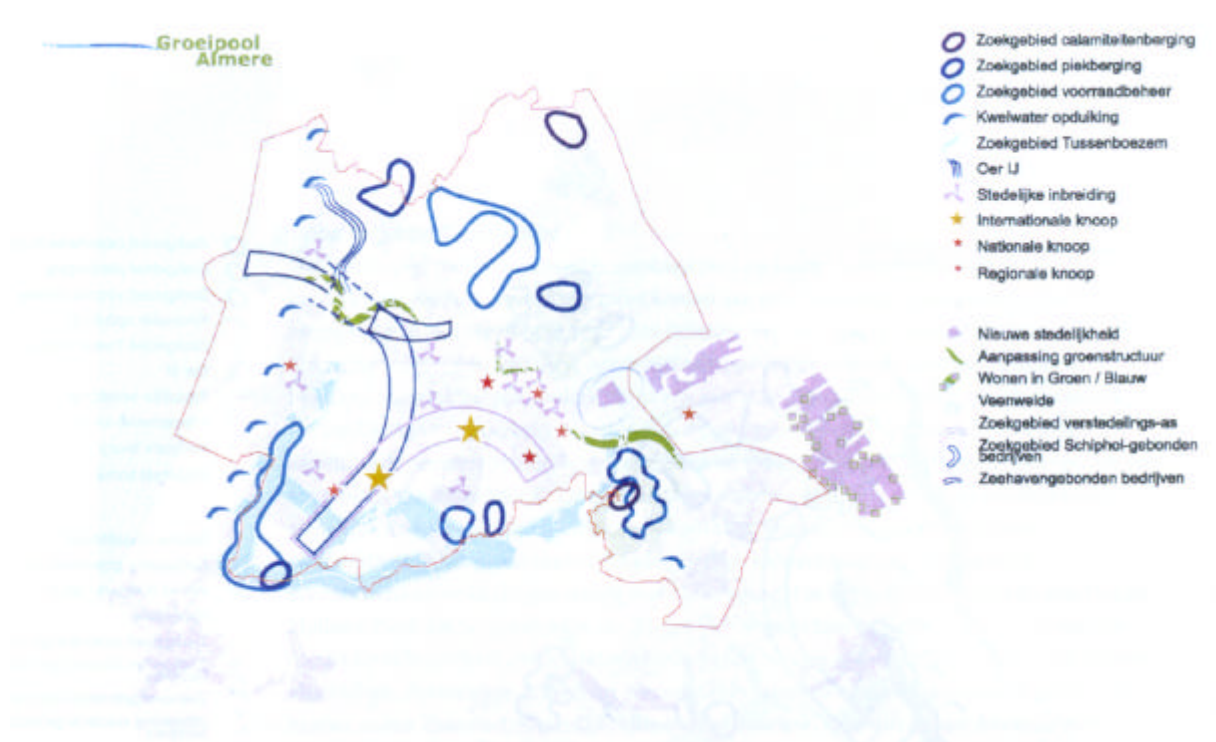
In the SEA five alternative so-called ‘development models’ are examined. Each model consisting of a combination of choices in water management⁹ (both water quality and safety against flooding), infrastructure development and new housing locations. This provides the spatial basis for five alternative housing models:

- Model 1 tries to find the new houses needed as much as possible in existing urban areas by making more effective use of these areas
- Model 2 uses new area for housing, trying to concentrate new housing area as much as possible in a limited number of locations. On these locations houses are build in both high and low densities.
- Model 3 uses new area, but dispersed over a larger number of new locations than in model 2. However, the area of each of these locations is kept to a minimum by building houses in high densities.
- Model 4 uses new area, dispersed over an even larger number of smaller locations in which houses are build in low densities (which has the preference of most house owners).
- A combination of the above four models (called the ‘preliminary preferred model’ by the competent authority).

In each of the five models, appropriate new infrastructure is designed to suit the choices made on new housing areas.

⁹ In all five models the choices for water management are the same. Originally two alternative scenario’s were developed. In the first scenario water quality and safety is guaranteed by actively managing water levels and quantities (pumping, draining, etc.). In the second scenario the solution is sought by restructuring area from a water perspective, e.g. no houses where flooding is possible, no agriculture where this would require extensive drainage, sufficient space to store large amounts of water in the case of calamities, etc. However, it was found that in all cases the second scenario was far more effective than the first. Therefore, all models are based on the second scenario.

Figure 4 Example below the graph of model 2.



The legend of the map on the right of the graph says (from top to bottom):

- the first six symbols indicate areas for water management
- the seventh symbol indicates existing urban areas suitable for building more houses within them
- the next three symbols indicate 'nodal points' or 'centres' of respectively regional, national and international importance (e.g. Schiphol airport)
- the 11th symbol indicates new housing areas
- the 12th symbol indicates new green areas
- the 13th symbol indicates new housing areas in areas of natural and landscape value
- the 14th symbol indicates a specific Dutch ecosystem (so-called 'peat-meadow system')
- the 15th symbol indicates the search area related to the main 'urban areas axis' in the region
- the 16th symbol indicates search area for enterprises related to Schiphol airport
- the 17th symbol indicates search area for enterprises related to IJmuiden sea port

Under Dutch EIA regulation it is mandatory to develop the 'best environmental alternative'. In this SEA the 'best environmental model' was developed by first determining which of the five models scored best on the aspects 'hindrance (noise and smell)', 'landscape' en 'ecology'. In a next step it was then examined whether the remaining effects of this model could be mitigated by additional measures.

3.3.3.3 Selection of Issues and Indicators (scoping)

Existing spatial policy in the south of North Holland mentions four issues of high priority: water (both quality and protection against flooding), living quality (both urban quality, nature and landscape), accessibility (traffic & transport) and economy. For each of these issues, a limited number of appropriate indicators were found (see below under 'impact analysis'). Following the advice of the independent EIA Commission, to the four issues also the issue of 'robustness' was added, i.e. the adaptability of a spatial model to unforeseen future events.

3.3.3.4 Impact Analysis (methods and tools used)

Alternatives were compared on the following environmental indicators (in italic the methodology used to score the indicator. All transport related effects were determined quantitatively with the use of a traffic model):

- water:
 - water quality and supply [*qualitative/expert judgement: indication of measures needed*]
 - safety against flooding [*qualitative/expert judgement: indication of measures needed*]
 - amount of open water [*quantitative: number of building locations in which remaining open space is used for houses rather than open water*]
 - existing activities in area needed for water storage/protection against flooding [*qualitative: extent to which new housing locations are situated in these area*]
- nature:
 - effect on protected area:
 - effect of water related measures [*qualitative/expert judgement*]
 - effect of measures for nature development [*qualitative/expert judgement*]
 - loss of area [*quantitative/ha*]
 - disturbance of nature area [*qualitative/expert judgement*]
 - effect outside protected area:
 - effect of water related measures [*qualitative/expert judgement*]
 - effect of measures for nature development [*qualitative/expert judgement*]
 - loss of area [*quantitative/ha*]
 - disturbance [*qualitative/expert judgement*]
 - fragmentation of nature area:
 - because of water related measures [*qualitative/expert judgement on the basis of the size of the area in which fragmentation occurs and the magnitude of effects*]
 - increased mobility [*% increase of fragmentation*]
 - use of space [*qualitative/expert judgement on the basis of the size of the area in which fragmentation occurs and the magnitude of effects*]
- landscape and archaeology:
 - use of space in rural areas [*ha*]
 - effect on open landscape [*qualitatively/expert judgement*]
 - effect on identity of landscape [*qualitatively/expert judgement*]:
 - because of water related measures
 - because of the development of landscape parcs
 - because of urban development
 - effect on historic areas and buildings [*qualitatively/expert judgement*]:
 - because of water measures
 - because of urban development
- traffic and transport [*use of DHV 'Noordvleugel'-model¹⁰*]:

¹⁰ In this model it was assumed that models would only differ as to the location of housing and working area (e.g. offices, industrial area). Differences in growth of number of inhabitants or jobs were not taken into account. The model resulted in maps indicating traffic intensity and capacity in the study area, tables with the expected modal split, number of vehicle and traveller-kilometres and number of hours lost while travelling because of congestion. Also, expert judgement was used by organising a workshop of experts discussing a specific set of questions about the effects, such as where congestion is to be expected, etc.

- effect on demand [*number of vehicle kilometres*]
- use of public transport [*expert judgement on the basis of results of the traffic model in travel kilometres public transport*]
- use of integrated traffic concepts [*distance between 'traffic mode exchange points', e.g. from car to train, or bus to train etc; the smaller the distance the more positive the score*]
- effect on secondary road network [*qualitative/expert judgement*]
- road safety [*amount of vehicle kilometres on secondary roads; more kilometres means less safe*]
- congestion [*intensity-capacity ratio of roads*]
- urban environment:
 - variety of urban quality (e.g. expensive versus cheap housing) [*expert judgement*]
 - segregation (e.g. chance of ghetto development, positive effect on integration ethnic minorities) [*expert judgement*]
- living environment quality:
 - hindrance (noise and smell) [*quantitative : number of new houses that will experience hindrance*]
 - safety (other than road safety, e.g. transport of dangerous goods) [*quantitative: risk of calamities*]
 - recreational area [*qualitative: amount of recreational area and access to it*]
- economy:
 - variety and quality of new working environments [*ha new industrial area; location relative to centres of economic activity*]
 - quality of living area for international staff [*number of new houses suitable for higher incomes, i.e. expensive, big houses and new houses in the centre of cities*]
 - development main ports [*expert judgement*]
 - unemployment [*qualitative; expert judgement; ratio number of inhabitants versus employment in 2020*]
 - use of agricultural area [*qualitative: growth or reduction of agricultural area*]
 - creation of possibilities for sustainable agriculture (i.e. combination of agriculture and nature protection) [*qualitative: growth or reduction of agricultural area with a high natural value*]
- robustness:
 - flexibility:
 - possibilities to accommodate unforeseen developments [*qualitative; expert judgement; on the basis of alternative scenarios in existing studies of possible future developments*]:
 - demographic development
 - change in habits (e.g. demand for bigger houses or gardens in the future)
 - stagnating economic development
 - possibilities for further growth after the planning period [*qualitative; expert judgement*]:
 - growth in living space
 - growth in working space
 - vulnerability:
 - financial risks [*quantitative: in particular cost of buying new area for water management and urban development*]
 - extent to which it is possible to control the desired development [*qualitative; expert judgement*]

For each indicator in the SEA first the existing situation is described, followed by a description of the effects.

3.3.3.5 Comparison of Alternatives

The alternative models are compared in two ways:

- On the basis of the quantitative or qualitative scores, all effects are translated into a 7-point scale (very positive +++ to very negative ---) by expert judgement. In a matrix these scores are given for all models for all criteria assessed. Weighting of scores did not take place.
- Per aspect assessed, the differences between models are qualitatively discussed.

Special attention is given to the comparison of model 5 (the preferred model of government) and the model that would score best from an environmental viewpoint (model 1 with extra additional mitigating measures).

In addition to their environmental effects, the alternative models are also compared and ranked on their contribution to seven important political issues:

- how to best fulfil the demands of the housing market?
- how to develop economy best?
- what new urban and living quality should be aimed for?
- should existing landscape identity be strengthened or should a new identity be developed?
- protect existing biodiversity or develop new biodiversity?
- how to locate living areas as close as possible to working areas to reduce mobility demand?
- how to get the most robust development in light of future uncertainties?

3.3.3.6 Public Participation

After publication of a starting note a first round of public participation took place on the required content of both the SEA and the plan for which the SEA is prepared. In this stage everybody in The Netherlands had the right to send in written comments. Also a round of public hearings was organised.

After publication of the SEA and the first draft plan, a new round of public participation took place on the quality of the SEA and the content of the draft plan. Again, every citizen, NGO, government authority, etc. had the right to send in written comments or speak at public hearings.

3.3.3.7 Uncertainty Analysis

In the SEA the uncertainties in the assessment are analysed and listed. These consist of three 'general' gaps in knowledge and a series of uncertainties per aspect, resp. water, nature, traffic, living environment, landscape and costs. As examples, below the identified general uncertainties and the uncertainties in predicting effects on nature are given.

The general uncertainties are:

- Since the models were developed on a relatively high abstraction level, the impacts are described at a high abstraction level too. At a later stage, i.e. when measures to be taken are more known in detail, impacts should be assessed more precisely.
- It is not yet clear when measures announced will be carried out. It is therefore equally unknown when predicted impacts will take place.
- Models will have impacts in other provinces too and these are described in the SEA. However, negotiation with these provinces still has to take place.

The uncertainties in effects on nature are:

- Part of the effects on nature will depend on the water management of the area in the future. Since these are not known in great detail, effects on nature that depend on water management cannot be predicted precisely.
- The disturbance of nature areas by noise is a rough indication only. In a later stage this should be assessed in more detail, at a more detailed level of spatial planning.
- It is assessed how much nature area will be lost because of new housing development. However, in the strategic models only 'search areas' for housing projects are given and not precise development areas (search areas evidently will be bigger than the areas finally developed). The loss of valuable nature, therefore, cannot be not assessed exactly.
- Necessary mitigation and compensation measures to prevent or compensate for loss of nature have not been taken into account.

3.3.3.8 Monitoring and Follow Up

In the SEA it is indicated what should be the content of a monitoring and evaluation plan:

- a check of the predicted impacts in the SEA
- an evaluation of the uncertainties listed in the SEA (see below)
- external developments such as population growth, mobility, infrastructure development
- specific political issues relevant in decision making.

It is stated in the SEA that on the basis of these general points, an evaluation programme should be developed that identifies specific parameters and deadlines. Also, the evaluation programme should be linked to existing monitoring programmes on spatial development, nature, mobility, environment and water.

3.3.3.9 Overview: what worked well and why

In its quality review the independent EIA Commission gave an overall positive judgement of the SEA. Most important criticism was that the underlying argumentation of the five models developed was not clear. In an earlier advice the Commission had advised to develop alternatives around actual political

dilemma's or issues. This advice had not been followed, but rather transformed into a method to compare alternatives (see above). A second criticism was that water management, that in all alternatives was an important element, had not been translated into concrete spatial demands. This should have happened since the spatial demands of water management can be very high and therefore influence the models significantly.

3.3.4 RESULTS AND LESSONS

3.3.4.1 Contribution to Decision-Making

The total SEA process took about 1 year. In the SEA it is concluded that the best model from an environmental viewpoint is model 1, with additional mitigating measures. The model that scores best overall is model 5, that in fact is a combination of the four other models. When compared with the best environmental alternative, the preferred model scores worse on nature, mobility, and landscape, but better on water issues, urban quality, quality of living environment, economic development and robustness.

An analysis of why model 5 scores worse on the three indicators mentioned, shows that this is most of all due to the effects of new housing locations in rural area. Therefore the environmental performance of model 5 can be optimised by first choosing for the development of the locations with the least environmental effects and avoiding rural areas as long as possible.

The influence of the SEA on strategic decision making is uncertain. Most of all because the preparation of the SEA took too much time. For that reason insufficient time existed to use the results of the SEA in final decision making. On the other hand, it is concluded by government that environmental issues did not raise much controversy in decision making. It is believed that the good quality of the SEA contributed to this. All in all, the provincial government judged the SEA as worthwhile and a new voluntary SEA has been started – again on a voluntary basis – for the strategy plan for the northern part of the province.

3.3.4.2 Outcome

The provincial government decided to choose for model 5 (combination model), with the following preconditions:

- sufficient area for water storage in relation to safety against flooding
- to respect existing natural and landscape values
- to combine as much as possible water measures and nature development
- provision of adequate transport infrastructure
- to accommodate as much as possible the expected future demand of the housing market

3.3.4.3 Conclusions for SEA Good Practice

The provincial government judged the SEA as useful, with the exception of the consultation of the general public. The plan generated little attention and few public comments, while the participation process took quite some time. In a new assessment for a similar plan consultation would be restricted to major NGOs.

In developing and comparing alternatives, actual political dilemma's provide a good basis. If alternatives show the possible ways out of the dilemmas, the assessment provides politicians insight in the options they have and their consequences.

Government concluded that too many aspects were assessed quantitatively. Because of this, the SEA took too much time. Also, quantitative figures give a false sense of certainty, while it was apparent that the final result were uncertain due to the strategic nature of the alternatives.

A lesson learned also was that timing is of the essence in SEA. Originally the intention was to first prepare the SEA and the strategy plan, to be the basis for the development of the spatial plan. Because of the time the SEA took, the strategy plan at one point was overtaken by the development of the spatial plan. Partly this was due because the SEA was started too late, partly due to the fact that the SEA assessed too many aspects quantitative. The SEA should have started earlier and have been of a more qualitative nature.

3.3.5 REFERENCES

- The Netherlands EIA Commission, 2002 '*Review Advice on the Strategic Integral Impact Assessment North-Holland South*', The Netherlands EIA Commission, Utrecht, The Netherlands.

3.4. The National Waste Management Plan 2002

3.4.1 INTRODUCTION

3.4.1.1 Nature of the Proposal

One of the objectives of this plan is to set so-called 'minimum standards' for the processing of a number of waste streams. These standards specify the minimum environmental performance of techniques to process waste streams. Under the plan, no license can be issued for techniques with a worse performance. In some cases the minimum standard is defined very broadly, e.g. 'incineration with energy retrieval'. However, for a number of streams the standard is defined as a specific technique.

A second part of the plan is to establish the preferred capacity for waste incineration in The Netherlands.

3.4.1.2 Role of the SEA

The SEA was carried out for those standards that were to be defined as a specific technique. In the SEA, the environmental performance of alternative techniques was compared. Also, the SEA was to give the environmental foundation for the capacity planning of incineration.

3.4.2 BACKGROUND: CONTEXT AND ISSUES

3.4.2.1 Social and Environmental Setting

The approach of setting 'minimum standards' was developed to give the private waste processing market in The Netherlands as much freedom as possible. A waste company can apply any technology it wants, as long as it scores better than the minimum standards. Obviously, the waste management plan generated much interest from private industry.

As to capacity planning for waste incineration, this capacity should not be too small, because then too much waste has to be land-filled, which is bad from an environmental viewpoint. On the other hand, the capacity should not be too big, because then the incentive for prevention and re-use of waste will disappear. Also, objective of the planning is to regenerate as much energy as possible while incinerating the waste. And, from an economic viewpoint, to optimally utilise the existing capacity for incineration in The Netherlands.

3.4.2.2 SEA/Decision Making Process

The waste management plan is a responsibility of the Minister of the Environment. It sets the waste management policy for a period of 4 years. Every four years it is renewed. For this plan an SEA is mandatory. According to Dutch SEA regulation the process is as follows:

Sep 1: publication of a starting note in August 1999 in which the objective to establish a new plan is explained

Sep 2: public participation; everybody that wants to do so can give its public comments on the required content of both the SEA and the plan. In addition to this mandatory requirement, an intensive informal public participation process was followed (see below under 'public participation')

Sep 3: advices of environmental and nature agencies and the independent EIA

Commission are given on the required content of both the SEA and the plan.

Sep 4: preparation of the SEA and the plan; the mandatory content of the assessment report is given in the law; one of the requirements is to describe the alternative that would be best from an environmental perspective.

Sep 5: publication of the SEA and the draft plan in January 2002

Sep 6: public participation; everybody that wants to do so can give its public comments on the quality of both the SEA and the plan.

Sep 7: advices of environmental and nature agencies and the independent EIA Commission are given on the quality of both the SEA and the plan (agencies) or just the quality of the plan (Commission).

Step 8: adoption of the plan by the Minister of the Environment, after amendment by Cabinet and Parliament

3.4.3 APPROACH AND METHODS USED

3.4.3.1 Information Assembly

The SEA was carried out on the basis of existing information. Information was drawn from:

- experiences from the implementation of previous waste management plans
- the existing action programme aiming at filling in the gaps of knowledge in these previous plans
- information from EIAs carried out for licensing waste processing facilities
- monitoring programmes of the Ministry of the Environment
- information from a number of research programmes from state institutes.

3.4.3.2 Development of Alternatives

Minimum standards

For 26 waste streams specific reference techniques should be specified. These included waste streams such as asbestos, batteries, photographic waste, organic waste, mercury-containing waste, dissolvents, construction and demolition waste, waste oil, etc. For each of these streams alternative techniques were described and compared on their environmental performance. E.g. for waste oil the following techniques were compared: incineration in a rotary drum incinerator, use as additional fuel in a cement oven, use as additional fuel in a power station and distillation with sodium treatment. For mercury containing waste the alternatives were vacuum distillation and pyrolysis/smelting. Etc.

Part of the SEA was to specify the technique that could be considered the best one from an environmental viewpoint.

Capacity planning

The SEA compared the environmental effects of four alternative planning scenarios for the incineration and further processing of waste from households, industry and construction activities in 2012 (this waste makes up about 80% of the total amount of incinerated waste). The scenarios are designed to indicate 'extreme' options. In all scenarios waste incineration is the basis. The alternative scenarios

differ as to the processing techniques that are used in addition to incinerating the waste. Only those techniques are utilised that are operational on a commercial scale or will be operational in the near future. Experimental or very costly techniques such as pyrolysis or gasification are not considered. In all cases waste incinerators should generate electricity and in all cases metal, inert material (e.g. glass and stones) and water should be taken out of the waste as much as possible.

- Scenario 1: First, waste is divided into RDF, PPF and ONF¹¹. PPF is burned as additional fuel in coal fired power plants or cement ovens. RDF is burned in new waste incinerators using the newest technology. ONF is either digested or composted first, and then burned in existing waste incinerators.
- Scenario 2: Waste is processed into RDF and then incinerated in new waste incinerators, specifically designed for RDF, i.e. fluidised bed incinerator or grate incinerator with combined heat and electricity generation.
- Scenario 3: All waste is integrally incinerated in waste incinerators. Low caloric waste in existing incinerators, high caloric waste in new waste incinerators; incineration capacity is increased until a balance between demand and capacity exists.
- Scenario 4 (status quo): no increase of incineration capacity; waste that cannot be incinerated is land-filled.

3.4.3.3 Selection of Issues and Indicators

See below under 'impact analysis'

3.4.3.4 Impact Analysis

Minimum standards

For each waste stream alternative techniques were compared using 'Life Cycle Analysis' (LCA). This method identifies the environmental effects of processing a waste stream all the way from production of waste material to its disposal. It includes the – often positive – environmental effects of re-use of material, e.g. the savings in raw materials, auxiliary materials and fuels this creates (see annex for a more detailed description of the LCA method).

The LCA describes the effect on a number of standard environmental themes:

- climate change
- acidification
- eutrophication
- dispersion
- use of resources
- disruption

Within these environmental themes a standardized list of so-called 'LCA-themes' are assessed:

- climate change: greenhouse effect and effect on ozone layer

¹¹ RDF: the components of the waste that burn best. ONF: the organic fraction with a high water content. PPF: paper and plastics.

- acidification: acidification
- eutrophication: water systems and land systems
- dispersion: toxicity for humans, eco-toxicity for water systems, eco-toxicity for land systems and photochemical oxidants
- use of resources: use of a-biotic resources
- disruption: effect on biodiversity and effect on life support systems

To make the results of the LCA more useful for political decision making, the analysis was carried out from different ‘political’ perspectives, such as specific emphasis on green house effect or specific emphasis on the dispersion of toxic material in the environment. For this purpose different weightings were given to specific effects. Also, a ‘distance to target’ analysis was carried out in which alternatives were compared on the extent to which they contributed to policy targets set in existing policy. In all cases, the total burden on the environment was also given.

The following weighting sets were used:

- all 6 environmental themes equally important
- all 12 LCA-themes equally important
- importance of effects relative to ‘distance to target’, i.e. if the relative contribution of an effect to a policy target is bigger, its importance is bigger
- only the greenhouse effect is important, the other effects are not; this weight sets reflects the importance that Dutch policy gives to reduction of energy use)
- only dispersion is important, the other effects are not.

Table 19 Below the used weights are given:

	Set 1 (see above)	Set 2	Set 3	Set 4	Set 5
greenhouse effect	0.5	1	0,59	1	-
effect on ozone layer	0.5	1	3,0	-	-
Acidification	1	1	2,9	-	-
eutrophication of land systems	0.5	1	1,8	-	-
eutrophication of water systems	0.5	1	1,8	-	-
toxicity for humans	0.33	1	0,66	-	0,33
eco-toxicity for water systems	0.17	1	0,34	-	0,17
eco-toxicity for land systems	0.17	1	0,34	-	0,17
photochemical oxidants	0.33	1	0,66	-	0,33
use of a-biotic resources	1	1	-	-	-
Biodiversity	0.5	1	-	-	-
life support systems	0.5	1	-	-	-

To gain insight in the relative contribution of waste processing to overall environmental problems in The Netherlands, as a baseline the total yearly environmental effect of the Dutch economy was calculated on each of the LCA themes. In addition, the total effect of Dutch economy was also calculated on:

- use of space
- amount of waste to be land filled
- use of energy
- use of water.

Per waste stream the scores on these four aspects was given too.

To enable the LCA, for each waste stream the SEA gave the following information:

- characteristic and composition of the waste stream
- alternative waste processing techniques
- process descriptions and LCA system boundaries
- mass balance of the process and use of space
- financial cost of the technique
- waste transport
- energy balance
- means used during waste processing
- emissions to water, soil and air
- gaps in knowledge and uncertainties
- overview of the use of resources, use of space and emissions

Capacity planning

The four alternative scenarios were compared on their environmental effects using a simplified form of Life Cycle Analysis, i.e. only the most relevant environmental aspects are considered:

- use of space for waste that is land-filled
- emissions of NO_x, CO₂, CO, carbon hydroxides, NH₃ and dioxins.

On the basis of this limited set of aspects, all standard LCA themes (see above under ‘minimum standards’) are scored in the LCA, including the four additional themes: use of space, amount of waste to be land filled, use of energy and use of water.

As usual the LCA not only looked at the direct environmental effects of the processing techniques, but also at the effects of remaining waste that should be land-filled, the use of additional chemicals in the waste processing (only the most important ones), etc. and the positive effects of reduced demand of primary resources and fuels because of re-use of waste and electricity and heat generation out of waste

processing. Also, the effects of necessary transport of waste or primary resources were taken into account. In this, only road transport was taken into consideration, because this type of transport has the biggest environmental effects).

A sensitivity analysis was carried out using the same weighting sets as described under ‘minimum standards’. Also, in all cases the uncertainty in the end result was analysed. In this analysis, both uncertainties in the amounts of waste that will be processed in the different processing techniques within a scenario were taken into account, as the uncertainties in the environmental effects of these techniques.

3.4.3.5 Comparison of Alternatives

Minimum standards

For each of the alternative techniques scores were given in the following formats:

- a matrix in which for all alternatives the scores on all 12 LCA themes were given (quantitative)
- a bar chart showing for all alternatives the added LCA scores (the higher the bar the higher the environmental impact; scores are added without ‘weighting’)
- a matrix in which for all alternatives the scores on land use, final waste production, use of energy and use of water were given (quantitative)
- a matrix in which for all alternatives the added LCA scores were given for each of the five different weighting sets (quantitative)
- a matrix in which the cost of a technique per ton processed waste was given (quantitative).

In addition, the techniques were discussed qualitatively (based on the quantitative scores) and final conclusions were drawn.

Below, as an example, some scores are given on the processing of waste oil.

Table 20 Effect scores per LCA theme (x10⁻¹²)

	Rotary drum	Cement oven	Power station	Distillation
use of a-biotic resources	-3400	-34788	-25567	-14788
greenhouse	12579	-2624	-5656	-1204
effect on ozone layer	-17	-579	-431	-535
photochemical oxidants	610	-4225	-3863	-1945
eco-toxicity for water systems	-259	-3037	-2321	-6127
eco-toxicity for land systems	-1084	-42231	-9927	-7237
toxicity for humans	-104	-973	-1090	-1330
Acidification	1674	-21824	-17638	-6158
eutrophication of water systems	1030	-1345	-1992	-548
eutrophication of land systems	3628	-4531	-6628	-1690
Biodiversity	-3706	-481	-1881	258
life support systems	-5022	-444	-1853	388

(higher score is more negative effect; negative score = positive effect)

Table 21 Weighted overall effect scores (10^{-12})

	Rotary drum	Cement oven	Power station	distillation
Weight set 1	2459	-71025	-56152	-25965
Weight set 2	5929	-117084	-78857	-40917
Weight set 3	8684	-487206	-371005	-88772
Weight set 4	12579	-2624	-5656	-1204
Weight set 5	-61	-9411	-3717	-3353

(higher score is more negative effect; negative score = positive effect)

Figure 5 Bar chart of the added LCA scores

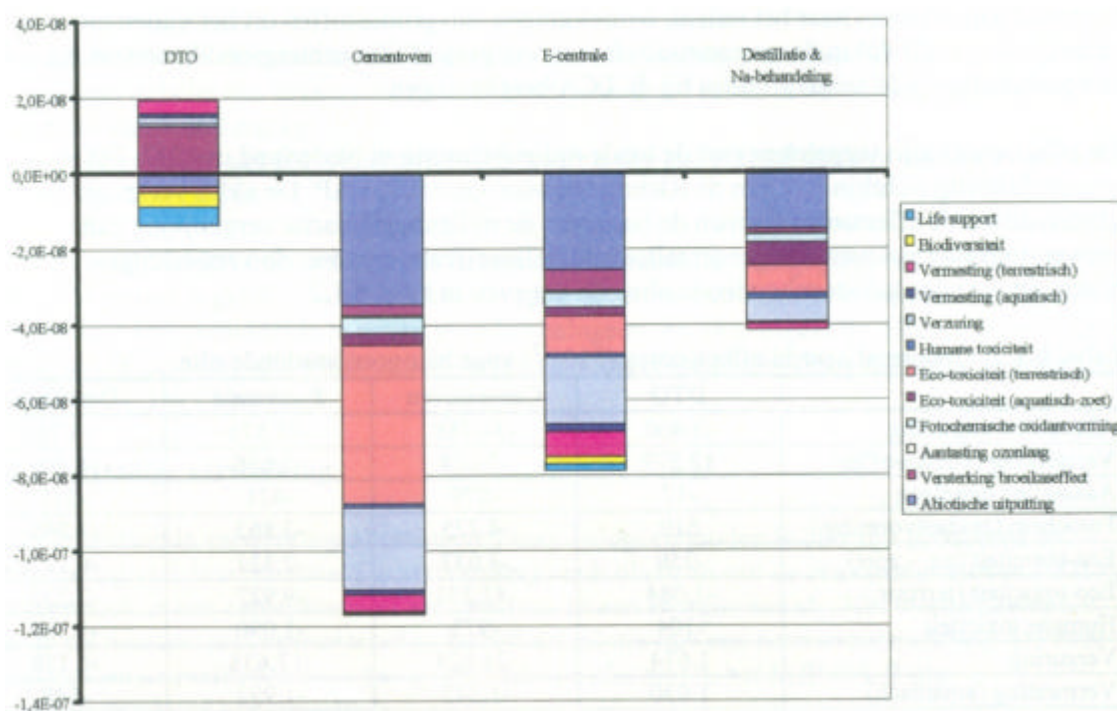


Table 22 Estimated processing costs per ton waste

	Estimated costs in Euro
Rotary drum incinerator	140
Cement oven	120
Power station	140
Distillation/sodium treatment	140

Capacity planning

The different scenarios for capacity planning were compared the same ways as described above under 'minimum standards'.

3.4.3.6 Public Participation

All major NGOs were contacted before the start of the SEA process and invited to engage in two round tables on alternatives and impacts. A selection of NGOs were invited to become part of a sounding board that was involved throughout the planning process.

As to participation of the general public, a distinction was made between 'organised public' - e.g. local NGO's, local political parties – and 'non-organised public', i.e. individual citizens. Organised public was actively invited to send in comments both in the scoping stage and the reviewing stage of the SEA. Individual citizens had a more passive right to send comments during these two stages.

For public participation the following methods were used:

- discussion groups in an early stage
- sounding boards throughout the process
- media: advertisements in papers and a regular information bulletin
- technical workshops throughout the process
- information meetings for the general public

The adopted approach led to a high response from NGOs. Most of this response dealt with the alternatives that should be examined. The environmental NGOs mostly focused on the examination of options to prevent and reuse waste.

A high response was also received from the organised public, although this mainly focused on local issues, which was not particularly useful for the more strategic decisions in the waste plan. Very few individual citizens responded.

One concrete result of public participation was the introduction of a new alternative into the planning process: the option to separate waste before incineration. Although it was not possible to include this alternative in the final plan, it will play a significant role in the new round of planning

3.4.3.7 *Uncertainty Analysis*

In the SEA a number of uncertainties were discussed:

Setting minimum standards;

- the composition of waste streams is often uncertain or highly variable; for this, sensitivity analyses were carried out
- for all techniques the same waste composition is used in calculating the impacts; however, it is known that a number of techniques specifically focus on waste streams with a specific composition
- emissions to soil because of leaching out of toxics are often not known
- the method of LCA still has a number of flaws. Particularly a number of so-called classification factors are not yet known. Classification factors are used to calculate the actual environmental effect of emissions.
- costs of processing a ton of waste are often not known because of company secrecy policy
- for some techniques it is uncertain whether these should be regarded 'proven' technology

Capacity planning:

- flaws in the LCA method (see above)
- it is not known what amount of waste (suitable for incineration) is to be expected in the future.

3.4.3.8 *Monitoring and Follow Up*

The SEA for the Waste Management Plan serves as monitoring and evaluation report of the results of the previous waste plan. The monitoring of the current waste management plan will take place in the 2006 Waste Management Plan. For that reason, it was judged ineffective to establish a specific monitoring and evaluation plan. The SEA stated that monitoring and evaluation of the plan will take place through:

- EIAs that will be carried out for specific waste processing facilities; in these EIAs the effects of the proposed waste facility will have to be compared with the minimum standard as set in the plan;
- a yearly monitoring of both composition and amount of waste to be processed in The Netherlands (including import/export and development of techniques for waste separation)
- the 2006 waste management plan and the SEA for this plan.

3.4.3.9 *Overview: what worked well and why*

In its quality review the independent EIA Commission argued that an enormous amount of useful information had been generated. Also, sufficient information was available to decide on minimum standards. Despite the fact that the end results of the LCA, due to a number of reasons, had a high degree of uncertainty, the results were certain enough to allow for the designation of minimum standards. The same conclusion was drawn for the information underlying the capacity planning.

3.4.4 *RESULTS AND LESSONS*

3.4.4.1 *Contribution to Decision-Making*

Minimum standards

For most minimum standards it was possible to draw conclusions as to what should be the minimum standard. It proved hard to conclude which techniques were the best from an environmental viewpoint. In many cases this depended on the applied weightings.

In all cases, the final LCA score was most influenced by the scores on the following themes: use of a-biotic resources, greenhouse effect and ecotoxicity in land systems. To a lesser degree, acidification and eutrophication of land systems also played a role. Waste processing did not appear to have substantial effects on the other themes.

Capacity planning

The LCA showed that all scenarios in fact have positive environmental effects¹². In all cases the negative effects of burning and processing the waste is more than compensated by the positive effects of energy generation and re-use of waste material. Of course, in this it should be realised that only a limited set of effects was taken into account.

¹² When using weighting set 2: i.e. all effects have the same weight.

Scenario 1 and 2 overall scored more or less equal. Scenario 1 scored better as to effect on ozone layer, photochemical smog production, eco-toxicity, toxicity for humans, remaining waste to be land filled and use of water. Scenario 2 scored better on eutrophication of water systems, use of space and use of energy. Ranking third was scenario 3, although this scenario scored best on biodiversity and life support. The status quo scenario overall gave the least positive effects. In all cases incineration in a coal fired power plant had better environmental scores than incineration in a cement oven (such an oven generates less energy and more emissions).

The sensitivity analysis showed that from all perspectives scenario 4 scored worst, scenario 3 was always better than 4 but worse than 1 and 2. Using the weighting set 'distance to target', scenario 1 was the overall best one; in the other three weighting sets scenario 2 was the best one.

Since in all scenarios the final scores were heavily influenced by the positive effects of energy generation, an additional sensitivity analysis was carried out on the assumed efficiency by which waste incinerators generate energy. It showed that if waste incinerators would achieve a 30% energy efficiency (rather than the 20% they currently achieve) scenario 3 scored as good as scenarios 1 and 2.

A surprising result was that the environmental performance of incinerating waste in installations designed for other purposes (e.g. power plants or cement ovens) was more or less the same as that of waste incinerators.

A final conclusion was that although scenarios 1 and 2 scored best on environmental issues, they both did not achieve the objective of optimally using the existing waste incineration capacity. Mainly due to the need in these two scenarios of building new incinerators using new technology.

3.4.4.2 Outcome

Minimum standards

In addition to the environmental effects, in the National Waste Management Plan also other aspects of the techniques were described such as costs, public health, reliability, feasibility, practicability and impact on import/export. On the basis of the both these and the environmental effects the minimum standards were set.

Capacity planning

Neither scenario 1 nor 2 was chosen, due to rapid changes in the structure of the European waste market. Under new European regulations a free market exists for high caloric waste, which effectively makes capacity planning of incineration capacity within one country impossible.

3.4.4.3 Conclusions for SEA Good Practice

The use of LCA proved to be useful. However, not in all cases such a comprehensive method appeared to be necessary. A number of minimum standards could have been set using a simpler method.

As to public participation, the extensive participation that was part of the strategic plan preparation was felt as advantageous by the planners. Firstly, because it stimulated NGOs to apply an integrated approach to waste management, rather than just focus on their particular interest. Secondly, because the finally adopted plan was widely accepted.

Another lesson learned was that from the NGOs mostly technical experts participated. Top level management representatives were not involved sufficiently. For the future new plan, in addition to technical experts, a separate 'high level steering group' will be part of the sounding board.

A second lesson learned on public participation was that environmental NGOs focused too little on technological issues and had a too weak position in the sounding boards compared to the other NGOs. In the preparation of the future new plan, environmental NGOs will be approached more bilaterally and will be explicitly challenged to give their opinion on technological issues too.

Finally, an important lesson learned is that a strategic plan (including its SEA) evidently will contain many assumptions and preconditions. It is crucial that public participation takes place in the formulation of these too. This significantly increases the credibility of the end results and the final plan. Also, to raise credibility it is important to carefully file all choices made during the process of plan formulation, in order to be able to justify the final plan in the end.

3.4.5 REFERENCES

- The Netherlands EIA Commission, 2002, 'Review Advice on the Environmental Assessment of the National Waste Management Plan', The Netherlands EIA Commission, Utrecht, The Netherlands.

Annex: Life Cycle Analysis (LCA)

Steps in LCA

Step 1 *definition* - define specific goal of the LCA
- define the 'measuring unit' for the assessment;
for example, in the SEA of the Dutch national waste plan the unit was: final processing of one ton of integral waste

Step 2 *analysis of the life cycle*

phase 1: set the boundaries: what should be taken into account?

for example, in the SEA of the Dutch national waste plan the life cycle is:

- collection of waste
- incineration of waste
- cleaning of emitting gases
- production of heat and electricity (+)
- reuse of metals (+)
- reuse of other residuals (+)
- storage of chemical waste

phase 2: for each part of the life cycle identify the following impacts:

- use of space
- use of resources
- emissions

Determine total impact by addition of impacts of individual parts of cycle

Step 3 *classification:* re-calculate total environmental impact by multiplying impacts with 'classification factors' into scores on ten standard 'themes':

- | | |
|--------------------|---------------------|
| - human toxicity | - aquatic toxicity |
| - soil ecotoxicity | - greenhouse effect |
| - ozone production | - acidification |

- eutrophication
- use of space
- smell
- use of natural resources

Classification factors are currently developed and take into account inter alia:

- * transport routes and -processes
- * sensitivities of surrounding environment
- * scarcity of resources

Step 4 *Evaluation*

phase 1: normalisation: put all scores in the same unit;
various normalisation methods exist, e.g.

- * percentage of existing pollution
- * contribution to environmental goals

phase 2:

- determine 'relative importance' of issues
- apply 'weight factors' that reflect political and scientific values
- multiply scores by weight factors

phase 3:

- add all scores, resulting in one figure: the so called 'environmental profile' of the policy, plan or programme

phase 4:

- carry out a sensitivity analysis, taking into account uncertainties and the possibility of different assumptions or weight factors
- do conclusions change?

Step 5 *Improvement analysis:* discuss on the basis of environmental profile whether the plan can be improved.

3.5. SEA for the Policy Plan for the Supply of Drinking Water and Industrial Water

3.5.1 INTRODUCTION

3.5.1.1 Nature of the Proposal

At the time of this case study, in The Netherlands water supply was the responsibility of regional Water Supply Companies. These companies received their permits for concrete projects from the provincial authorities under provincial policy. Provincial policy, in its turn, had to comply with national policy. This national policy was set by the Ministry of the Environment in the 'Policy plan drinking water and industrial water supply' (in Dutch the abbreviation is 'BDIV'). The BDIV included decisions on:

- guiding principles for drinking water production, e.g. reduction of water demand and criteria for site selection of production facilities;
- quality assurance and environmental management systems for the production and distribution of water, e.g. recommendations for the identification of appropriate water resources.

The SEA was carried out as part of the preparation of the BDIV.

3.5.1.2 Role of the SEA

The two main goals of the SEA were to determine the ecological impacts of alternative national water production policies and to compare alternative methods of water production.

3.5.2 BACKGROUND: CONTEXT AND ISSUES

3.5.2.1 Social and Environmental Setting

Most significant environmental problems related to water supply were soil dehydration and land use by water production facilities. These two problems severely affected biodiversity. Also, many fresh water resources were polluted and required more and more expensive purification methods when preparing drinking water. The option to use the least polluted resources had as a disadvantage that these were the most valuable for biodiversity.

3.5.2.2 SEA/Decision Making Process

The establishment of this BDIV was subject to a legal procedure provided by physical planning legislation, the so-called 'physical planning core decision'. This procedure provides for decision making in four phases:

- step 1: publication of the preliminary core decision by the Cabinet
- step 2: public consultation and publication of its results
- step 3: Cabinet Decision
- step 4: approval by parliament.

The SEA was integrated into this process. Effectively this meant that before step 1 some extra procedural steps were included:

- In May 1990 a starting note was published as a kick off of the assessment, followed by a round of public participation on the required content of the assessment.
- Following this, the assessment was prepared, as an integral part of the preparation of the preliminary core decision
- In June 1993 both documents were published, being step 1 of the above mentioned PKB procedure. Following this the procedure as described above was followed.

3.5.3 APPROACH AND METHODS USED

3.5.3.1 Information Assembly

Most baseline data were provided by the Water Supply Companies . In the Netherlands extensive monitoring takes place on surface water and ground water quality, soil humidity, biodiversity, visual/historical landscape, etc. For example, it was possible to draw a map of The Netherlands with a grid of 1 km x 1 km, showing the sensitivity of terrestrial vegetation to soil dehydration, and the potential for redevelopment of such vegetation where it had disappeared. Also, the activities of Water Supply Companies were closely monitored. Information sources were national scientific and semi-scientific research institutes. The SEA was carried out partly on the basis of existing information, although for two major elements new models were developed. This development took quite some time. However, this was accepted as part of the relatively high ambition the SEA had.

3.5.3.2 Development of Alternatives

Alternative production policies

As a first step in the assessment, five alternatives for future national water production policy were developed. Two broad categories were distinguished:

- A on the basis of the *existing* ratio groundwater/surface water use:
- *increasing* total drinking water production;
 - *reducing* total drinking water production;
 - reducing *industrial* use of water;
- B on the basis of a *shift* in the ratio groundwater/surface water use:
- *increasing the existing use of ground water (i.e. both shallow and deep ground water and infiltrated river water), decreasing use of surface water;*
 - reducing current use of ground water, increasing use of surface water.

Alternative production methods

The SEA made a comparison of the following production methods:

1. use of ground water:
 - a. use of shallow ground water
 - b. use of *deeper* ground water
 - c. use of *infiltrated* river water
2. use of surface water:
 - a. direct abstraction via a natural reservoir
 - b. direct abstraction via an artificial reservoir

3. use of artificial infiltration (i.e. injection of surface water into the underground, after which it is pumped up as ground water):
 - a. surface infiltration
 - b. deep infiltration.

3.5.3.3 *Selection of Issues and Indicators*

See below under 'impact analysis'.

3.5.3.4 *Impact Analysis*

Alternative production policies

The environmental effects of the alternatives were assessed in the following steps:

- 1 Prognoses were made of the future water production capacities needed in each of the alternative policy options.
- 2 National hydrological models were developed for both ground water and surface water, as well as an appropriate geographic information system (GIS).
- 3 Combining the prognoses, the hydrological models and the GIS, the impacts of each of the policy alternatives were determined on surface water and ground water in the Netherlands.
- 4 Then, a model was developed to determine existing natural values of moist and wet ecosystems in the Netherlands (the so-called 'DEMNET' model). The main features of this model are the identification of homogenous ecosystems (so-called 'ecotope groups') and the estimation of the existing natural value of these ecosystems per square kilometre, based on:
 - the presence of ecotope groups
 - the national and international rarity of these groups.
- 5 Finally the results of step 3 were used in the DEMNET model to determine which changes could be expected in existing natural values as a result of the influence of the various policy alternatives on the state of surface water and ground water in The Netherlands.

Alternative production methods

The following approach was taken to assess alternative production methods:

- 1 The effects of alternatives were assessed on the following environmental aspects:
 - nature effects
 - landscape effects
 - effects on the a-biotic environment: use of resources, waste production, energy.In addition to these environmental aspects, also the effects on the following aspects were determined:
 - public health
 - use of space
 - technical/economical aspects, such as availability, flexibility, vulnerability and costs of methods.
- 2 *Sub-criteria* were defined per aspect and assessed either quantitatively or qualitatively. In the qualitative assessment alternatives were ranked according to each other (1 is the best one; 8 is the worst one):

Table 23 Alternative production methods

Aspect	Sub-criteria	Type of assessment
Nature	Change in natural value	Quantitative with the use of the DEMNAT model
Landscape	Possibility of production facility to fit into existing landscape	Qualitative; scale 1 – 8
A-biotic environment	Use of energy	Quantitative; MWh/Mm ³
	Production of waste	Quantitative; ton/Mm ³
	Production of chemical waste	Quantitative; ton/Mm ³
	Use of resources	Quantitative; ton/Mm ³
Public health	Possibility to protect the water source	Qualitative; scale 1 – 8
	Possibility to control pollution of the source	Qualitative; scale 1 – 8
	Possibility to clean the source from existing pollution	Qualitative; scale 1 – 8
	Additives needed during purification	Qualitative; scale 1 – 8
	Availability of protected water stock	Qualitative; scale 1 – 8
	Technical certainty of the method	Qualitative; scale 1 – 8
	Chance of meeting legal standards	Qualitative; scale 1 – 8
	Advantages for consumers	Qualitative; scale 1 – 8
Use of space	Direct use of space	Quantitative; ha/Mm ³
	Surface area to which limitation apply	Quantitative; ha/Mm ³
Proven technology		Qualitative; scale 1 – 8
Flexibility	Quantity of water	Qualitative; scale 1 – 8
	Quality of water	Qualitative; scale 1 – 8
Vulnerability	Vulnerability to radio active pollution	Qualitative; scale 1 – 8
Costs	Direct costs	Quantitative
Administrative & juridical aspects	Acceptance by society	Qualitative; scale 1 – 8
	Existence and effectiveness of administrative instruments	Qualitative; scale 1 – 8
	Resources needed to apply administrative instruments	Qualitative; scale 1 – 8
	Resources needed to introduce administrative instruments	Qualitative; scale 1 – 8
	Amount of time needed to introduce administrative instruments	Qualitative; scale 1 – 8

3 Scores for sub-criteria were translated into *one score* by means of multi-criteria methods.

The assessment mainly took place on the basis of expert judgement, information from literature and modelling, e.g. effects on nature, social cost for water consumers and the cost of a rise of soil humidity for agriculture.

3.5.3.5 Comparison of Alternatives

Alternative production policies

Alternative production policies were compared on their effect on natural values in The Netherlands, using the results of the DEMNAT model.

Alternative production methods

The final scores for each of the methods were used to rank alternative water production methods from 'best' to 'worst' on the basis of a multi criteria analysis, with weights reflecting five different perspectives:

- health most important
- biotic environment most important
- nature most important
- landscape most important
- economy most important.

After this, sensitivity analyses were carried out, both on uncertainties in the methodology applied, uncertainties in scores and uncertainties in the weight sets used. Also, for each of the aspects it was discussed which sub-criteria were most important in the final scores and how future developments would affect the final scores.

3.5.3.6 Public Participation

Inter-agency consultation and public participation took place through the following methods:

- written comments during the scoping stage of the SEA (before step 1 of the PKB procedure)
- written comments on the SEA and the preliminary core decision (step 2 of the PKB procedure)
- public hearings
- dedicated meetings with target groups and related agencies throughout the planning process.

The results of the participation process were published in a separate volume (part 2 of the PKB procedure). An explanation how these were used in decision making was published in the Cabinet Decision on the BDIV (part 3 of the PKB procedure). Also, results of public participation were integrated in the advises of the independent EIA Commission. In fact the SEA procedure served as a 'boost' and structuring of the public discussion with respect to drinking water production in The Netherlands. The results of the SEA were the main motivation for a restructuring of the planning system.

3.5.3.7 Uncertainty Analysis

The analysis of uncertainties (a legally required section of any SEA) identified the following major uncertainties: the future quality of water resources (because of uncertainty about the effectiveness of environmental policy), future water consumption (that is related to uncertainties in economic growth to be expected), advancement of technology for water production and treatment within the plan period and the planning and realisation of new projects.

One lesson learned in the SEA process was, that the predicted environmental impact should not be an extrapolation of the impact of the existing water supply facilities. New facilities will be developed in a

more environmentally sound manner. It proved feasible to make an estimation of the potential for such environmental improvement, and account for it in the assessment.

3.5.3.8 *Monitoring and Follow Up*

A 'definition study' for the monitoring plan was included in the BDIV. Starting point was that lower tiers will have to establish their own monitoring systems, and report to the Ministry which will aggregate the information. Main items in the monitoring plan are:

- quality of water resources
- quality assurance and reliability
- environmental impact
- water saving
- choice of resource types
- production facilities.

3.5.3.9 *Overview: what worked well and why*

The independent EIA Commission reviewed the SEA and considered the quality to be good. In particular, the development of the DEMNAT model was judged favourably. However, the lead authority was advised to adopt caution when applying the results of the assessment at the regional level. The production techniques that score best in the SEA could perform differently in the regions due to specific hydrological situations in each case, e.g. not in all regions does water abstraction affect nature. Also, the score of a production technique will depend on developments in related sectors within a region, such as agriculture. For example, it would not be very effective from a nature viewpoint to end the use of ground water for drinking water in a specific region with an aim to save nature, if this meant that the same water would later be used and discharged to surface water by farmers. The Commission advised the selection of a framework of measures from the EIA, aimed at the conservation or development of nature that is affected by water production.

3.5.4 *RESULTS AND LESSONS*

3.5.4.1 *Contribution to Decision-Making*

Alternative production policies

The SEA showed:

- there is a *direct relation* between drinking water production and ecological impacts;
- ending all *ground water* abstraction would lead to a 12% increase in the natural value of moist and wet ecosystems (compared with 1988);
- ending all *drinking water* production would lead to a 10% increase in natural value;
- ending all *industrial use* of water would lead to a 2% increase in natural value;

- ending abstractions from *shallow ground water* would be most effective in raising natural values, followed by respectively deep ground water, infiltrated river water and industrial use.

Alternative production techniques

The main conclusions from each of the five perspectives were roughly the same:

- best score: use of deep ground water, infiltrated river water and deep infiltration;
- medium score: use of surface infiltration and natural reservoir surface water;
- worst score: use of direct extraction from surface water, shallow ground water and artificial reservoir surface water.

These conclusions proved to be robust in the sensitivity analysis

3.5.4.2 Outcome

According to the competent authority, the SEA did influence the decision-making process. The results of the SEA were taken into account when formulating national policy for future public water infrastructure in the Netherlands. Furthermore, the methods developed as part of the SEA both stimulated and structured project EIAs in the water sector, which facilitated interpretation of the National Plan when preparing plans at the regional level.

3.5.4.3 Conclusions for SEA Good Practice

In most SEAs for many indicators qualitative assessment of impacts will be sufficient to find out which alternative is best, or indeed the only option looking at the uncertainty in the prediction. However, in this case the government specifically wanted to know the quantitative relation between water production and nature and accepted that this would take a little longer to find out. This SEA shows that such methodology in principle is available or can be developed. For this, as part of the SEA a number of new computer models were developed. As a consequence the SEA took a number of years to be completed. This was not felt as negative by government, because the new information generated in the SEA was useful in follow-up decision making for many years.

3.5.5 REFERENCES

- Mens & Ruimte, 1996, '*SEA Case Studies*', European Commission, DG XI, Brussels.
- The Netherlands EIA Commission, 1993, '*Review advice on the Environmental Assessment of the Policy Plan Drinking and Industrial Water Supply*', The Netherlands EIA Commission, Utrecht, The Netherlands.

3.6. SEA for a National Plan on the Production of Electricity

3.6.1 INTRODUCTION

3.6.1.1 Nature of the Proposal

At the time of the case study, the ‘Structure Scheme Electricity Supply’ (Dutch abbreviation: SEV) at the national level set the environmental and spatial conditions for electricity supply in The Netherlands. This plan is developed by national government. The actual generation of electricity was the responsibility of regional Electricity Supply Companies. These were organised into the ‘Cooperation of Electricity Supply Companies’ (Dutch abbreviation: SEP). The SEP prepared an ‘Electricity Supply Plan’ every two years. This plan had to comply with the conditions set in the SEV. E.g. the SEV sets out the *possible* locations for power stations and the suitability of each location for power generation using a certain type of fuel. Out of these potential locations the SEP then chooses the locations to be utilised and the type of power station to be build on this location.

According to the Electricity Act 1989, the SEV should include decisions with respect to:

- the possible locations of power plants of 500 MWe or more;
- the suitability of these locations for utilisation of certain fuel types;
- the maximum capacity per fuel type which may be installed in The Netherlands.

Decisions on nuclear energy were subject to a separate line of decision making and formed no part of the SEV.

3.6.1.2 Role of the SEA

Mandatory the SEA should cover the following decisions in the SEV :

- 1 locations of power plants with a capacity over 500 MWe.
- 2 choice of fuel types and maximum generating capacity in The Netherlands for each of the fuel types

The competent authority decided in its terms of reference that the SEA should voluntarily also cover a number of other decisions:

- generation technology and mitigation measures
- use of de-centralised electricity generation, including wind energy
- routing of power extension lines

3.6.1.3 Focus of this Case Study

The case study focuses on the assessment of alternatives for the choice of fuel types, for generation technology and mitigations measures and for site selection of locations for power plants.

3.6.2 BACKGROUND: CONTEXT AND ISSUES

3.6.2.1 Social and Environmental Setting

The Netherlands has huge reserves of natural gas. However, for strategic reasons it is national policy to reserve part of this gas for the future. Therefore, a significant part of Dutch electricity is generated by using imported coal. From an environmental viewpoint, the use of gas has many advantages over the use of coal. For this reason Dutch environmental NGOs for a long time have advocated the use of more gas. One of the purposes of the SEA was to look at the pros and cons of a policy to increase the use of gas.

3.6.2.2 SEA/Decision Making Process

The establishment of the SEV was subject to a legal procedure provided by physical planning legislation, the so-called 'physical planning core decision'. This procedure provided for decision making in four steps:

- step 1: publication of the preliminary core decision by the Cabinet
- step 2: public consultation and publication of its results
- step 3: Cabinet Decision
- step 4: approval by Parliament.

The SEA was integrated into this process. Effectively this meant that before step 1 some extra procedural steps were included:

- In May 1991 a starting note was published as a kick off for the assessment, followed by a round of public participation on the required content of the assessment.
- Following this, the assessment was prepared, as an integral part of the preparation of the preliminary core decision
- In May 1992 both documents were published, being step 1 of the above mentioned PKB procedure. Following this the procedure as described above was followed.

3.6.3 APPROACH AND METHODS USED

3.6.3.1 Information Assembly

As base line data, the SEA concentrated on describing the main existing environmental problems created by electricity generation. Main problems related to *power plants* were:

- incompatibility with existing policies: physical planning policy, nature policy and landscape policy
- thermal pollution because of the use of cooling water
- nuisance and safety risks.

The main problems related to *use of fuel* were:

- ambient air quality
- acidification

- global warming
- solid waste residues.

With the exception of electricity demand scenarios (see below) the assessment took place on the basis of existing information.

3.6.3.2 *Development of Alternatives*

Site selection

Alternative sites were mainly derived from the previous national electricity plan. In that plan 31 sites had been selected as potential locations for electricity generation. Nine of these sites were omitted from the SEV because of their obvious disadvantages compared to the other sites and because in the light of new electricity demand forecasts they were no longer needed. Onto the remaining 22 sites, two new sites were added because of their potential for utilization of residual heat. All thus remaining 24 potential sites were regarded as location alternatives for the SEV. These comprised both of locations where currently no power station was situated and locations where the current capacity to generate electricity might be extended.

Choice of fuel type

Alternatives were developed through the following steps:

Step 1: Demand scenarios

Scenarios were developed for the electricity demand to be expected in the future (2000 and 2010). For each year two scenarios were developed: one based on a relatively low demand and one based on a relatively high demand. These forecasts were made by a simple computerised model, assuming high and low starting points for economic growth, structural change and energy saving measures:

- Economic growth forecasts were derived from publications of the Economic Planning Office (CPB), which manages sophisticated computerised models
- Expected structural change was an extrapolation of present trends in electricity-intensity
- Energy saving was derived from the targets of the national energy saving programme.

Need for *centralised* electricity generation was calculated by deducting from the total demand the expected amount of electricity generation through *de-centralised* generation.

Step 2: Fuel type alternatives

For each of the demand scenarios, two 'fuel type alternatives' were developed

- the preferred option of government: 50% use of coal and 50% use of gas;
- the 'environmental' option focusing on gas: 33% use of coal and 67% use of gas and oil gasification.

Step 3: Alternatives for generation technology and mitigation measures

For each fuel type, a description of the state of the art of technology was given. On this basis for each fuel type up to four alternative power generation techniques and available mitigation techniques were described and compared on environmental and other aspects in a generic way.

Step 4: development of 'integral' alternatives

On the basis of the information from steps 1, 2 and 3, the following alternatives were developed:

1. high scenario; 50% coal/50% gas; traditional coal technology
2. high scenario; 33% coal/67% gas and oil gasification
3. low scenario; 50% coal/50% gas; traditional coal technology
4. low scenario; 33% coal/67% gas and oil gasification

In addition, for alternatives 1 and 3 two 'sub-alternatives' were examined: use of coal gasification technology instead of the more traditional use of coal (i.e. powdered coal):

5. high scenario; 50% coal/50% gas; coal gasification
6. low scenario; 50% coal/50% gas; coal gasification

In total, this led to 6 so-called 'basic' alternatives

Step 5: development of 'environmentally friendly alternatives'

The basic alternatives were used as starting points for the development of 'environmentally friendly alternatives' for centralised power generation:

- 1 First the environmental pros and cons of the following variations were examined:
 - replacing existing coal fired plants by gas fired 'steam and gas units'
 - use of low sulphur coal
 - extended use of heat recycling in gas fired plants
 - several additional end-of-pipe measures for removal of NO_x and CO₂.
- 2 Then the best scoring variations were combined into three 'most environmentally friendly alternatives'.

3.6.3.3 Selection of Issues and Indicators

Site selection

All locations and their identified development alternatives were assessed on the following criteria:

- availability of *cooling water* and sensitivity of the available water bodies for thermal pollution and additives;
- *other water quality impacts*, e.g. toxicity of waste water;
- impact of *transport and storage* of fuel and of solid waste residues;
- compatibility with *land use plans*;
- impacts on *nature and visual landscape*;
- *noise*; with and without mitigation measures;
- *external safety*; hazards for the area were assessed by means of a generic assessment of types of installations, including minimum distances and/or additional safety measures required to comply with external safety regulations;
- *radiation risk*; this was assessed in a generic way per type of installation; maximum 'individual risk' in expected number of casualties per year at certain distances were estimated by means of 1) data on radiation from particles in flue

gases, 2) emission from stocks of solid waste residues and 3) dispersion models.

Choice of fuel type

All alternatives were compared on their impact on:

- • emission of NO_x, SO₂ and acidification ;
- • emission or storage of CO₂;
- • emission of dust and gaseous emission of chloride, fluoride, borium, selenium and mercury;
- • estimates of the production of solid waste residues and their disposal, such as long term storage of coal incineration residues;
- • radiation;
- • depletion of non-renewable energy sources.

3.6.3.4 Impact Analysis

Impacts were assessed through a mix of modeling (e.g. demand scenarios, noise effects, risk assessment), expert judgment and use of knowledge in existing literature. The impact of integral alternatives was estimated in a large spreadsheet model. This assessment led to qualitative scores on the suitability of alternative sites and quantitative scores for the alternative fuel alternatives.

3.6.3.5 Comparison of Alternatives

Site selection

The alternative sites were compared in three ways:

1. In the summary of the SEA per impact the results of the assessment were discussed qualitatively, i.e. which sites score favorably and which sites do not.
2. In the main text of the SEA a spreadsheet was given in which for all sites on all of the assessed aspects the suitability was described qualitatively. E.g. in terms of 'sufficient cooling water available' a site was either suitable, not suitable or suitable under certain conditions or with extra measures taken.
3. Also, in the main text per site a qualitative discussion was given on its suitability and what additional measures were required before the site could be used.

Use of fuel

Alternatives for fuel use were also compared in three ways:

1. In the summary, the scores of all the alternatives were compared to policy goals. Does an alternative achieve a policy yes or no? If none of the alternatives do, which alternative contributes most?
2. In the main text of the SEA, in a spreadsheet for all alternatives – i.e. basic alternatives and environmental alternatives – quantitative scores were given on all of the aspects assessed.
3. Also in the main text, for each of the alternatives conclusions were drawn as to how it scores on the aspects assessed and how it compares to other alternatives.

3.6.3.6 Public Participation

Public participation took place through the following methods:

- written comments during the scoping stage of the SEA (before step 1 of the PKB procedure)
- written comments on the SEA and the preliminary core decision (step 2 of the PKB procedure)
- public hearings during the above two steps.

In the above steps everybody in The Netherlands that wants to do so has the right to comment. An overview and discussion of the comments were published in the recommended terms of reference ('guidelines') for the SEA, in part 2 of the PKB-SEV and in the EIA review by the EIA Commission.

In this case, the electricity plan did not generate a lot of participation. All in all 32 comments were received. Partly because the most relevant stakeholders in The Netherlands are almost always involved in strategy formulation in all sorts of ways, e.g. as participants in formal Advice Councils to the government. The general public did not participate much because the decisions in the SEV did not directly affect them.

3.6.3.7 Uncertainty Analysis

All in all the results of the SEA contained many uncertainties, especially in the case of new and yet unproven technology. The following main uncertainties were identified in the SEA:

- uncertainty about emissions in the case of unproven technology
- the impossibility to carry out a quantitative risk assessment for some of the technologies based on coal and oil gasification
- lack of data on the contribution of power plants to pollution of sediments and (aquatic) ecosystems with heavy metals
- lack of data on the composition of solid residues from oil gasification
- uncertainty on the impact of CO₂-emission to the atmosphere
- the effect of certain alternative detergents in cooling water is insufficiently known
- cost increase of applying low sulphur coal was not known
- cost of CO₂-removal from flue gas was not known
- lack of knowledge on the impact of the politically adopted 'stand still principle' for radiation emissions from building materials on the potential for reuse of residues of coal firing
- reuse of solid residue from coal firing will save energy because it prevents the need for producing 'new' materials; this, however, could not be quantified

- costs related to technology could not always be quantified

3.6.3.8 *Monitoring and Follow Up*

In the Cabinet decision it is decided that five years after the coming into force of the SEV its effects should be evaluated along the lines mentioned in the SEA and in the advice of the EIA Commission.

In the SEA it was stated that:

- monitoring should take place of fuel use for electricity generation, use of sites for power plants, generation of wind energy and the construction of power extension lines;
- information will be used that will come from existing research projects by a number of institutes and ministries;
- reporting of monitoring results will take place periodically and the results will be compared to the predictions in the SEA.

In its review advice the EIA Commission recommended to monitor:

- the integration of sustainability objectives into electricity policy;
- development of electricity demand and use of primary energy sources;
- technical options for energy saving;
- environmental and spatial consequences of the construction of smaller or de-central power stations;
- development of coal gasification technology and other innovative techniques;
- development of new strategies for the use of wind energy;
- development of options for CO₂ storage and prevention.

3.6.3.9 *Overview: what worked well and why*

The independent EIA Commission gave a positive judgement on the clear description of the methodology applied and the conclusions reached. The EIA Commission, however, also stated that not sufficient effort had been made to operationalise the notion of sustainability. It recommended to monitor during evaluation of the SEV how sustainability objectives were integrated into electricity generation policy.

3.6.4 *RESULTS AND LESSONS*

3.6.4.1 *Contribution to Decision-Making*

The decision makers judged the SEA as useful for decision making. Also, in their view the assessment had a major impact on the finally adopted SEV, although it was hard to say what the SEV would have looked like would the SEA not have been carried out.

3.6.4.2 Outcome

On the basis of the SEA 18 sites were accepted as suitable sites for electricity generation; for each site it was decided for which type of fuel it was suitable. As to fuel use, it was decided that in 2010 only 33% of the electricity needed should be generated using coal, with a maximum of total 6000 MW. New power plants should use coal gasification.

3.6.4.3 Conclusions for SEA Good Practice

The approach used in the SEA was felt as appropriate, although a critical note by the decision makers was that the SEA in some aspects had been too detailed. On a next occasion the SEA could aim at generating less detailed information and that way be carried out more quickly.

3.6.5 REFERENCES

- Mens & Ruimte, 1996, '*SEA Case Studies*', European Commission, DG XI, Brussels.
- The Netherlands EIA Commission, 1992, '*Review Advice on the Content of the Environmental Assessment of the Structure Scheme Electricity Supply*', The Netherlands EIA Commission, Utrecht, The Netherlands.

3.7. Energy Policy of the Czech Republic (EP-CR)

3.7.1 INTRODUCTION

3.7.1.1 Role of the SEA

SEA of the EP-CR was the first pilot SEA in the Czech Republic. It started when the draft EP-CR was already prepared by the proponent (Ministry of Industry). It was a mono-alternative proposal and the proponent learned about necessity to apply SEA only during initial submission of the policy to the Czech Government. SEA was initiated on the basis of the Czech EIA Act (Art. 14 dealing with SEA) by the request of Ministry of Environment. Subsequently, an external consultant (SEVEn) was hired to carry out the SEA.

SEA team aimed at mainly elaboration of the SEA Report and applied the following steps to this end:

- scoping (1national public hearing to comment on the draft plan and on the proposed assessment methodology)
- elaboration of the draft SEA Report
- public review of the draft SEA Report (1national public hearings in the main chamber of the Czech Senate)

SEVEn establish two external expert teams to assist in carrying out the SEA. Team A comprised of 13 multi-stakeholder experts whose task was to define the scope of SEA, including:

- delineation of main alternatives of the policy,
- determination of time-frames for evaluation of impacts (e.g. whether only immediate or long-term impacts should be analyses and what should be the exact time-scales)
- establishment of main environmental indicators to compare alternatives

Team B comprised of 19 experts whose task was to carry out the actual assessment. ToR for the Team B included:

- describe, as precisely as possible, each of the main alternatives in terms of their outputs to the environment,
- quantify environmental indicators established by the Team B for each alternative
- evaluate impacts indicated by the quantified environmental indicators
- design measures to offset or mitigate negative environmental impacts

After completion of the above assessments, another small expert team was established to carry out multi-criteria comparison of alternatives. This team organised a survey among sample of 32 representative respondents to define social importance (weight) of each impact category and each indicator used.

3.7.2 BACKGROUND: CONTEXT AND ISSUES

The Energy Policy of the Czech Republic (EP-CR) was drafted in 1998 as the first comprehensive strategic document that set out objectives and measures for development of entire energy sector (electricity, coal and gas). The main issues addressed were:

- decision whether to enforce limits of coal mining (established in 1992) that lead to gradual closure of main coal mines in the country
- decision whether to stop or proceed with already initiated building of the second nuclear power plant (NPP Dukovany)
- decision whether more extensive state support should be provided for energy savings and alternative energy sources
- decision on speed of internalisation of external environmental costs in energy market

3.7.3 APPROACH AND METHODS USED

3.7.3.1 Information Assembly

The assessment was based on extensive mathematical modelling (model MARKAL – computing done by SRC International) that provided outputs of various alternatives. Collective expert judgments utilized personal experience of Team B and was used only for few indicators (waste waters, radioactive waters, and impacts on employment)

3.7.3.2 Development of Alternatives

SEA Team A defined the following three basic alternatives of the policy. Each of these alternatives meets the following presumptions:

- Annual GDP growth is 2-4%
- Energy demand of the economy (expressed by index of primary energy sources per GDP unit) steadily decreases
- Czech Republic meets all international obligations, including Kyoto targets
- All alternatives are fully aligned with EU legislation

Alternative A suggests development of energy sector which is based on locally available sources of fossil fuels (black and brown coal). Previously established limits of coal mining are not enforced and economic burden of current energy process does not increase (i.e. there is no further internalising of external environmental costs, carbon tax and energy tax are not introduced). Use of primary energy sources will slightly increase. Growth of energy use is higher than growth of primary energy sources. Both blocks of the second nuclear power plant will be finalised by 2004-2005.

Alternative B suggests development of energy sector based on locally available sources of fossil fuels, yet previously established limits of coal mining are enforced. This is compensated by import of electricity and gas. Energy prices will be probably higher than those under *Alternative A* – this will trigger changes in structure of existing energy sources. There will be more use of energy saving schemes

and alternative energy sources will increase as well. Growing use of cogeneration units will further support of growth in gas import.

Use of primary energy sources will not increase. Energy use may slightly increase. Both blocks of the second nuclear power plant will be finalised by 2005.

Alternative C suggests energy savings schemes (including increased efficiency in energy use) and rapid increase of alternative energy sources. Increased efficiency in energy use and energy savings schemes are supported by stimulation of business dealing with energy savings, by targeted state actions (.e.g. major energy savings in state-own facilities, funding and technical assistance programs for technological changes in private enterprises). The target is to reduce use of primary energy sources by 1,5% annually, i.e. by 16% by 2010. Energy use will not increase - it will rather decrease. The following alternative energy sources will grown: biomass (by maximum of 90 PJ), small water plants (by 4 PJ), wind (up to 5 PJ), solar collectors (by 3 PJ) and there will be limited use of photovoltaic cells. Energy prices increasingly internalise external environmental costs – this leads growing use of cogeneration units. Second nuclear power plant will not be finalised. Previously established limits of coal mining are enforced.

3.7.3.3 Selection of Issues and Indicators

The SEA (Team A) defined the following set of indicators for analyse the proposed policy:

Table 24 Indicators for analyse the proposed policy

Impact Category	Weight of Category	Impacts and main indicators	Weigh of impacts	Weight of indicator
Environmental impacts	30%	Air emissions	58%	
		CO2 (tons)		12%
		CH4 (tons)		15%
		SO2 – total (tons)		21%
		SO2 – local (tons)		5%
		NOX – total (tons)		22%
		NOX – local (tons)		7%
		Particulate matters (tons)		18%
		Water pollution	21%	
		waste waters from mining (m3)		50%
		other waste waters (m3)		50%
		Impacts on soil	18%	
		Land occupation by mining (km2)		30%
		Land occupation by flooding (km2)		10%
		Land occupation by landfills (km2)		35%
		Land occupation by new installations (km2)		25%
		Annual production of waste	3%	
		Ash from power plants (tons)		20%
Unused gypsum (tons)		10%		
Used nuclear fuel (tons)		30%		
Radioactive waste tons)		40%		
Impacts on resources	20%	Impact on Energy Sector	20%	
		Reduction of primary energy sources (tons)		10%
		Reduction of gypsum sources (tons)		25%
		Share of renewable energy sources in primary energy sources (%)		25%
		Use of primary energy sources per capita (GJ/person)		25%
		Use of primary energy sources per economic unit (GJ/GDP)		15%
Social impacts	20%	Impact on Infrastructure	20%	
		Number of people to reallocated		
		Impact on Employment	80%	
		Employment changes by energy savings		50%
		Employment changes by energy production		X
Employment changes by changes of mining		50%		
Economic impacts	30%	Impact on Economy	-	-
		Investment costs per 1GJ unit	-	-
		Running costs per 1GJ unit	-	-
		Costs of energy saving schemes	-	-
		Costs of measures to offset and mitigate adverse environmental impacts	-	-

3.7.3.4 Impact Analysis and Comparison of Alternatives

Main SEA contractor and external consultants (SRC International) defined set of specific implementation measures of each alternative. This was then used for comprehensive mathematical modelling (model MARKAL) that provided data for majority of indicators. Collective expert judgments were used only for three indicators: “waste waters”, “radioactive waters”, and “impacts on employment”.

Indicators were estimated for all three alternatives. In order to mutually compare all alternatives, alternative A was used as a baseline (i.e. impacts of alternatives B and C were compared against

baseline situation established by alternative A). This can be illustrated on an example of comparison of all alternatives using indicator “CO2 emissions”: Estimated CO2 emissions for alternative A were classified as 100%, alternative B then produced 95% of CO2 emissions compared with alternative A, and alternative C produced only 87% CO2 emissions compared with alternative A. Such comparisons were done for all indicators.

After completion of the above assessments, it was evident that Alternatives C and B score much better on almost all indicators than Alternative A (the only exception were economic indicators where Alternative A scored best).

This conclusion however did not reflect social values attributed to each category impact. Therefore a multi-criteria comparison of alternatives was carried out. A survey among sample of 32 representative respondents was organised to define social importance (weight) of each impact category and each indicator used. This was then processed through standard multi-criteria analysis.

Multi-criteria analysis (incl. sensitivity analysis) resulted in very similar conclusion as the original simple analysis of alternatives. The fact that impacts were assigned weights did not change the basic fact that Alternatives C and B performed much better on almost all indicators than Alternative A.

This main conclusion was presented in the draft SEA Report to the proponent (Ministry of Industry). It was agreed that proponent will consider these findings and will select optimal alternative. Detailed mitigation measures and monitoring scheme was to be designed for finally selected alternative.

3.7.3.5 Public Participation

Identification of stakeholders

There was a separate public participation organised for the SEA. The following means identification and notification of the public were provided:

- www page with announcement of the SEA process and background documents for the SEA
- permanent special e-mail address to gather comments

In addition, NGOs established a network of 6 regional coordinators that disseminated information about the SEA, organized 6 regional public workshops and forwarded comments to the SEA team.

Mode(s) of involvement

First option for public participation was one national public workshop in initial review of the draft policy and SEA scoping. The workshop was held in very interactive manner – participants broke down into groups to define specific impacts and comment of the proposed alternatives. The workshop attracted approx. 80 persons (mainly EIA experts, energy experts, energy lobbies and NGOs).

Second option for public participation was a large national public hearing on the draft SEA report. The hearing was organised in Senate (under personal auspices of the speaker of the Senate) and was held in very formal manner. The hearing attracted approx. 170 persons (mainly municipalities, energy lobbies, NGOs, members of Senate and of the Parliament).

Comments on effectiveness of public participation

Evaluation of responses and comments revealed that participants were quite satisfied with both events. Involvement of the parliamentary body (i.e. Senate) contributed to the prestige and transparency of the entire SEA process.

3.7.3.6 *Monitoring and Follow Up*

The main conclusion of the draft SEA Report were evaluations and mutual comparisons of individual alternative options of the policy. The report was presented to the proponent under agreement that proponent will consider these findings and will select optimal alternative. Detailed mitigation measures and monitoring scheme was to be designed for finally selected alternative.

3.7.4 *RESULTS AND LESSONS*

3.7.4.1 *Contribution to Decision-Making*

The entire SEA process lasted approximately 12 months and the draft SEA Report was given to the Ministry of Industry shortly before the change of Government. The incoming Government has very decided to entirely redo Energy Policy – it strongly preferred Alternative A since Government priority was maintenance of energy intensive industries and development of second nuclear power plant (NPP Dukovany). Since SEA provided pointed out major environmental problems of these proposals, the Ministry of Industry decided to ignore the draft SEA Report. It drafted new Energy Policy and commissioned another consultant (UK company MARCH Consulting) to carry out SEA. Both the new policy and its SEA were not prepared in publicly transparent manner. They were made publicly accessible shortly before submission to the Government and were heavily publicly criticised (completion of NPP Dukovany then became matter of significant diplomatic disputes between the Czech Republic and Austria). The SEA Report for the new policy was of very poor quality. It is widely considered as an example of the poorest and most biased SEA practice in the country.

3.7.4.2 *Conclusions for SEA Good Practice*

SEA had very good quality but it could have been concluded much quicker, if additional complicated analyses (i.e. multi-criteria analysis) were not performed. The main environmental issues and trends connected with possible implementation of each alternative were evident already from first evaluations. SEA could therefore have been completed in shorter time and could have provided an earlier input into decision-making process on the policy. It is however questionable, whether the newly coming Government would consider the finalised policy or whether it would have drafted its own new policy (more likely option)

Main lessons for the SEA practice are:

- Always use the simplest technique available to carry out the given task. It will save you time and money,
- SEA does not replace political decision-making. It is only decision-support document that can be ignored.

3.7.5 *KEY REFERENCES AND INFORMATION SOURCES*

This project has not yet been reported in international or national literature. Further information on the overall design of the SEA procedure (including public participation) can be obtained from Jiri Dusik (jdusik@rec.org). More information on the SEA Report can be obtained from Mr. Jiri Zeman (jiri.zeman@svn.cz).

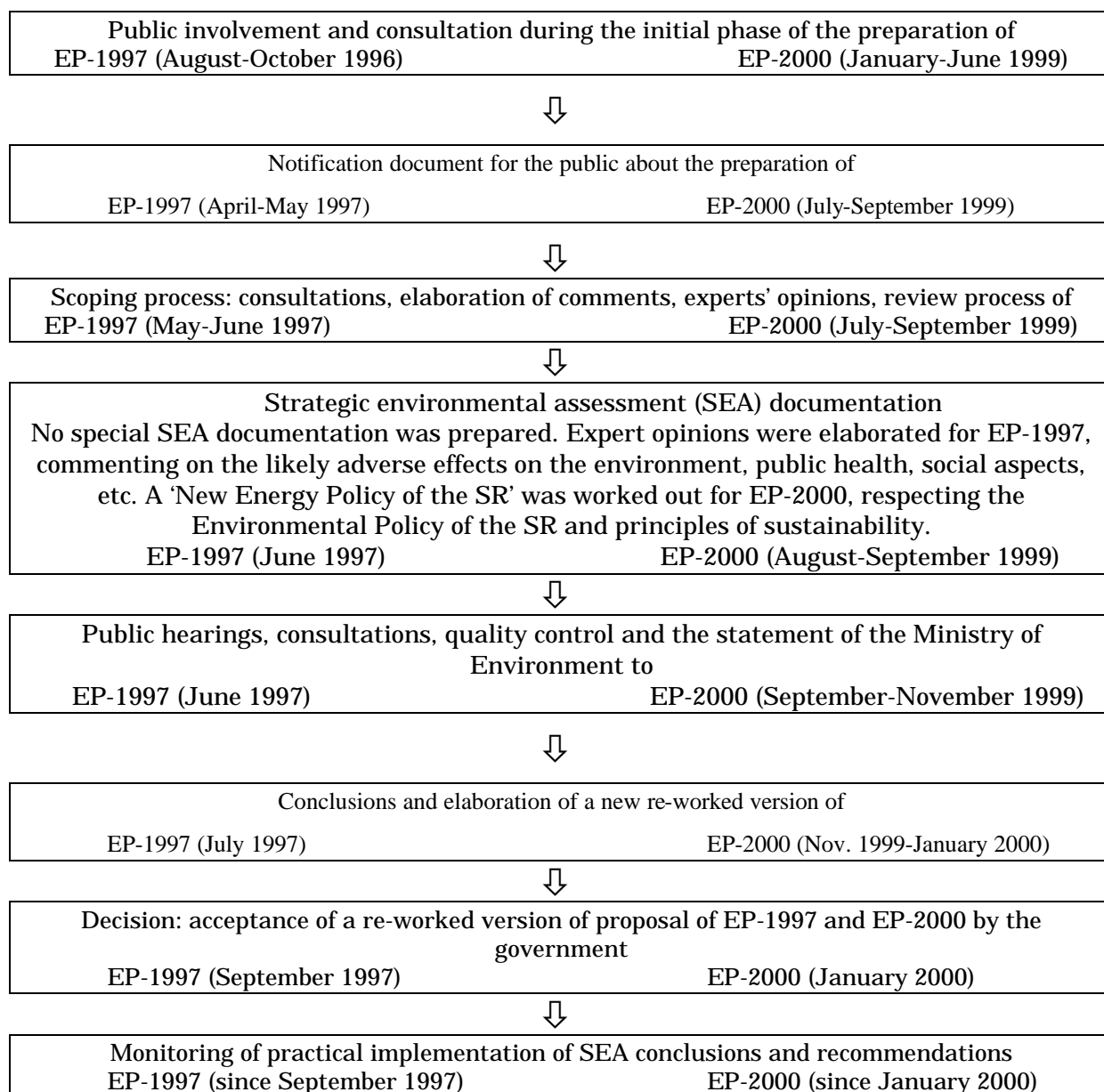
3.8. Energy Policies of the Slovakia (EP-1997 and EP-2002)

3.8.1 INTRODUCTION

3.8.1.1 Role of the SEA

This paper outlines key aspects of the SEA of applied for Energy Policy submitted to the Slovak government in 1997 (EP-1997) and to the new Energy Policy approved by the Slovak government in 2000 (EP-2000).

Figure 6 The SEA processes of EP-1997 and EP-2000 consisted of the following steps (for further details see Annex 2):



The SEA processes of EP-1997 and EP-2000 consisted of the following steps:

1) *Public involvement and consultation during the initial phase of the preparation of EP-1997 (August-October 1996) and EP-2000 (January-June 1999)*

In August 1996, the Ministry of Economy elaborated a draft of the content of EP-1997 and asked NGOs (joined together in ENERGY 2000) to prepare comments. ENERGY 2000 formulated comments in co-operation with many experts from universities, research institutions and practices. The same step was also taken during preparation of EP-2000, when in January 1999 NGOs received the outline of EP for comment.

In October 1996, ENERGY 2000 obtained a new, completed proposal of the content of EP-1997. In the case of EP-2000, ENERGY 2000 received a new, re-worked draft in March 1999.

These activities were already directly connected to the drafting of EP-1997, and, in some form, initiated more intensive contacts between NGOs and professional experts, for example through exchanging elaborated comments to the content of EP-1997, statements regarding proposed acts on energy, exchanging information about the findings of the research project "Strategic environmental assessment as a tool of realisation of environmental policy and strategy of sustainable development" (Kozova et al., 1996), and other important material (e.g. from the discussion in the Committee of the Slovak Parliament for the Environment and Nature Conservation). In May 1997, representatives of NGOs visited the Ministry of Environment and discussed with competent officials from the Department of Environmental Impact Assessment and Inter-sectoral Relationships the expected time schedule of SEA of EP-1997 in relation to Article 35 of the EIA Act.

From April to June 1999 NGOs participated in meetings held by the Committee of the Slovak Parliament for the Environment and Nature Conservation, at which the preparation of the new energy policy was discussed. Initiative was taken over, similarly as in case of previous reviews of energy policies in 1995 and 1997 by NGOs and experts associated under ENERGY 2000. A novelty compared to the SEA process of EP-1997 was a joint meeting of the above stated the Committee of the Slovak Parliament for the Environment and Nature Conservation with the Committee for the Economy, Privatisation and Enterprising, on June 22 1999, the agenda of which was the Nuclear Energy Policy of SR. Draft of this policy was submitted by the Ministry of Economy as a supporting paper to the Energy policy under preparation. NGOs commented on this paper and by an official letter informed the Ministry of Economy on legal obligation to submit also this document, having nature of a basic development concept, for environmental assessment according to article 35 of EIA Act together with the Energy policy. The Ministry of Economy did not accept this request, the document was withdrawn and was not submitted in this form to the Government.

The difference from SEA 1997 was also in the fact that the Ministry of Economy provided to NGOs the working draft of EP-2000 for commenting already in June 1999, still before it was made public and before the official start of the public discussion. Some comments from NGOs therefore could be incorporated already at this stage. At the same time the first discussions started between the representatives of NGOs, the Ministry of Environment and the Ministry of Economy on deadlines and the public discussion procedure.

2) Notification document - Information for the public about the preparation of EP-1997 (April-May 1997) and EP-2000 (July-September 1999)

The Ministry of Economy published the full text of draft EP-1997 (without appendices) in the "Economic Newspaper" on April 25, 1997, and in the newspaper "Trend" on May 12, 1997. The general public were able to obtain, on request, the full text with appendices at the Ministry of Economy. In contrast to SEA EP-1997, the full text of the draft EP-2000 was not published in the press. Public information on EP-2000, however, was much broader than in 1997. Public discussion started with the publication of the announcement on preparation of draft of the Energy Policy of the Slovak Republic in the "Economic Newspaper" on July 9, 1999. The full text of the draft was also published on the Internet sites of the Ministry of Environment, the Ministry of Economy, the Faculty of Natural Sciences of

Comenius University and several NGOs (e.g. Greenpeace, Slovakia). The text of the EP-2000 draft was made available for the public and at all district and regional authorities. Also, the press coverage of topical issues related to the Slovak energy sector was wider than before. The public was also informed through the media about the venue and methodology. A two-month period was allowed for the submission of comments on the draft EP-2000.

During the summer months of 1999 the "For Mother Earth" NGO organised 11 info-kiosks on the squares of seven towns in Slovakia. These outlets allowed the public to become acquainted with the draft of EP-2000, to discuss the paper with activists and to express comments.

3) Consultations, expert opinions, reviewing and scoping process of EP-1997 (May-June 1997) and EP-2000 (July-September 1999)

In May 1997 the relevant departments of the Ministry of Environment elaborated comments on EP-1997. In addition, the Ministry of Environment asked eight experts from different areas to submit expert opinions on EP-1997. These experts prepared a presentation of their opinions for the public discussion (hearing). Other comments and statements on EP-1997 were sent directly to the Ministry of Economy or to the Ministry of Environment prior to the public hearing.

Broad public information, and increased NGO and ministry experience with organising SEA, had a big impact on the method of commenting on EP-2000. The Ministry of Environment no longer contracted the opinions of selected experts. The expert opinion was only sought at the end of the process. Despite this, during the public discussion of the EP-2000 draft, the Ministry of Environment received a total 441 opinions and comments. Of these 146 were written opinions, while 295 had been collected by the "Za Matku Zem" NGO and submitted as comprehensive material to the ministry. All relevant entities presented their opinions on the EP draft. The structure of the 146 comments was as follows: the public (28); firms (33); schools (9); research institutes (4); specialised energy associations (3); specialised other associations (8); unions (9); self-government (3); public administration (34); NGOs (13); other (2) (the Statement of the Ministry of Environment, 1999).

Within the commenting procedure on the draft of EP-2000, NGOs associated under the initiative for an alternative solution for Slovak energy. ENERGY 2000 held a co-ordinating meeting on July 16, 1999 on the process of commenting on EP-2000. The most important outcome was the decision to prepare and submit an alternative draft of the energy policy. This document, entitled the "*New Energy Policy of SR*", was submitted by ENERGY 2000 for public discussion on August 5, 1999. The Ministry of Environment, Comenius University and NGOs published this alternative proposal on their websites, together with the official draft.

In conclusion to the discussions, in September 1999 NGOs organised an international conference. This comprised a discussion of the new energy policy, renewable energy sources and approximation to EU policy, and other specialised events promoting an alternative energy policy for Slovakia.

Comments from experts and the public were collected at the Ministry of Environment until September 15, 1999. Copies of all opinions submitted within the commenting procedure were provided by the Ministry of Environment, for the Ministry of Economy and for selected key NGOs.

In August and September 1999 there were consultations between the Ministry of Environment and the Ministry of Economy with the participation of representatives of NGOs to determine the scope of assessment, assessment of assumed impacts, the manner in which other documents should be made available. This was the basis for the submitted draft of the energy policy, the precision of the time schedule for environmental assessment, etc. In September 1999 the discussion focused on organising the public hearing of EP-2000, its scenarios, content, etc.

4) Public hearing, quality control and the statement of the Ministry of Environment on EP-1997 (June 1997) and EP-2000 (September-November 1999)

The Ministry of Environment, in agreement with the Ministry of Economy, organised the public hearing on EP-1997 in June 1997 at the Faculty of Natural Sciences of Comenius University, Bratislava. The public hearing continued for an entire day. There were more than 120 participants, from the Ministry of Economy, the Ministry of Environment, other bodies of state administration, professional organisations, producers of energy-related equipment, operators of equipment utilising renewable sources of energy, representatives of universities and research institutions, NGOs, and the media.

The preparation and course of the EP-2000 public hearing, which was held on September 23, 1999 at the Ministry of Economy differed greatly from the 1997 event. It was attended by more than 150 participants from Slovakia, Austria and Germany. Experts, representatives of national bodies and the public were also invited through the embassies of countries bordering the Slovak Republic. The structure of participants was similar to 1997 and all relevant parties were represented. The proponent of the draft energy policy, the Ministry of Economy, NGOs and the Ministry of Environment agreed in advance on the method of announcing the deadline for the public hearing, for inviting participants, the content and structure of discussion, and rules for the discussion. The discussion was led by two independent moderators. There was a brief introduction covering the SEA procedure itself, the official governmental draft, and the alternative EP-2000 proposal submitted by NGOs under ENERGY 2000 umbrella. The discussion then continued in agreed blocks with determined time limits.

A recording was made of the public hearing (September 1999). From this a 28-page transcript was produced. The full recording is available at the Ministry of Economy and the Ministry of Environment. NGOs received both in full. A selection of the most substantial contributions was used in the statement of the Ministry of Environment on EP-2000.

The Ministry of Economy and the Ministry of Environment discussed the EP-1997 proposal on June 20, 1997. The Ministry of Environment statement on EP-2000 was discussed with the Ministry of Economy on November 12, 1999.

The Ministry of Environment prepared the statement on the basis of the opinions of experts, other comments sent to the Ministry of Economy and the Ministry of Environment, the public discussion, as well as consultations between the Ministry of Economy and the Ministry of Environment.

Based on the analysis of the submitted EP-2000 draft, as well as the opinions and positions submitted within the commenting procedure and the results of the public hearing, the Ministry of Environment prepared a statement. This was discussed with the party preparing the draft Energy Policy (i.e. the Ministry of Economy)--in accordance with § 35, para. 2--from the viewpoint of its impact on the environment. The Ministry of Environment issued the definitive version of the statement on November 15, 1999.

5) Conclusions and re-worked versions of EP-1997 (July 1997) and EP-2000 (Nov. 1999-Jan. 2000)

The conclusions of the public hearing, together with the respective statements from the Ministry of Environment and the Ministry of Economy, were sent to all participants on July 30, 1997. With regards to the EP-2000 SEA process, the recording of the public hearing and the opinion and statement of the Ministry of Environment was not sent to all participants. These documents can be obtained at the Ministry of Environment.

The Ministry of Economy submitted re-worked versions of EP-1997 and EP-2000 proposals to the Slovak government, which take into account some SEA conclusions and recommendations (see Table annex1).

6) Decision: acceptance of EP-1997 (September 1997) and EP-2000 (January 2000) proposals

The Slovak government discussed and accepted EP-1997, approved specific points in the Government Resolution on the Updated Energy Policy and commissioned the ministries to implement them.

EP-2000 was adopted by the Slovak government on January 12, 2000. Compared to the original draft the adopted version was substantially revised and included several ideas generated by the public discussion.

3.8.2 BACKGROUND: CONTEXT AND ISSUES

The adoption of strategic documents for the energy sector has been taking place in the Slovak Republic for some time. In 1993 the ‘Energy Policy for the Slovak Republic to the year 2005’ was prepared against the backdrop of an independent Slovak national energy system. The philosophy of the energy policy consisted of a rational approach to both energy production and consumption. The emphasis was on energy saving, which had to be achieved through macroeconomic measures, the modernisation of production processes, pricing policy, and the use of other options.

In 1995 a simple strategic environmental assessment (SEA) was applied to the ‘Updated Version of the Energy Policy for the Slovak Republic to the year 2005’ (with a perspective up to 2010), on the basis of Article 35 of the National Council of the Slovak Republic Act No. 127/1994 on Environmental Impact Assessment (‘EIA Act’). Between August 1996 and September 1997 a SEA process was applied to the subsequent version of the updated energy policy.

After the elections in 1998 the new government declared basic goals for the energy sector, which included the preparation of a new energy policy. The government decided to accelerate the preparation of this document in view of the EU accession process. In 1999 the SEA process was applied to the proposal of a new energy policy. The SEA process included a high level of active public participation. The entire energy policy was adopted by the Slovak government in January 2000.

3.8.3 APPROACH AND METHODS USED

3.8.3.1 Information Assembly

As it is evident from the above, the entire SEA process was organised as an open iterative commenting process. The main goal of the SEA team was to evaluate adequacy of public comments on the proposed policies. When doing so, the SEA team used mainly its collective expert judgments. No mathematical modelling/computing was done.

3.8.3.2 Development of Alternatives

Energy Policy 1997

According to the proponent (the Ministry of Economy), EP-1997 determines the strategic intentions within the energy sector (perspective to 2010) in the following areas:

- Providing the economy with fuels and energy;

- Improving the safety of energy generation with respect to internationally accepted criteria;
- Increasing the efficiency of energy transformation;
- Decreasing the negative impact of the energy sector on the environment;
- Gaining stability of the electric, natural gas and oil systems;
- Gradual reduction of energy demand and increased energy saving;
- Increasing utilisation of renewable energy sources; and
- Supporting structural changes in the Slovak economy, which will lead to higher productivity and reduced energy intensity.

The proponent submitted two "nuclear" alternatives. The principal difference between the first (basic) alternative and the second was only in the suggested type of the Mochovce nuclear power station. The first option planned to complete all four blocks, the second only two.

Energy Policy 2000

In comparison to the EP-1997 objectives, the EP-2000 objectives are elaborated in more detail and are also broken down into short-term, medium-term and long-term criteria. The short-term category elaborates the objectives for individual energy industries (electric energy, supply of heat, oil, natural gas, coal). Possible tools for the achievement of these objectives are also stated. Strategic goals are:

- To satisfy the energy needs of society in a reliable, safe, effective and ecologically acceptable way, in requested energy types and forms;
- Liberalisation of the electricity and natural gas market, harmonisation of Slovak legislation with that of the EU;
- Fulfilment of international agreements in the areas of ecology, nuclear safety, investments and energy trade (Kyoto Protocol, Nuclear Safety Treaty, Supplementary Agreement to Energy Charter Treaty, Protocol on Energy Efficiency and Ecology Aspects of the ECT, etc.);
- Reduce the energy intensity to the level of EU member countries;
- Build up storage capacities to the volume of 90-days emergency oil stock and oil product stocks (until 2010);
- Strengthen the strategic position of the Slovak Republic in the area of transit of strategic energy supplies, through the development of gas and crude oil pipeline systems;
- Resolve the concept of the back part the radioactive fuel cycle in nuclear power plants;
- Increase the share of renewable and secondary energy sources in the consumption of primary energy resources (PER).

EP-2000--as one of the first sectoral politics and/or policies--also deals in detail with the issue of sustainable development (SD). The chapter on SD includes: environment, energy savings, utilisation of renewable energy sources, science and research programmes. As stated in the document, environmental

protection is one of the determining factors shaping energy policy. Basic aspects are characterised as follows:

- Realisation of measures to reduce emissions and basic pollutants will lead to higher utilisation of natural gas;
- Basic conditions for achieving the Kyoto goal will maintain the share of energy generation from sources producing minimum CO₂ levels, and will sharpen the focus on energy intensity reduction, on energy savings and renewable energy sources. Therefore the energy policy in the field of renewable sources ought to utilise individual programs and other tools to stimulate utilisation of largest possible potential (technically and economically acceptable) before 2008.

3.8.3.3 Selection of Issues and Indicators

In the SEA of EP-1997--especially within the framework of the reviewing process and public discussions--the principal questions were concentrated in the following areas:

- To orient, in the long-term perspective, the Slovak energy system to non-nuclear alternatives;
- To create competitive and motivating conditions in environmental management and the effective realisation of energy-saving programmes;
- To cover energy demand through co-generation and improved thermal efficiencies in power plants, as well as through the increased utilisation of renewable energy sources;
- To minimise the negative impacts of the energy sector on the environment;
- To eliminate the monopolisation of the energy sector;
- To improve the relations of the energy sector with the public and to create conditions for public involvement in the management and decisionmaking process in the energy sector;
- To increase transparency of the pricing policy in the energy sector.

In the EP-2000 SEA process the circle of issues discussed in 1997 was expanded and some issues were specified into the following areas and issues:

- Sustainable development of the Slovak energy sector;
- Nuclear Energy Policy (close down of V1 Jaslovské Bohunice and completion of NPP Mochovce, back-end fuel cycle);
- Transformation, restructuring of the energy sector and privatisation;
- Pricing and subsidy policy;
- Preparation for integration into the internal market of the EU.

3.8.3.4 Impact Analysis and Comparison of Alternatives

As it was already stated above, the entire SEA process was organised as an open iterative commenting process. The main goal of the SEA team was to evaluate adequacy of public comments on the proposed

policies. When doing so, the SEA team used mainly its collective expert judgments. No mathematical modelling/computing was done.

3.8.3.5 Public Participation

See description under item 3.8.1.1.

3.8.4 RESULTS AND LESSONS

3.8.4.1 Contribution to Decision-Making

The entire SEA process was carried out part of open policy planning process. SEA thus has direct relevance to the policy-making. Annex 1 provides evaluation of the final version of EP-2000 from the viewpoint of incorporating principal requirements, comments and recommendations from the SEA statement of the Ministry of Environment

The table below outlines evaluation of SEA components in the case study of the Energy Policy (1997) and (2000) as perceived by its authors:

Table 25 Outlines evaluation of SEA components

SEA Elements	Evaluation.	Explanation
Assessment of alternatives	1-2 EP-1997 2 EP-2000	In EP-1997 two "nuclear alternatives" were submitted by proponents for environmental assessment. Non-nuclear alternatives and comparisons between nuclear and non-nuclear alternative solutions of Slovak energy were not included. This is why NGOs prepared a proposal for non-nuclear variants for comparison (from environmental and economic aspects) and assessment. EP-2000 is positive in the sense that it does not focus only on defending nuclear energy, but deals with the use of RSE and energy saving. Not even EP-2000 solves scenarios of energy sector development in a complex way. However, these are stated for selected areas, e.g. for the utilisation of RSE. Within the public discussion at the beginning of August 1999, ENERGY 2000 in co-operation with independent experts submitted its own alternative proposal "New energy policy of the Slovak Republic", which was submitted for public discussion together with the government document.
Assessment of impacts on ecosystems	1	Assessment of impacts on ecosystems was not included in either EP-1997 or EP-2000. A few aspects of these impacts were the subject of environmental expert reviews.
Assessment of health impacts	1	Only very limited information relating to health impacts was included to EP-1997 and EP-2000. More aspects of these impacts were the subject of some expert reviews in 1997 and public comments in 2000.
Assessment of socio-economic impacts	1-2	Only limited assessment of socio-economic impacts was included in EP-1997 and EP-2000. Socio-economic assessment was the subject of some expert reviews of experts and comments from economic and environmental areas.

SEA Elements	Evaluation.	Explanation
Relation to decision process	<p>1-2 EP-1997</p> <p>2 EP-2000</p>	<p>Some rational comments and recommendations from the SEA process were included in the reworked version of this policy (although some principal ones, relating to the variant solutions, were omitted). Several important points were included in the Decree of the Slovak Government pertaining to this policy (for example, support for the rationalisation of consumption of fuels and energy and support for increasing the portion of renewable sources of energy).</p> <p>The government resolution on EP-2000 adopted a whole range of principal points, which will decisively strengthen the direction of the energy sector towards sustainable development. These include: resolutions related to the disposal of spent nuclear fuel; the procedure for liquidation of nuclear energy installations; other points of this resolution related to assessment of hydro-energy potential (and overall support for the use of renewable sources of energy); promotion of rationalisation in fuel and energy consumption, etc.</p>
Stimulation of public participation	<p>1-2 EP-1997</p> <p>2-3 EP-2000</p>	<p>At the start of the preparation of the policy the proponent asked some NGOs to comment on a draft of EP-1997. Several weeks before the public hearing the proponent published a Draft of the Updated Energy Policy in two newspapers, to inform the general public about the preparation of the policy. More than 120 groups participated in the public hearing organised by the Ministry of Environment and the proponent. Each participant was able to present his/her comment. All participants received the conclusion from the public hearing together with the Statement of the Ministry of Environment. The final effects of the relatively good public stimulation were limited: comments from interested parties were only partly accepted and, despite NGO initiative, a non-nuclear variant was not included in the final version of the policy.</p> <p>An important change in the approach to the preparation of EP-2000 was the much-improved communication between the proponent of EP-2000, the Ministry of Environment and NGOs and other subjects. All necessary documents were available for the commenting process, submitting own alternative policy for the public discussion, there was possibility to consult, to participate on preparation of the public discussion. The quality of preparation for the public discussion (hearing) was very high.</p>
Procedural quality checks	<p>1 EP-1997</p> <p>2 EP-2000</p>	<p>In EP-1997 no formal control of SEA procedural quality was realised, although some aspects of it were evaluated by the Ministry of Environment in the conclusion of the public discussion.</p> <p>During the 1999 SEA process NGOs monitored the effectiveness and quality of the process. The activity of NGOs contributed to the level of quality.</p>

SEA Elements	Evaluation.	Explanation
Relation to project-level EIA	1 EP-1997	The SEA process had only a general relation to the project level of EIA (relating to the new projects).
	2 EP-2000	EP-2000 has a much greater link to project level. This is also the result of the above-stated adopted resolutions of the SR government.

Legend: Scale for expert evaluation: 0 – does not exist, 1 – major problems, 2 – minor problems, 3 – functioning well

As explained in Table 25, the SEA process did not influence the basic alternatives of EP-1997 and the time horizon to 2005 was also very short. On the other hand, thanks to the co-operation of parties involved, SEA in 1999 significantly influenced the content of EP-2000. Evidence for the higher quality of the SEA process can also be gained from comparison with the comments on EP-1997 and EP-2000 outlined above. Comments on EP-2000 are more specific, but also comprehensive, and relate to the most important problems of the Slovak energy sector, including sustainable development, while comments from 1997 were oriented mainly towards the non-existence of non-nuclear alternatives in EP.

Neither the proposal of EP-1997 nor EP-2000 contained an assessment of impacts to ecosystems, health assessment and socio-economic assessment in an appropriate scope. During the SEA process and, especially, in the framework of the public discussion, representatives of NGOs presented strong critical opinions. From this viewpoint, the expert opinions, the public discussion and consultations between the Ministry of Economy and the Ministry of Environment were very important, since they complemented some necessary parts of the environmental assessment of EP-1997 and EP-2000. Within the framework of the SEA process, NGOs submitted an alternative non-nuclear alternative to the presented proposal of EP-1997 and gave a comparison with the nuclear options from environmental, economic and social perspectives. Despite all these efforts and relatively effective public discussions, consultations and clearly formulated recommendations, the final version of EP-1997 contained only the nuclear options without any principal changes.

The SEA process on EP-2000 differed in that NGOs submitted to public discussion not only an alternative related to electric energy, but a complete alternative proposal for EP. The entire process of the public discussion and also the public commenting process was organised in a more effective way than had previously been the case. In contrast to 1997, in 1999 several parts of the alternative EP proposal were reflected in the final official EP version adopted by the Slovakian government. The draft of EP-2000, submitted for public discussion in July 1999, was significantly changed and re-worked as a result of the SEA process, and thus benefited from a more sustainable nature.

3.8.4.2 Conclusions for SEA Good Practice

This pilot well illustrates different application of SEA – it aims to provide opportunities for public participation in very general policy making. SEA lacked technical analyses, yet it fulfilled its public participation objectives.

3.8.5 KEY REFERENCES AND INFORMATION SOURCES

This project has been reported in Dusik, J (ed.) (2001): Proceedings of International Workshops on Public Participation and Health Assessment in Strategic Environmental Assessment, REC, UN/ECE, WHO/Euro, November 2001, 147 pp.

Further information on the SEA can be obtained from Dr. Maria Koozova, (kozova@nic.fns.uniba.sk).

Table 26 Annex 1: Evaluation of incorporation of principal requirements, comments and recommendations from the SEA statement into the final version of EP-2000

Principal points (comments) of the statement of the Ministry of Environment on the draft of EP-2000	Evaluation of comments – whether or not accepted in the final version of EP-2000			Comment/commentary, compliance with the govt. resolution No. 5/2000 as adopted in EP-2000 and other resolutions adopted in 1999
	Yes	Partially	No	
To adhere to the requirement of § 35 Act NC SR No. 127/1994 on environmental impact assessment.				EP-2000 does not contain a complete assessment of expected environmental impacts, as required to exclude or reduce adverse impacts. For example, there is no assessment of impacts which occur in mining of fuels, waste disposal (especially waste from nuclear energy), adverse impacts from transmission equipment, impact on the health of population, etc.
EP-2000 should represent a starting point for the principal transition of Slovak energy towards sustainable development. This direction however necessitates dropping the nuclear alternatives for the further development of electricity generation (long-term) and currently not to expand the existing 6 operated NPP units.				It is positive that EP-2000 does not focus solely on defending the development of nuclear energy, but also deals in detail with the utilisation of RSE and energy savings. EP-2000, as one of the first sectoral policies, deals with the issue of sustainable development. It assesses selected impacts of energy on the environment (not complete, as stated above), energy savings (within individual sectors), renewable sources from the view of their prospective use and R&D. However, social impacts of energy development are missing (correlation), assessment of risks (e.g. in connection with nuclear energy) and other areas, such as education on energy savings, use of renewable energy sources, access to information in the energy sector, the public and NGOs relations (forms of stimulation, motivation, support etc.). Does not state complex assessment from the viewpoint of sustainable development principles. Related resolutions of the SR govt.: B.3, B.5 (5/2000)
EP-2000 should include requirements from principal environmental documents, such as the Strategy of the National Environmental Policy, the National Environmental Action Program, the National Strategy on Biodiversity Protection, etc.				Some elements of these documents are incorporated in EP-2000. Related resolutions of the Govt. SR: B.9 (5/2000)
EP-2000 should include analysis of international documents (from the viewpoint of commitments and impacts). EP-2000 should clearly and				EP-2000 gives detailed analysis of international documents and activities in the energy sector (especially in energy savings, energy efficiency) and the environment. Great attention is also given to the preparation of the Slovak energy

transparently define strategic plans of the state in terms of commitments of the SR towards the EU				system for its integration into the internal market of the EU. There is no analysis of international conventions, e.g. the Aarhus Convention (with respect to access to information, public involvement in the decision-making process and justice in environmental matters).
EP-2000 should clearly define the goals, accountability, time horizon and methods, and how these will be reflected in concrete policies. It should also determine instruments for realising the goals. EP-2000 should also clearly formulate interlinks with nuclear energy.				EP-2000 outlines these main pillars: preparation for the internal market of the EU, security of energy supply and sustainable development. The policy gives details about strategic, medium-term and short-term goals. However, it does not clearly define a time horizon or how these goals will be reflected in other policies. In several sections a clear definition of the target condition is missing, i.e. the target to be achieved (e.g. formulation of the scope—percentage--of renewable energy sources is unclear). A clearer formulation of the prospective direction of the Slovak energy sector is also missing--i.e. beyond 2020-30 (<u>non-nuclear alternative</u>). In addition, the method of monitoring the enforcement of adopted measures is not outlined.
EP-2000 should clearly set the manner, procedure and time schedule for all proposed measures: restructuring of the energy sector, de-monopolisation and decentralisation of the energy sector, diversification of energy sources, abolition of monopoly position of energy companies, etc.				Most of the required tasks are already being solved, or their solutions are under preparation--mainly within the framework of EU integration. Related resolutions of the SR govt.: No. 37 (90/1999)
EP-2000 should contain possible scenarios for energy sector development and analysis of alternative solutions.				EP-2000 does not solve scenarios of energy sector development in a complex way. It only gives this for selected areas, e.g. utilisation of RSE.
EP-2000 should create assumptions of energy self-sufficiency for local and regional communities (self-governments).				There is no connection to regional energy concepts (either those already prepared, or proposals for re-working existing regional energy concepts). Related resolutions of the SR govt.: B8 (5/2000)
EP-2000 should clearly describe the relation between energy management and environmental criteria, as well as the overall philosophy for building an energy system within the context of the development of society.				In contrast to previous conceptual documents EP-2000 pays a relatively large amount of attention to environmental concerns. As noted above, not all environmental aspects are taken into account. Besides these, EP-2000 should include decisive environmental criteria and indicators of energy's impact on the environment in terms of the production and storage of radioactive waste and the production and liquidation of waste related to individual methods of energy production. Related resolutions of the SR govt.: B2, B3, B5,

				B9 and B12 (5/2000)
In EP-2000 should elaborate in detail issues of rationalisation of fuel and energy use in SR, to analyse tools for rationalisation, to analyse economic justification of indirect instruments, etc.				This issue is dealt with in the energy savings chapter, but also in other sections. It clearly demonstrates the adverse effects of delaying the adoption of a law on the effective use of energy and the related support instruments and mechanisms. Related resolutions of the SR govt.: B1, B7, (5/2000); No. 56 (90/1999)
EP-2000 should declare among its priorities a change in the taxation system and also an amendment to the complex system of national legislation related to the energy sector.				Among the short-term measures EP-2000 includes a modification of tax regulations. It also requires the amendment of selected laws. However, it is necessary to review and subsequently amend the entire system of national legislation in the energy sector, with the consistent application of sustainable development principles (social, cultural, economic and environmental).
EP-2000 should be based on the economic and (especially) industrial policy of the state and should create the basic presumption for its realisation, from the cross-sectoral economic analysis and should be linked with other sectors.				EP-2000 respects the national economy input data that were used in the medium-term strategy of economic development plans of the Slovak economy for industry. Other sectors, however, are prepared in general terms. The policy lacks a cross-sectoral view and links to the regional dimension (and related support funds for regional development, especially structural funds).
EP-2000 should create sufficient preconditions for a more fundamental change in the current adverse situation in the energy-intense generation of GDP.				This section is evaluated in individual chapters. It would be desirable, however, to elaborate it in more detail, with a view to securing control over adherence to these measures. Otherwise the situation could once again arise, as stated by EP-2000, that the objectives are not met.
EP-2000 should contain other principal areas, such as: projection of need of sources with respect to current and future demand; assumed model of energy sector transformation; concept for solving pricing policy; evaluation of adjustment to new requirements (environmental, legislative, preparation for EU membership, etc.).				Some tasks related to this point are also being solved as part of the preparation for integration into the internal market of the EU. Also, despite certain progress in this field there are still several open issues (starting with the projection of need of sources to pricing policy). Related resolutions of SR govt.: B2, B6, B11 (5/2000).
EP-2000 should define principles of govt. policy for the development of primary energy sources of SR and for support to secure access to primary energy sources abroad.				This issue is being solved in individual chapters and also within the goals. Related resolutions of SR govt.: B2 (5/2000).
EP-2000 should give a satisfactory answer to issues of support for trends of R&D and new knowledge in				It lacks analysis of possibilities to involve scientific and research basis of universities and NGOs working in the energy sector.

optimisation of energy systems in the future.				
EP-2000 should define principles for promoting the use of underground natural structures for storage of PES, including heat.				This section defines principles for the storage of natural gas and the mandatory stock of oil. Related resolutions of SR govt.: B10 (5/2000).
EP-2000 should secure and respect an organic link to regional energy policies. EP-2000 should clearly define the role of regional energy policies.				This area deserves realistic analysis (i.e. criticism). The development of these concepts has not been managed well from the point of view of methodology. The promised turn in using RES was not fulfilled. In EP-2000 practically no attention is paid to this.
In EP-2000 it is necessary to review the calendar of regulated energy price adjustment from the viewpoint of social impact.				EP-2000 includes a calendar of regulated energy price adjustments, including heat. However, it does not deal with impacts on the social sphere. Related resolutions of SR govt.: B4 and B6 (5/2000).
EP-2000 needs to deal more precisely with the issue of compliance with air protection limits.				For example, it is not feasible to rely only on nuclear power stations for meeting air protection limits. It is also necessary to deal with coherence resulting from the use of Slovak coal. Related resolutions of the Govt. SR: B2 (5/2000).
EP-2000 should outline measures for creating conditions for the energy efficiency of RES. At the same time, the effect of using RES on jobs should be analysed.				This issue has been dealt with. However, impacts on air quality (e.g. from the extraction of energy sources) are still missing. Related resolutions of SR govt.: B8 and B12 (5/2000).

Legend:

EP-2000 – Energy policy of SR adopted by the SR govt. on 12.1.2000, RES – renewable energy sources, PES – primary energy sources, EU – European Union, R&D – Research and Development

Selected items from the resolution of SR govt. No. 5/2000 on draft EP-2000 and other resolutions related to the energy sector:

B.1: to submit to govt. meetings information on the security of fuel supply for SR during 2000-2005 (until June 30, 2000).

B.2: to submit to govt. meetings information on the coal-mining program in Slovakia, including the state participation pilot program on the liquidation of the Dolina coal mine (by May 31, 2000).

B.3: to submit to govt. meetings a proposal of the concept of economic, material and time procedures for spent nuclear fuel disposal and procedures for liquidation of nuclear installations (by October 30, 2000).

B.5: to submit to govt. meetings a proposal for the completion or non-completion of units 3 and 4 of NPP Mochovce (by March 31, 2000).

B.4: to secure for buyers of electricity--according to the appendix of this resolution--conditions for selecting electricity suppliers from among license holders in the territory of the Slovak Republic.

B.6: to develop proposals for the modification of customer categories and tariffs in electric energy and gas industry (by March 31, 2000).

B.7: to initiate amendments to Act 303/1995 on budgetary rules so that in budget-funded and contribution organisations either third-party financing or the "contracted energy capacities and services" for the realisation of energy efficiency projects can be applied, until the time when the project is repaid (by April 30, 2000).

B.8: in connection with restructuring the state administration to review the possibility to transfer competencies for issuing prior permits for construction or close down of heat source to the bodies of self-government.

B.9: to prepare an environmental assessment of the hydro-energy potential of SR (by December 31, 2000).

B.10: to submit to govt. meetings a draft concept for achieving a 90-day stock of oil products and solutions for emergency situations (by February 29, 2000).

B.11: to prepare an introduction of short-term reporting for the energy sector in compliance with the EU and IEA methodology (from January 1, 2000).

B.12: to develop a program for the promotion of rationalisation of fuel and energy consumption in connection with competencies in the sector (by June 30, 2000).

Ě. 37 (90/1999): to prepare a bill on the regulation of natural monopolies with the aim of creating conditions for an independent regulator (September 2000)

Ě. 56 (90/1999): to prepare a proposal for a program of reducing energy intensity and use of alternative energy sources, including support for R&D in this area (September 1999).

3.9. Comprehensive Planning of the Naissaar Island, Estonia

3.9.1 INTRODUCTION

3.9.1.1 Role of the SEA

The objectives of Strategic Environmental Assessment included:

- consideration of environmental conditions in the planning process;
- promotion of the need to consider environmental aspects in the planning process;
- providing the public with a possibility to participate in the planning process;
- providing of environmental assessment to planning solutions;
- improvement of the quality of planning.

This SEA was at the same organised as a pilot project (implemented in cooperation with Finland) that served also the following “capacity building” objectives of the pilot project included:

- focussing on environmental impact assessment of the developed comprehensive planning in practice;
- training of Estonian experts, authorities, planners and public in SEA;
- management of comprehensive planning process and the parallel conducting of SEA
- promotion of the need to consider environmental aspects in the decision-making process;
- promotion of public awareness as an important aspect of SEA.

EA conducted in the course of the planning process (of the pilot project) was managed by a planning working group (which included environmental experts) in cooperation with representatives of the local government. The county government in its responsibility for supervision concerning the planning was regularly informed about the progress. The county government was also responsible for reviewing of the SEA report and for approving the SEA report. The local government considered the EA results both at making the intermediate decision - selection of the suitable alternative - and at making the final decision - approving the planning.

At environmental assessment of the planning, an attempt was made to cover all stages of classical strategic environmental assessment.

The first stage concerned determination of the aim and objective of the planning as well as of SEA. This included collecting of available source data, mapping of the existing conditions and development of the preliminary overview of environmental conditions. On this basis, the alternatives were defined, and identification of potential impacts and scoping was performed.

In the next stage, prediction of the scope and significance of the potential impacts, as well as of the assessment of the impacts was performed. The process was continued with comparison of the alternatives, taking into consideration the unwished/negative environmental impacts of applying the alternatives in practice, and comparison of the options for mitigation of those impacts.

As a result of comparison of alternatives, the optimum solution was determined which was developed into a planning proposal. At the improvement of the planning proposal, more specific EA was conducted and recommendations were developed for monitoring the state of the environment. In the end of this process, the final SEA report was compiled which included the interim reports developed through the SEA stages as well as other relevant materials concerning the planning and SEA process.

The topic covered throughout the process was public involvement and participation, provision of possibilities for participation as well as public hearings. Public meetings were organized and group seminars held for interested parties.

The Main Players of the SEA process

Through different stages of the process, the planning initiator, competent authority, planning organization together with environmental experts, decision-maker, and public participated in the activities.

The initiator in this case was the local municipality which in accordance with the Estonian Planning and Building Act is also the decision-maker (as concerns the context of EIA). Interests of the municipality were related to strategic land use planning and planning of the natural as well as cultural environment, taking into consideration criteria of sustainable development and the development objectives of the municipality. The municipality was also interested in considering the environmental conditions with the aim of preserving most of the island in its natural development, as well as in finding the optimum solutions to potential conflicts of interest between the different parties (i.e. state, municipality, future land-owners and other parties).

The objective of the local municipality as the decision-maker was the approval of comprehensive planning which would meet all legal requirements as well as everyone's interests.

An important role in the conducting of the SEA was played by performers (experts) of the EIA - in this case, environmental experts of Finland and Estonia. The experts conducted the environmental inventory and analysis of the planning territory, determined the factors of impact and assessed potential impacts of the different activities. Their task was to cooperate with planning experts, manage the SEA process, cover all stages of SEA, and draw up the final report.

The competent authority in this SEA process was the county(regional) government which is supervision body of the comprehensive planning. Its task was reviewing of the final SEA report (together with comments to it from the public), determination that the planning meets valid requirements, supervision of considering national interests, and finding of solutions to conflicts arising in the course of the process in case this is not stipulated otherwise. The county government was also responsible for setting of requirements to the putting into practice of activities following the comprehensive planning process, as well as to monitoring of the state of the environment.

The largest group participating in the SEA process was undoubtedly the public - interested persons or persons potentially affected by the planning. These included future land-owners, associations of scientists, entrepreneurs, professional societies/unions, movements, and other private or legal persons. The aim of participation in the process was to represent interests related to development of the planning territory, assist in specification of the problems coming up in the process, and make sure that their interests would be duly considered at decision-making.

3.9.2 BACKGROUND: CONTEXT AND ISSUES

This example deals with pilot SEA undertaken for Naissaar Island which is located at the north coast of Estonia. The reasons for undertaking pilot projects for integrated planning and SEA for this island included the following considerations:

- no comprehensive planning had been developed for the island so far;
- the whole territory of the island belongs to the Nature Park (a protected area with recreational objectives) which was established in 1995 with Governmental Regulation No. 150 - this sets certain restrictions to planning the nature management and human settlement of the island;
- for the last 50 years before Estonia's regaining of independence, the island was occupied by a Soviet army base - as a consequence, a number of areas have been severely polluted
- (with oil products and heavy metals);
- there was no civil population in the island, however, reprivatization of illegally seized land to former owners had already been begun;
- the highest value of the island is the natural environment itself with its virgin character and relative purity: 80% of the island is covered with forest, besides that, numerous dunes, mire landscapes and species-rich plant communities are found.

In accordance with the Estonian Act on Planning and Building, comprehensive planning of a municipality or town defines the main functions for use of the territory as well as the requirements concerning use of land and water areas and restrictions to building/construction activities. Thus, comprehensive planning is not directly related to building/construction activities and does not provide bases for issuing of construction permits not permits for use of natural resources. However, requirements concerning use of landscapes and natural communities are established with comprehensive planning and, if necessary, recommendations concerning the taking of land areas and single objects into protection or making of amendments in their protection rules can be made.

3.9.3 APPROACH AND METHODS USED

In the process of development of the comprehensive planning environmental assessment was divided into four different stages.

Table 27 The stages of the planning and EA process.

Planning	Environmental Assessment	Public Participation
0. Preparatory activities, development of work schedule	0.Preparatory activities, development of work schedule	Information on the initiated planning
1. Development strategy Source data and investigations Development objectives	1. Environmental aspects of the strategy Environmental investigations Environmental objectives	Public discussion
2. Proposing of development alternatives (planning alternatives)	2. Programme for environmental assessment Scoping Prognosis of magnitude and significance of impacts for relevant alternatives Additional investigations	Public discussion
3. Draft planning proposal	3. Preparation of SEA report on	Public discussion

	preferred alternative (draft planning proposal)	
4. Planning proposal	4. SEA report	Public display and consideration of the results of the public display

Both the mentioned processes were carried out in parallel and were closely connected, contributing to and having influence on each other.

3.9.3.1 First Stage:

The first stage of the process proved to be considerably effective thanks to the involvement of representatives of district and commune authorities, land-owners of the area and representatives of other interested parties. With their participation **the first public meeting** was held where SWOT analysis (strengths, weaknesses, opportunities, threats) was conducted among the participants. At the meeting, the initial opinion of the different parties was defined, problems of the island and development possibilities of the territory were identified.

3.9.3.2 Second Stage:

The second stage of the planning process was also successful. It was begun with planning the development alternatives. In parallel to this, the state of the environment of the island was further investigated on the basis of available data and site visits with the aim of identification of influencing factors and scoping the topics to be considered at the conducting of EA. Four development alternatives were drawn up by the planning and EA working group; the fifth alternative was added later from outside this group. The proposed development alternatives for Naissaar were the following:

Table 28 Proposed development alternatives

Alternative 0-	The island is left by itself, without any concrete action plan developed (<i>No-action alternative</i>)
Alternative 0+	Necessary cleaning up is performed in the island, small-scale building activities and use of the island is possible
Alternative 1	Increase of local population as well as tourism and recreation activities, development of the service sector and construction activities
Alternative 2	Considerable increase of local population as well as tourism and recreation activities, construction of new roads in the island, varied service sector, regulated movement
Alternative 3	A theoretical alternative based on the principle that activities are concentrated in the very south and north end of the island. The extreme option for this alternative foresees the settlement of tens of thousands of people in the island

For identification and assessment of environmental impacts, the matrix analysis method was used. Environmental components, at which impacts arising from implementation of the planning would be directed, were presented in horizontal lines:

- nature and landscape(ground and surface water; weather; fauna; biological diversity; etc.)
- structure of population and man-made environment (buildings; facilities; infrastructure; historical heritage; etc.)
- man and society (living; working; service; health; safety; private property, etc.)

Activities bringing about the impacts were presented in vertical columns:

- activities causing the impacts: short-term activities (construction; risks; dangerous situations; etc.) and continuous or long-term activities(living; tourism; recreational activities; traffic; economic activities; etc.)
- description of the impacts (frequency; scope; strength; etc.)
- the significance of the impacts
- possibilities for avoiding or mitigation of the impacts.

The identified factors of influence were assessed in broad categories so as to facilitate easier understanding of the differences between alternatives as concerns their environmental impact. As a result of this matrix analysis, activities causing significant negative impact were identified as well as environmental components which would suffer the most from those activities.

At the second public meeting, the planning process and EA process were introduced, development alternatives of the comprehensive planning were described and their potential environmental impacts were commented upon. Representatives of the interested parties participated in conducting the matrix analysis, as a result of which the vision of the public concerning the environmental impacts of the alternatives was presented. The positions of the working groups differed mostly in their emphases, however, some conclusions could be drawn on the basis of those.

Environmental experts of the working group continued working more thoroughly on the significant environmental impacts as identified with participation of the public.

Special attention was paid to landscapes, coastal plant cover, sand dunes and mire areas. Ground water quality was analysed and factors influencing the diversity of fauna, flora and landscapes were investigated. Impacts on the social environment, especially on security, structure of the society, recreational activity, quality of the living environment and land use were also considered to be of high importance. In the assessment process, potential risks associated with development of the transport system and tourism, forest (timber) processing and waste management were analysed. In parallel to assessment of the impacts, analysis of their mitigation measures and the efficiency of those was conducted.

In this stage of the planning process, comparison was made between the environmental impacts of the alternatives considering the opinion of both the environmental experts, the public, interested parties and officials. As the interests and wishes of all participants in the process coincided in this case, the selection of the optimum alternative proved to be easy.

It was decided that development alternative No.1 would be taken as the basis for drawing up of comprehensive planning as this was most easy to be merged with environmental requirements and would still enable settlement and recreational activities of modest scale.

On the basis of alternatives presented in the planning as well as SEA results, the municipality also decided to take development alternative No.1 as a basis for drawing up the planning proposal.

3.9.3.3 *Third Stage:*

In the third stage of the planning process, work was continued with developing a planning proposal based on the selected alternative, in the course of which attention was focussed on the characteristic features of this option and on the finding of planning solution. In parallel to this, the potential environmental impacts were further specified and final assessment was given to those together with recommendations concerning measures for prevention or mitigation of environmental damage.

The third public meeting was held, at which the draft version of the planning proposal was introduced to participants. Both positive and negative environmental impacts and their mitigation measures were described. Comments and proposals of representatives of the public concerning mitigation measures were presented and discussed.

3.9.3.4 *Documentation of the SEA process and SEA report*

Documentation of the more important topics as well as of positions influencing the progress and decision-making throughout the process facilitated the compilation of the final EA report. At the development of the report, earlier interim reports were made use of and more detailed assessments concerning the environmental impacts of the planning proposal were added. The report also included recommendations concerning the mitigation measures to be implemented while applying the comprehensive planning in practice. The necessity for monitoring was discussed and guidelines for organization of monitoring of environmental components in the island were given.

Before presenting the planning to the public, the county government (competent authority) reviewed the planning proposal and draft SEA report and made its decision concerning the necessity of additional approval of these documents.

After that comprehensive planning was introduced to and officially approved by the neighbouring municipalities and all relevant authorities. In accordance with the Act on Planning and Building the proposal was put on public display for four weeks, together with the EIA report. During this time, it was possible to submit comments concerning the planning. The views presented during the public display period were analysed and incorporated into the planning.

3.9.3.5 *Supervision of Planning and EA report*

After public display of the documents, the county government verified whether:

- the planning meets the requirements of sustainable development and all valid legal requirements;
- environmental objectives were duly taken into account and measures for solving environmental problems were foreseen;
- conditions necessary for maintaining environmental quality were met;

- the conducted environmental assessment was sufficient and the report included all necessary data;
- the conditions for participation of the public in the process had been sufficient;
- Public opinion and comments were considered at the making of decision.

The whole process of development of the comprehensive planning for Naissaar took 17 months having started in December 1995, and being completed in April 1997, with the approval of the comprehensive planning.

3.9.4 RESULTS AND LESSONS

3.9.4.1 Contribution to Decision-Making

SEA conducted in parallel to the development of comprehensive planning resulted in directing the planning process already in its course towards environmentally sound solutions, while taking into account the interests of different interested parties related to the planning territory. As a consequence, no considerable problems or seriously differing opinions arose in the final stage of the planning - the implementation stage.

Table 29 Expert evaluation of SEA elements in the case study

SEA Elements	Expert evaluation	Explanation
Assessment of alternatives	3	Alternatives were assessed in broad categories and to a sufficient extent
Assessment of impacts on ecosystems	3	It was a key component of the assessment and assessment was conducted quite deeply
Assessment of health impacts	2	Assessment was conducted to a sufficient extent
Assessment of socio-economic impacts	1	Economic impacts were not assessed
Stimulation of public participation	3	Excellent conditions for public participation and involvement were created
Procedural quality checks	0	No formal base
Relation to decision process	2	Decision maker took into consideration the conclusions made by experts
Relation to project-level EIA	0	Comprehensive planning is not directly related to building activities and therefore it has no relation to project –level EIA
Post-SEA monitoring	0	The guidelines for post-SEA monitoring of environmental components in the island were given, but there are no results yet

Scale for expert evaluation of the SEA elements in the case study:

- 0 not existing
- 1 major problems
- 2 minor problems

3.9.4.2 *Conclusions for SEA Good Practice*

One of the most important and successful stages of the process was public involvement and participation. Timely and early informing of the public enabled to avoid the arising of conflicts, find new creative solutions and receive information concerning the preferences of interested parties and inhabitants. Good organization of the public involvement process made it possible to avoid the situation in which changes would need to be made in the planning implementation stage.

The effectiveness of the process was also enhanced by the division of the planning and EA process into stages. Thus, it was easier to scope the topics to be considered, focus attention on the key problems and recommend alternative solutions to those. In the course of intermediate stages it was possible to obtain varied information for solution of the identified problems and to analyse the potential impacts of decisions made in the course of the process.

More important facts were documented during each stage, identified problems together with the assessments and recommended solutions as well as interim decisions were presented in written form.

The opinion of the competent authority concerning the effectiveness of the process was positive. The implemented pilot project proved well that the integration of EA into the very process of development of planning is the only way to reach a solution optimum from the viewpoint of both the natural environment and the society while using the minimum of resources.

Officials of the local government considered the process of development of the planning highly useful and informative and they were also of high opinion of the rational use of both time and material resources throughout the process. The fact that environmental impact assessment was carried out in parallel to the development of the planning considerably facilitated the process of approval of the planning and decision-making.

The weak aspects of the process were the following:

- Source data concerning the state of some environmental components of the island were partly lacking. Gaps and partial insufficiency were identified in data concerning biological (mainly faunistical) and geological (especially concerning the genesis) and geomorphological information. Consequently, the identification of environmental impacts in these areas proved to need further investigation.
- While considering development alternatives, the possibilities for making changes among the areas reserved for different types of activities were not considered well enough
- The role of the decision-maker (the municipality) appeared to be relatively modest since the municipality could not adopt intermediate decisions sufficiently fast. The main deficiency was the lack of experience in planning and EIA, and some ignorance in environmental law and regulations.

3.9.5 KEY REFERENCES AND INFORMATION SOURCES

This project has been reported in In: Sadler, B., Dusik, J, Casey, S. and N.Mikulic (1998): Strategic Environmental Assessment in Transitional Countries: Emergin Practices, REC, May 1998. Further information on the case study can be obtained from Jiri Dusik (jdusik@rec.org). More information on the SEA process can be obtained from Ms. Ly Jalakas, E-mail: Ly@rvl.envir.ee

3.10. Regional Land-use Plan for Pisek-Strakonice, Czech Republic

3.10.1 INTRODUCTION

3.10.1.1 Role of the SEA

SEA was carried out in accordance with Art. 14 of the current Czech SEA Act for all regional land-use plans. The SEA was undertaken within the planning process for both draft plan as well as proposed plan (i.e. second and third stage of the planning process).

NB: It should be noted that the SEA application for regional land-use plans is a standard routine in the Czech Republic (over 20 such SEAs were carried out since 1992). In addition, the Czech Ministry of Environment issued in 1994 detailed guidance for SEA of regional land-use plans – the effectiveness of the entire process were evaluated in 1999 and the overall SEA approach was confirmed with minor modifications.

3.10.2 BACKGROUND: CONTEXT AND ISSUES

Regional Land-use Plan for Pisek-Strakonice deals with a conurbation of two cities and their wider territories (total area covered by the plan is about 1500 km²) in the south of the Czech Republic. The plan establishes general framework for design of lower-level land-use plans (usually done for cities or municipalities). The main aims of the plan are to:

- propose limits for the use of given territory
- coordinate all major planned development projects in the given territory

The plan responds to demands (raised by public authorities and private persons) for the changes in the use of the given territory. It deals with all known major planned development projects in the following areas:

- urban development
- transport infrastructure
- energy infrastructure
- water resource management
- economic activities (industry, agriculture, forestry and fisheries) and mining
- recreation and tourism

The proponent is the Ministry of Regional Development that also coordinates all process. The planning process is organised in three basic steps:

- data gathering for the plan (review of all relevant documentation, complemented by research to obtain new data, when needed)
- draft plan (usually proposes and compares alternative development scenarios for the territory)
- proposed plan (develops the selected alternative in detail).

Within all three stages of the planning, there is organised public commenting. Major consultations are organised when the draft plans (the proposed alternatives) is developed.

3.10.3 APPROACH AND METHODS USED

3.10.3.1 Information Assembly

This SEA is based on work a three-member SEA team. They derived their findings from available studies of the state of environment in the given territory, documents outlining the key environmental issues, surveys developed during elaboration of the plan and their expert judgments.

3.10.3.2 Development of Alternatives

The plan was proposed in single alternative. As already indicated, it contained major planned development projects in the following areas:

- urban development
- transport infrastructure
- energy infrastructure
- water resource management
- economic activities (industry, agriculture, forestry and fisheries) and mining
- recreation and tourism

3.10.3.3 Selection of Issues and Indicators

SEA analyses possible impacts of the proposal on:

- inhabitants (number of negatively affected inhabitants by the proposed developments)
- air quality and climate (only impacts on local air quality considered)
- water (capacity to retain and channel water, surface water quantity and quality, ground water quantity and quality)
- geology and geomorphology (impacts on assigned sources of minerals and on undermined territories)
- soil (changes in the scope of arable land)
- forests (changes in the scope of forests)
- ecosystems and landscape (impacts on protected areas, on territorial systems of ecological stability and on visual quantities of the landscape)
- cultural, historic and archaeological sites (impacts cultural heritage-protected areas, on areas with archaeological findings, on other sites of cultural or importance)

The key environmental issues in the above area were described and overall trends were summarised.

3.10.3.4 Impact Analysis

Analysis of proposed limits for the use of the territory

The SEA proceeded with analysis of adequacy of proposed limits for the use of the territory.

A matrix of the proposed limits for individual development sectors and of the key environmental issues was prepared to examine their mutual compatibility. Axis X of the matrix provided key environmental issues (see above item 3.3) and axis Y outlined the proposed limits for development interventions in sectors outlined in the above item 3.2. Possible environmental impacts were indicated, using the following general symbols (+2 very positive, + positive, - negative, -2 very negative).

The matrix was completed by detailed text explaining the main findings. SEA consultant often recommended application of voluntary application of EIA or other environmental evaluations (e.g. biological assessment) for main developments.

Analysis of overall impacts of the all main proposed development project on key elements of environment

Possible environmental impacts of the proposed specific development projects were analysed with assistance of simple matrix. Such matrix was prepared for each element of environment to obtain view on possible cumulative impacts of proposed development interventions.

For each environmental issue (e.g. water), a separate matrix was developed. Axis X of the matrix provided list of key environmental indicators for the given issue (see above item 3.3. for the list of indicators for each category of environmental issues). Axis Y outlined the proposed individual development interventions that were relevant to the given element of the environment. Possible environmental impacts were indicated, using the following general symbols:

- nature of the impact (+2 very positive, + positive, - negative, -2 very negative)
- scale of the impact (site-specific, local, regional)

These matrices were again completed by detailed text explaining possible cumulative impacts of proposed development interventions. SEA consultant often recommended specific measures to mitigate environmental problems and/or to increase protection of the given element of the environment (e.g. by applying stricter environmental protection rules in the given territory).

Maps –Overlays indicating relationship between the proposed developments and key environmental issues

Maps –Overlays indicating relationship between the proposed developments and key environmental issues were used for verifications of matrices outlining overall impacts of the all main proposed development project on key elements of environment. Two maps were prepared:

- Map 1: urban areas, transport and technical infrastructure, heritage sites and geology)
- Map 2: nature protection, water, agricultural land and forests

3.10.3.5 Public Participation

There was no separate public participation process. SEA Report was presented along with the proposed plan to public authorities and the public.

3.10.3.6 Monitoring and Follow Up

The plan is currently in the stage of draft plan. Based on the review of the draft plan and its SEA, the proposed plan (and its SEA) will be elaborated.

3.10.4 RESULTS AND LESSONS

3.10.4.1 Contribution to Decision-Making

Linkage between the plan and the SEA is clear, yet it would be helpful if the draft plan was elaborated in alternatives. The SEA is just used to check quality of the proposed draft plan – and indeed it found no major environmental issues.

3.10.4.2 Conclusions for SEA Good Practice

This SEA illustrates that SEA can be effectively undertaken even with very simple analytical tools.

3.10.5 KEY REFERENCES AND INFORMATION SOURCES

This case study has not yet been described in international or national literature. Further information on the analysis can be obtained from Jiri Dusik (jdusik@rec.org). Additional information on the plan and its SEA can be obtained from Mr. Martin Smutny (martin_smutny@env.cz) or Mr. Vojtes Vyhnalek, (eia@iol.cz).

3.11. Waste Management Plan of the Czech Republic (WMP-CR)

3.11.1 INTRODUCTION

3.11.1.1 Role of the SEA

SEA was carried out by 5-member team (mainly academic experts) as a separate process organised in parallel to the planning process. The SEA team regularly met with the planning team, yet it did not strictly follow the planning process (i.e. elaboration of analytical part of the programming document, setting up objectives, measures, implementation systems, monitoring system). SEA team aimed at elaboration of the SEA Report and applied the following steps to this end:

- scoping (14 regional and 2 national public workshops to comment on the draft plan and on the proposed assessment methodology)
- review of the detailed Terms of Reference for SEA (1 national workshop organised for national association of environmentalists)
- elaboration of SEA Report
- public review of the SEA Report

3.11.2 BACKGROUND: CONTEXT AND ISSUES

The Waste Management Plan of the Czech Republic (WMP-CR) has been prepared in 2002 as the first comprehensive strategic document that set out objectives and measures for management of main types of waste. It is a framework document prepared for 2003-2012 which will be complemented by Regional Waste Management Plans.

WMP-CR sets out objectives for management of the main categories of waste and set out demand- and supply-management measures to achieve objectives for each category of waste. Demand management measures include regulatory, economic, institutional, educational or voluntary measures. Supply management measures suggest optimal treatment facilities for various types of waste.

The WMP-CR does not deal with location or extend of planned waste management facilities. This issue will be addressed by the Regional Waste Management Plans that have to respect mandatory part of the WMP-CR.

WMP-CR has the following components:

- introduction (binding force of Plan, terminology, institutional arrangements for waste management, etc.)
- evaluation of the current state of waste management in CR
- obligatory part of the plan (mandatory objectives, measures and implementation/monitoring arrangements)
- recommendatory part of the plan (non-binding objectives, measures and implementation/monitoring arrangements)

3.11.3 APPROACH AND METHODS USED

3.11.3.1 Information Assembly

The assessment was based on collective expert judgments that utilized personal experience of SEA team, materials developed during elaboration of the plan and existing information source.

3.11.3.2 Development of Alternatives

The plan was prepared in two alternatives:

- officially proposed alternative was elaborated by the proponent (Ministry of Environment).
- the “green alternative” was elaborated by local NGOs (network of NGO experts coordinated by the local Friends of Earth). Elaboration of the “green alternative” was financially supported by the proponent (Ministry of Environment) since it served as source of independent suggestions for elaboration of the “official” version of the plan.

The official planning process involved work of several teams that elaborated various parts of the plan. Since these team often worked separately, the entire plan was prepared through very iterative process - it was rewritten four times to incorporate newly acquired data.

Mandatory part of the WMP-CR contain specific obligatory objectives, measures and implementation/monitoring arrangements for the following types of waste:

- Hazardous waste
- Products and waste that contain PCBs
- Medical waste

WMP-CR also contains specific objectives, measures and implementation/monitoring arrangements for the following types of waste treatment:

- Recycling of household waste
- Waste deposition to landfills
- Limiting of biodegradable matter in waste deposited to landfills
- Management of product wrapping

3.11.3.3 Selection of Issues and Indicators, Impact Analysis and Comparison of Alternatives

When analysing the proposed plan, the SEA team used the following techniques of evaluation:

- A. Matrix indicating general environmental risks of various waste management approaches.* This assessment was based on presumption that although all waste facilities need to comply with strict EU standards (Czech legislation is fully aligned with EU standards), they still pose various degrees of environmental risks. The SEA team therefore prepared detailed matrix which compared environmental risk of the following waste management approaches (axis y):

- a. collection, separation and transport of waste
- b. use of waste as sources of secondary materials
- c. incineration of waste for production of energy
- d. chemical and biological treatment of waste
- e. composting
- f. incineration of waste without production of energy
- g. landfills
- h. permanent depository of waste

The above mentioned waste management approaches were evaluated, using the following categories of possible impacts (axis x):

1. climate
2. air quality
3. geology and geomorphology
4. water
5. soil
6. ecosystems
7. landscape
8. archaeology, history and culture
9. health and well being at workplace
10. health and well being of general public
11. past environmental liabilities

Cells in the assessment matrix provided outline of key environmental issues and indicated marked (by using different colours their nature and possible severity – from most positive to most harmful). This evaluation enabled the SEA team to rank the various waste management options and provided basis on general comments on proposed measures.

B. Evaluation of environmental risks of various waste management approaches based on through their linguistic evaluation. This evaluation was used to complete the above described analysis. It was carried out with assistance of prognostic approach based on “fuzzy sets”. This technique enables establishment of collective expert judgement (expressed in linguistic term such as: poor, good, nearly sufficient, etc.) from individual expert judgments that are also expressed in linguistic evaluations of a given proposal. The exact transformation of individual linguistic judgements is based on theory of “fuzzy sets” and requires comprehensive computing and prior research.

SEA used this technique to verify the above general evaluation of environmental risks of various waste management approaches. SEA team indicates that it achieved a great degree of similarity in both evaluations, yet SEA Report does not provide clear and understandable comparisons of result of both assessments.

C. Matrix of possible specific environmental impacts of the all proposed objectives, principles and measures of the WMP-CR. Within this evaluation, the SEA team prepared a detailed matrix of all specific proposals of the plan (axis y) and reviewed them against the following categories of possible impacts (axis x):

1. climate
2. air quality
3. geology and geomorphology

4. water
5. soil
6. ecosystems
7. landscape
8. archaeology, history and culture
9. health and well being at workplace
10. health and well being of the general public
11. past environmental liabilities

When filling this matrix, SEA Team used basic symbols: + (good), 0 (indifferent/neutral), - (negative). The collective expert judgment was based on individual evaluations by team members. These assessments provide basis for main recommendations of the SEA team regarding environmental features of individual sections of the proposed plan.

- D. Review of internal consistency of the plan.* This was major concluding analysis that involved review of internal logic of plan. It examined whether:
- specific objectives correspond with issued raised in the analytical part of the plan
 - specific objectives correspond with general management objectives set out by the plan
 - specific management principles correspond with specific objectives of the plan
 - specific measures correspond with specific objectives and principles
 - suggested indicators enable proper measurement of attainment of specific objectives
 - specific objectives of the obligatory part of the plan correspond with measures proposed in the recommendatory part of the plan

Based on this assessment, the SEA team pointed out numerous inconsistencies between a) proposed specific objectives and with issued raised in the analytical part of the plan and between b) some of the specific objectives and principles and “corresponding measures”. The SEA team also pointed out problems of adequacy of suggested indicators for measuring achievement of specific objectives (many indicators were either irrelevant or it unrealistic as the data-gathering regards). Data from this “non-environmental” assessment are heavily reflected in the concluding sections of the SEA Report and complete environmental evaluations obtained within previous assessment.

3.11.3.4 Public Participation

Identification of stakeholders

There was not separate public participation organised for the SEA. The proponent (Ministry of Environment) hired REC - Czech Office to organise a single public participation process that would serve both the planning and the SEA process. The following means identification and notification of the public were provided:

- www page with announcement of the SEA process, old and current versions of WMP-CR and background documents
- permanent special e-mail address to gather comments
- network of 14 regional coordinators was established to facilitate dissemination of information about the SEA, organizing of regional public workshops and gathering of comments
- regional stakeholders were periodically notified using e-mail conferences and targeted mailing

Mode(s) of involvement

Main options for public participation were provided during initial review of the draft plan and SEA scoping when 14 regional and 2 national public workshops were organised. Each of the regional public workshops was organised by 10-25 people, national workshops attracted about 50 persons each.

In addition, a review of the detailed Terms of Reference for SEA was done through 1 national workshop organised for national association of environmentalists (Society for Sustainable Living)

The final SEA Report was again reviewed through 2 national public workshops (each attended by approx. 30 persons).

Comments on effectiveness of public participation

Evaluation of responses and comments revealed that participating experts and public were interested mainly in the proposed plant itself and only to a minor degree in the SEA process. This can be attributed to the fact that public and participating experts did not find any major conclusions of the SEA team which should be commented upon and therefore focused on the proposed NWP-CR. It may be also caused by the fact that SEA Report was not presented in understandable form (e.g. scoping materials were quite theoretical and did not indicate actual SEA methodology and the SEA Report was quite comprehensive and often difficult to understand).

Altogether, about 500 public comments were received on the proposed plan. The major problem in public participation was the fact that majority of these comments was not used since the individual chapters of the WMP-CR were constantly changes and many comments of previous versions of the plan became irrelevant at the time of their receipt.

3.11.3.5 Monitoring and Follow Up

The monitoring and the follow-up provisions constitute integral part of the plan. The SEA team pointed out pointed out problems of adequacy of suggested indicators for measuring achievement of specific objectives (many indicators were either irrelevant or it unrealistic as the data-gathering regards).

3.11.4 RESULTS AND LESSONS

3.11.4.1 Contribution to Decision-Making

Due to lack of clear substantive linkage between work of the SEA team and the work of planning team, it is difficult to outline clear contribution of to the NWP-CR planning process.

As the SEA Report regards, it certainly provides numerous comments on the final proposed plan which are summarized in the SEA Report. They are being currently considered within the finalizing decision-making on the proposed NWP-CR by management of Ministry of Environment.

3.11.4.2 Conclusions for SEA Good Practice

Based on the evaluations of this project, it can be concluded that SEA and public participation would have been much more effective if both procedures operated within clear and transparent planning process. Changes in the NWP-CR planning made it almost impossible to correlate planning works with the SEA and public commenting.

As the quality of SEA Report regards, one can point out need for better clarify of the overall SEA approach and methodology. Some theoretical constructions and approaches (e.g. very theoretical scoping document and the use of fuzzy sets for partial evaluations of waste management approaches) that were used in the SEA made it quite difficult for the public to clearly understand SEA conclusions. This also limited public discussions and commenting.

3.11.5 KEY REFERENCES AND INFORMATION SOURCES

This project has not yet been reported in international or national literature. Further information on the analysis can be obtained from Jiri Dusik (jdusik@rec.org).

Further information on the public participation process can be obtained from Ms. Simona Šulcová (simona.sulcova@reccr.cz) and Tomas Kazmierski (tomas.kazmierski@reccr.cz).

3.12. Waste Management Plan of the Plzen Region (WMP-PL), Czech Republic

3.12.1 INTRODUCTION

3.12.1.1 Role of the SEA

SEA is being carried out by 4-member team (mainly waste management experts) as a separate process organised in parallel to the planning process. The SEA team regularly meets with the planning team and closely follows the planning process. SEA team does not aim at sole elaboration of the SEA Report – its main states goal is to provide input into various stages of the planning and into comparison of alternative scenarios within the plan.

3.12.2 BACKGROUND: CONTEXT AND ISSUES

The Waste Management Plan of the West Bohemia (WMP-PL) is a subsequent document that provides detailed arrangements for implementation of the Waste Management Plan of the Czech Republic (WMP-CR, see description of this example in the other case study).

WMP-PL has been initiated in 2002 as the first strategic document for integrated waste management in the region. WMP-PL follows objectives and measures for management of the main categories of waste set out in the WMP-CR. It examines opportunities for practical implementation of these objectives and measures, by analysing of possible development projects that are needed to be implement objectives and measures of the WMP-CR.

3.12.3 APPROACH AND METHODS USED

3.12.3.1 Information Assembly

As in the case of SEA of WMP-CR, this assessment is also based on collective expert judgments that utilizes personal experience of SEA team, materials developed during elaboration of the plan and existing information source. .

3.12.3.2 Development of Alternatives

The plan is currently being drafted (expected completion is March 2003). It currently analyses development projects may be needed to be implement objectives and measures of the WMP-CR

The planning team and the SEA team currently consider the following 4 alternatives:

Alternative 1a proposes only waste separation and its further use combined with depositing of unusable materials to landfills. It comprises of the following specific measures:

- Separation of waste at its sources – mechanical sorting of communal waste through ballistic separator and sorting lines at selected locations
- Use of separated waste – esp. glass, metals, etc.
- Depositing of unusable fractions at landfills (type S-OO and S-NO)
- Incineration of waste with separation of burnable fractions (paper, plastics, etc.)
- Composting of biologically degradable waste

Alternative 2 proposes development of incinerator for communal waste with capacity 100.000 tons/year. This involves option of energy use of communal waste from the region.

This alternative comprises of the following specific measures:

- Separation of waste at its sources – mechanical sorting of communal waste through ballistic separator and sorting lines at selected locations
- Use of separated waste – esp. glass, metals, etc.
- Incineration combined with cogeneration of heat and electricity
- Depositing of communal waste generated outside of area served by incinerator at landfills (type S-OO and S-NO) and depositing of ash from generator at landfill (type S-NO)
- Composting of biologically degradable waste

Alternative 3 proposes separation of communal waste at its source, transport of remaining unusable communal waste into low-capacity pyrolysis line with capacity of 60.000 tons of communal waste per year. This alternative comprises of the following specific measures:

- Separation – general preventive measures for effective separation of waste at its source, use of sorting/separating lines
- Use of separated waste – esp. glass, metals, etc.
- Incineration at gasification facility combined with cogeneration of heat and electricity
- Use of coke
- Depositing of unusable fractions from sorting lines and of caught combustion emissions from gasification facility at landfills (type S-OO and S-NO)
- Composting of biologically degradable waste

Alternative 4 proposes increased effectiveness of separation of communal waste at its source and treatment of residual communal waste through thermal shrinking (up to 30% of its original bulk). Waste treated through this technology is either re-used (treated waste fractions that fell through screen are used for alternative fuels and composting, treated waste fractions that stayed above the screen go for separation or deposited at landfills (the remaining waste fractions that go to landfills are of about 10% of the original waste volume). This alternative comprises of the following specific measures:

- Separation – general preventive measures for effective separation of waste at its source, use of sorting/separating lines
- Use of separated waste – esp. glass, metals, etc.
- Treatment of residual communal waste through thermal shrinking
- Depositing of unusable waste fractions from sorting lines and from thermal shrinking at landfills (type S-OO and S-NO)

- Composting of biologically degradable waste

3.12.3.3 *Selection of Issues and Indicators, Impact Analysis and Comparison of Alternatives*

When analysing the proposed plan, the SEA team used the general assessment approach applied within SEA of WMP-CR. It uses the two following techniques of evaluation:

A. Matrix indicating general environmental risks of various waste management approaches.

The SEA team for WMP-PL copied and re-approved the detailed matrix that was prepared for SEA of WMP-CR. It compares environmental risk of the following waste management approaches (axis y):

- i. collection, separation and transport of waste
- j. use of waste as sources of secondary materials
- k. incineration of waste for production of energy
- l. chemical and biological treatment of waste
- m. composting
- n. incineration of waste without production of energy
- o. landfills
- p. permanent depository of waste

The above mentioned waste management approaches were evaluated, using the following categories of possible impacts (axis x):

1. climate
2. air quality
3. geology and geomorphology
4. water
5. soil
6. ecosystems
7. landscape
8. archaeology, history and culture
9. health and well being at workplace
10. health and well being of general public
11. past environmental liabilities

Cells in the assessment matrix provided outline of key environmental issues and indicated marked (by using different colours their nature and possible severity – from most positive to most harmful). This evaluation enabled the SEA team to rank the various waste management options and provided basis on general comments on proposed measures.

B. Matrices of possible specific environmental impacts of the all proposed alternatives of the WMP-PL. Within this evaluation, the SEA team prepared a detailed matrix for each alternative (all specific waste management measures in each alternative were put on the axis Y) and axis X provided the following categories of possible impacts:

1. climate
2. air quality
3. geology and geomorphology
4. water
5. soil
6. ecosystems

7. landscape
8. archaeology, history and culture
9. health and well being at workplace
10. health and well being of general public
11. past environmental liabilities

When filling this matrix, SEA Team used the following evaluation scale:

	Symbol	Impact
	-3	very negative
	-2	negative
	-1	partly negative
	0	indifferent
	+1	partly positive
	+2	positive
	+3	very positive

Evaluations of possible impacts followed from evaluation of general environmental risks of various waste management approaches (see matrix under analysis A) – these were further précised since specific features of proposed measures were known. The team used in this evaluation collective expert judgments.

3.12.3.4 Public Participation

Identification of stakeholders

As with SEA of WMP-CR, there was not separate public participation organised for this SEA. The proponent (the Plzen Region) hired Regional Development Agency to organise a single public participation process that would serve both the planning and the SEA process. The following means identification and notification of the public were provided:

- www page with announcement of the planning process (including SEA) which provided background documents and old and current versions of the plan
- permanent special e-mail address to gather comments (this email addressed was linked to the planning team)
- regional stakeholders were notified using targeted mailing

Mode(s) of involvement)

Main options for public participation so far one regional public scoping workshop (about 50 participants) to review the proposed alternatives and SEA approach and methodology. The comparison of 4 alternatives of the plan is currently made public accessible at www site and will be reviewed through public workshop in February 2003.

Comments on effectiveness of public participation

Evaluation of responses and comments revealed that participating experts and public were interested both in the proposed plant and the SEA process. This can be attributed to the facts that SEA was presented in quite understandable form and it was easy to follow the logic of the assessment.

3.12.3.5 Monitoring and Follow Up

The plan is currently under development. Monitoring and the follow-up provisions will be developed for finally selected alternative.

3.12.4 RESULTS AND LESSONS

3.12.4.1 Contribution to Decision-Making

There is clear and substantive linkage between work of the SEA team and the work of planning team. Both teams currently considered alternative options of the plan.

3.12.4.2 Conclusions for SEA Good Practice

Evaluations of this SEA and especially its relationship to its “parent SEA” done for national plan, it can be concluded that concept of tiering can work quite effectively in SEA.

3.12.5 KEY REFERENCES AND INFORMATION SOURCES

This project has not yet been finalised. Further information on the analysis can be obtained from Jiri Dusik (jdusik@rec.org). More information on the Plan and its SEA can be obtained from Mr. Skorepa (skorepa@bohemiaplan.cz). Further information on the public participation process can be obtained from Mr. Petr Pelcl (petr.pelc@cpkp.cz).

3.13. M4 SOUTH WALES COMMON APPRAISAL FRAMEWORK

3.13.1 INTRODUCTION

3.13.1.1 Nature of the Plan

This case study sets out the approach and results of a pioneering Multi-Modal Study that was the first to address inter-urban travel problems using a multi-criteria approach. Rather strangely it is also an example of where a uncertainties over a major motorway project led to the commissioning of this SEA type study, thus contrasting with the standard policy-plan-programme-project hierarchy often promoted by some. The SEA was undertaken as an integral part of the transport study.

3.13.1.2 Role of the SEA

The SEA was an integral part to the evaluation of alternative transport solutions to congestion on a section of the M4 motorway around Newport. Given its function, initially to confirm that a relief motorway was the preferred solution the SEA was essentially an internal exercise for the Welsh Office, hence public consultation was not applied.

3.13.1.3 Focus of this Case Study

The focus of the study is to report the environmental indicators used and illustrate how only a small sub-set were relevant in reporting the relative performance of the different transport strategies. Other indicators were of value in exploring the impacts but not in discriminating between strategies as the impacts were of a similar magnitude at the scale of the study, or were amenable to mitigation and hence not key decision making issues.

3.13.2 BACKGROUND: CONTEXT AND ISSUES

3.13.2.1 Social and Environmental Setting

Given the planning context, environmental, transportation and economic considerations needed to be examined in an integrated manner. Indeed integration was even more critical given that the environmental complexities were increased by the adverse environmental conditions associated with the current M4 motorway at least in terms of impacts on the human environment and the adverse impacts of the proposed relief road upon cultural heritage, ecological and landscape interests.

The study area for the alternative highway projects was easy to define and, as noted above, the corridor for the relief road exhibited both ecological and heritage interests of national importance, but with relatively few residential properties. In contrast, alternatives for the existing M4 encountered both exceptional engineering and alignment/ safety constraints as well as noise, severance and air quality impacts on large numbers of residents along the boundary of the motorway.

A crucial task was to define the study area for the rail projects and the indirect consequences arising from the alternative road solutions, since in theory they could extend from Swansea to London due to the effects of electrifying the Great Western rail line. This raised issues of apportionment. This is the task of determining whether particular impacts should be assigned only to transport users from South Wales or to other users along the entire rail corridor. Tests of significance were applied and the boundary was eventually defined as being South Wales.

3.13.2.2 SEA/Decision Making Process

In 1989/90, the Welsh Office commissioned the South Wales Area Traffic Study (SWATS) which examined the existing and future performance of the motorway and trunk road network in the area.

Subsequently in 1991 the Secretary of State announced a number of additions to the roads programme, including a relief road around Newport. In July 1995, the Secretary of State announced the preferred route for the M4 Relief Road which runs between Magor and Castleton (Junction 23 to 29), passing to the south of Newport. Then in March 1997 to a Stage 2 commission to develop the scheme with adequate detail in order to enable the Secretary of State to progress the Orders for its delivery.

In July 1998, the Welsh Office produced "Driving Wales Forward - A Strategic Review of the Welsh Trunk Roads Programme" makes the following statement about the M4 around Newport.

“The consultation paper sought views on how the problems of congestion which already exist, and which are predicted to worsen steadily, on the M4 motorway in south-east Wales should be resolved. It noted that the Welsh Office had already engaged consultants to carry out a review, using a common appraisal framework, of the options for dealing with the problems around Newport through road and/or public transport enhancements, and emphasised that, especially in view of the environmental concerns which have been expressed, we would wish to study all the options closely before taking decisions on whether to proceed with the schemes for a relief motorway south of Newport, and for widening the existing M4 motorway north of Cardiff. “

This statement recognised that the environmental concerns associated with the relief motorway raised by objectors, as well as the lack of consideration of alternatives, put at risk the proposed solution and hence a study was required. The alternative to be considered included different modes, tolling, policy instruments and intelligent transport systems.

The purpose of the M4 CAF study was to:

- a) undertake a "Common Appraisal" of options to provide relief from the anticipated effects of increasing traffic on the M4 around Newport between Magor and Castleton;
- b) to appraise options on the basis of acceptable environmental, financial, economic and safety criteria; and
- c) to bring all the relevant issues together to advise the Secretary of State on whether he should proceed to seek the statutory powers to construct the M4 Relief Road.

The M4 CAF was undertaken at a time of rapid change in transport policy, assessment and appraisal. Not only was there a change in government, but several changes in policy, most notably a commitment to an Integrated Transport Policy, and publication of the Transport White Paper and the Welsh Transport Policy Statement (July 1998).

3.13.2.3 Issues Material to the Case

The main issue was the non-existence of any guidance or methodology to develop and screen transport measures, to define the study area, to assess the impacts of the strategies and to evaluate the alternate strategies.

3.13.3 APPROACH AND METHODS USED

3.13.3.1 Information Assembly

As the SEA emerged from a project an extensive amount of information on the environmental characteristics of the setting of the relief motorway was available to the study. In contrast, little information was available at the outset for any of the new transport measures that were being examined in the SEA. This raised a potential concern of a bias against those measures where greatest information existed. In

reality this situation did not result, since the indicators were carefully selected so that they did not impart any bias towards a particular mode or a particular situation.

Data for the SEA was assembled through reconnaissance surveys, through the use of aerial photographs and maps. A reconnaissance survey is a site visit by environmental specialists, but this does not involve the collection of data or the production of formal records.

In order to provide data to support the impact assessment different sources of information were used. Where quantitative analysis was undertaken, such as for noise or air quality, then the data was derived from the transport model which itself was based upon traffic survey data specifically assembled for the study. However, in the case of some of the quantitative analysis, such as for the aquatic and ecological assessments, new data was developed during the SEA based upon an assumed footprint for the transport measures. For example, the area of land taken within designated sites and the number of watercourses that would be traversed or diverted. The basic information was assembled from aerial photographs and maps.

In other situations, the basic information was assembled from a review of land use maps and development plans, supported by information available on areas of acknowledged importance.

3.13.3.2 Development of Alternatives

The M4 CAF examined a range of alternative transport measures that satisfied the study objectives and then formulated three basic strategies for assessment:

- a) Road building strategy;
- b) Enhanced public transport strategy; and
- c) Traffic/demand management strategy.

Each strategy represented an extreme example of the measures that could be realistically delivered under each theme. For example, within the enhanced public transport strategy both infrastructure and fiscal elements were included with a real term reduction in public transport fares being assumed. The traffic/demand management strategy also employed a mix of infrastructure and policy measures including land use measures, urban car parking charges, urban road pricing, infrastructure and telematic measures applied to the M4 and telecommunications. The measures were identified through discussions with those responsible for the provision of transport infrastructure and services as well as major users of the networks.

For each of the measures an outline environmental appraisal was undertaken in order to identify any fundamental constraints to the delivery of measure. Only those measures that were considered to be deliverable were included in the appropriate strategy. The strategies were defined as extreme options in order to discern the extent to which each could by itself contribute to the solution of the problems.

Having defined the extremes, the best measures from each of the strategies were identified in terms of transport, economy and environment and entered into a hybrid strategy to produce a good combination of measures assuming the M4 Relief Road was not built. Motorway tolling was included in this strategy. The hybrid strategy was then compared with the road building strategy.

3.13.3.3 Selection of Issues and Indicators

At this stage detailed field surveys were not undertaken and readily available data sets were collected and reconnaissance surveys were undertaken. Using traffic data initial estimates of noise and air quality and public amenity issues were explored. Table 30 sets out the environmental indicators that were used.

In seeking comparability of assessment between transport measures involving different modes, it was necessary to develop objectives and indicators that address the likely environmental impacts. This task was undertaken by technical decision-makers with other stakeholders having little involvement in the definition or validation of such objectives. Had the objectives been subject to review by elected decision-makers and

other stakeholders then, they may well have been more focused and proved to be a better aid to the elected decision-makers. The indicators were selected on the basis of minimising the need for external data assembly and to ensure that all relevant topics were addressed. The avoidance of introducing bias across different modes or geographic areas was also an important factor.

Table 30 M4 CAF Objectives and Indicators

Issue	Objective	Strategic Indicator	Data Source
ENVIRONMENT			
Noise & Vibration	Traffic noise levels in the vicinity of transportation infrastructure are minimised (EO1)	* Length of main transportation network with a change in noise levels	Transport model
Air Quality	Total greenhouse gas emissions from transport are minimised (EO2).	* Change in CO ₂ emissions in the regional transportation model area	Transport model
	Any increase in the acidification loading due to transport is minimised (EO3).	* Change in NO _x emissions in the regional transportation model area	Transport model
	Emissions from transport affecting local air quality are minimised (EO4).	* Percentage change in total emissions of NO _x within Newport	Transport model
Landscape/ Townscape	Minimise adverse change in designated or historic landscapes (EO5).	* Area of transportation infrastructure affecting designated or historic landscapes	Land use plans, assumed format of transport measures, reconnaissance surveys
Biodiversity / Nature Conservation	Minimise any adverse effects on the integrity of designated sites of national importance (EO6).	* Area of transportation infrastructure affecting designated sites * Extent of direct or indirect risk to designated sites	Land use plans, assumed format of transport measures, reconnaissance surveys
	Minimise adverse effects upon locally designated sites of irreplaceable value (EO7).	* Area of sites of local ecological value directly or indirectly affected	Land use plans, assumed format of transport measures, reconnaissance surveys
Cultural Heritage	Minimise adverse affects on the integrity of nationally designated sites of cultural heritage (EO8).	* Number of Scheduled Ancient Monuments or Conservation Areas experiencing a change in their setting	Land use plans and local records
Water Resources	Minimise any increase in the susceptibility of land use activities to flood risks (EO9).	* Area of floodplain occupied by new transportation infrastructure	Land use plans, assumed format of transport measures
ACCESSIBILITY			

Issue	Objective	Strategic Indicator	Data Source
Community Severance	To reduce community severance or conflict between motorised and non-motorised travellers (EO11).	* Length of transportation infrastructure with a change in severance	Land use plans, assumed format of transport measures, reconnaissance surveys
INTEGRATION			
Land Use, Plans and Policies	Minimise the need for property demolition or land take (EO12)	* Potential for property to be demolished or relocated	Land use plans, assumed format of transport measures, reconnaissance surveys
	Maximise support to transportation, land use planning, environmental sustainability and health policies (EO13).	* Extent to which plans and policies are assisted or hindered	Government policy documents and local policy documents
Resource Use	Minimise the amount of energy consumed by the transportation network (EO14).	* Change in the consumption of energy within the regional transportation network.	Transport model
Construction	To minimise risk of extensive construction disturbance to sensitive features (EO15)	* Area of major construction works within 100m of properties or designated sites	Land use plans, assumed format of transport measures, reconnaissance surveys

Note: Transportation infrastructure includes all transport related works having a discernible physical presence and applies to cycle routes, bus routes, pedestrian facilities and traffic management measures as well as roads and railways.

3.13.3.4 Impact Analysis

At this time no guidance existed on how to undertake a SEA was not available and hence a method was invented. The methodology adopted for the M4 CAF was an objectives-led approach with the following key stages in the appraisal:

- a) Define geographic and time boundaries for the study;
- b) Integrated specification of transport scenarios;
- c) Establish the objectives;
- d) Identify potential effects of individual transport measures;
- e) Identify appropriate indicators;
- f) Define baseline conditions;
- g) Forecast effects of transport strategies;
- h) Appraise relative performance of each transport strategy;
- i) Identify preferred strategy.

Appraisal thresholds that suggested the likelihood of significant environmental effects were used to screen the transport measures and to constrain the assessment activities to those that merited examination. For example, the change in traffic necessary to deliver a 1dBA change in noise levels.

3.13.3.5 Comparison of Alternatives

The results were reported in an Environmental Summary Table to enable those indicators that had no bearing on the option selection process to be removed from further consideration (See Table 31). The

process of reducing the fourteen indicators to a core set to present in the summary report to elected decision-makers proved to be one of the challenging aspects of the study. Those indicators that failed to provide any basis for discriminating between the transportation options were easily eliminated, but others proved to be more problematic. While the noise indicator was considered worthy of reporting, in practice, the assumptions taken in its calculation meant that its use as a headline indicator could not be sustained. Also, as some indicators were essentially telling a similar story to decision-makers, surrogates were selected to summarise several indicators.

For each alternative strategy the assessments for each impact category were generated. From this those impact indicators which were providing essentially the same answer, then that indicator was not of use in selecting the preferred strategy. From the 15 indicators this allowed several to be removed as not aiding the selection process. Then for each the remaining indicators each alternative was ranked according to the relative performance. This enabled an environmental perspective on the preferred environmental strategy to be identified. However, other topics such as transport and economic development also generated alternative preferences. In most situations there was broad agreement, while in others the environmental assessment concluded that the preferred strategy would give rise to adverse effects upon local/rural road networks or upon designated sites. In such cases, these adverse effects were reported in the final assessment made to the decision-makers.

The appraisal of the scenarios was assisted by combining the performance of each transport measure as recorded by the various indicators into a Framework. However, it was important that such a Framework should not be too long and complex, as it would be difficult to appreciate the issues. Furthermore, the desire was to assemble a summary of this on a single page for ease of understanding.

For each environmental topic the four scenarios were ranked according to their environmental performance, recognising the opportunities for mitigation.

3.13.3.6 Public Participation

There was no public involvement during the assessment process as it was originally intended that the work would be used at a public inquiry into the road proposal. In reality the study questioned the road in its proposed configuration and also proposed a series of other measures to address the problems of safety, demand management and investment in other modes. This solution then raised important political issues that elected members needed to explore before any further work could be undertaken on the proposed measures.

3.13.3.7 Monitoring, Uncertainty and Cumulative Effects

Uncertainty and cumulative effects were addressed in the study adopting a precautionary principal where valued environmental resources were at serious threat and there was uncertainty as to the scope for mitigation. The uncertainty in site selection for some of the measures also gave rise to issues as to whether the environmental impact could be avoided during project development. Hence a three point risk scale was applied of high, medium and low. The cumulative effects of the measures upon air quality as well as the loss of habitat and landscape were recognised.

Precautionary Principle: One of the transport measures was located in an area of high environmental sensitivity, but given the lack of detail on how the project would be designed and the exact nature of the impacts, the precautionary principle was applied. This meant that the impact was given a higher significance to reflect the uncertainty. In another situation where, some flexibility in the assumed location of the transport measure was available, so using the precautionary principle its indicative location was modified to lessen the impact.

Consideration of cumulative was considered in the way in which some of the indicators were defined. For example, the total area of transport infrastructure affecting designated sites. In other situations, the

consequences of a change in the historic environment indicator also coincided with areas of high ecological importance. Such multiple impacts in the same locality were then reported qualitatively.

Given the objectives of the study, there were no commitments made towards ongoing monitoring of the situation.

3.13.4 RESULTS AND LESSONS

3.13.4.1 Contribution to Decision-Making

The factors that contributed towards the success of this study were the close involvement of environmental team within the engineering design team and the ability to generate novel approaches to the assessment activities.

3.13.4.2 Outcome

The study, in considering all technically feasible transport measures, essentially delivered a hypothetical solution that was not founded in political reality, as elected decision-makers were external to the study process. As a result, the recommendations for demand management through tolling were regarded as being too radical. In part this situation arose from a complex local policy context in which elected decision-makers were unclear on how to intervene and interact with the complex issues.

The lack of involvement by elected decision-makers was mirrored in the narrow selection of stakeholders active as consultees during the process, there being no stakeholder involvement to represent environmental or social interests. This situation led a failure to address the tensions between sustainable development and transport faced by the National Assembly for Wales. The study objectives also, being narrowly defined, failed to address the tensions between local, regional and national objectives which were also in a period of change.

A lack of technical guidance available on the setting of objectives and indicators was a weakness in that it highlighted the lack of a high level policy structure for dealing with issues such as the appropriate level of service that the transport network should provide. This was a crucial aspect where a clear direction from elected decision-makers would have been desirable.

3.13.4.3 Conclusions for SEA Good Practice

Incorporation of the SEA into the transport planning process helped the clarification of the key trade-offs that were needed and thus informed the decision-makers of the complexity of the issues that were faced. It contributed towards an evolution of thinking in transport planning in the UK and ultimately led to the re-appraisal of the initial motorway relief road that stimulated the study, such that a lower standard of road is being explored.

The environmental assessment led to a recognition of the environmental issues associated with alternative transport measures at an early stage, such that some measures were re-defined and in the case of others the need for further investigations into mitigation measures were identified.

The conclusion for good practice is that there is a need for a framework for assessment activities but that flexibility should be encouraged in order to reflect local circumstances. Also, the benefits of distilling all the environmental information that was assembled to a compressed presentation focusing upon the key indicators that were relevant to the decision-making process helped the task of communicating complex

issues to the decision-makers (See Table 32). Crucially, decision-makers need to be involved in the process of defining viable alternatives and appreciating the implications of such decisions.

Table 31 Section of the M4 CAF Environmental Appraisal Table

Ref	Objective	Performance Indicator	Do Min	Transportation Options				Comment	Significance to Decision
				Public Transport	Traffic/Demand Management	Road Building	Hybrid		
THEME: ENVIRONMENT									
EO1	Traffic noise levels in the vicinity of the transportation network are minimised	Length of main transportation network with a change in noise levels		67 km net deterioration	129 km net improvement	4 km net improvement	81 km net improvement	M4 Relief Road and Newport Avoiding Line introduce new noise source in Gwent Levels a tranquil zone. Increased rail noise on Ebbw Vale/Hereford/Gloucester lines.	Moderate
EO2	Total greenhouse gas emissions from transport are minimised	Change in carbon dioxide emitted in the regional transportation model area	319 tonnes	- 4%	- 16%	+ 2%	- 8%	Rail emissions of CO ₂ are not considered in this assessment.	Moderate
EO3	Any increase in the acidification loading due to transport is minimised	Change in NO _x emitted in the regional transportation model area	1645 kg	- 2 %	- 7%	+2%	- 2%		Minor

Table 32 M4 South Wales Common Appraisal Framework Summary Table

Indicator	Objective	Road Building Scenario	Enhanced Public Transport Scenario	Traffic/Demand Management Scenario	Hybrid Scenario
Transport: Local Issues	Optimise local impact	43% reduction in M4 traffic. Minimal impact on Newport	6% reduction in M4 traffic. Small beneficial impact on Newport	77% reduction in M4 traffic. 11% increase in traffic in Newport	58% reduction in M4 traffic. 24% increase in traffic in Newport
Transport: Strategic Issues	Assist National Transport Objectives	Objectives not assisted	Assist these objectives	Neutral to objectives	Assists these objectives
Environment: Local Issues	Minimise adverse local impact	Local benefits to existing M4 corridor. Local adverse effects on the Gwent Levels	Improvement in local condition, but some areas deteriorate	Complex effects on local conditions, some improvement but adverse effects from traffic diversion	Complex effects on local conditions, some improvement but adverse effects from traffic diversion but less than T/DM
Environment: Strategic Issues	Minimise adverse strategic impact	Increase in CO ₂ emissions. Loss of 83 ha from SSSI	Reduced CO ₂ emission. 22 ha from SSSI	Large reduction in CO ₂ emissions No land take from SSSI	Reduced CO ₂ emissions. Loss of 1.2 ha from SSSI
Economic: Local Issues	Maximise traveller benefits	£440m	£1038m	-£3556m	-£464m
	Maximise accident savings	£56m	£83m	£241m	£74m
Economic: Strategic Issues	Maximise economic value (NPV)	£273	£1103	£549m	£1332m
Capital Cost of Scenarios * (undiscounted)					
Total **		£340m	£930m	£176m	£653m
Attributed		£340m	£255m	£176m	£129m

* The capital costs would be met from a variety of sources, and would, in some cases be off-set by revenue

** These costs are non-attributed and are likely to generate benefits elsewhere.

3.14. A69 Haltwhistle Bypass

3.14.1 INTRODUCTION

3.14.1.1 Nature of the Plan

The A69 Haltwhistle bypass is a 3.3km wide single carriageway road that entered the Trunk Road preparation pool in 1975 and was opened to the public in May 1997.

3.14.1.2 Role of the SEA

Assessments for project routing alternatives are regarded as project level EIA in the UK, since the decision has previously been taken that a road is the solution. In the UK, a SEA would be applied to the decision as to whether a road or another solution was appropriate. For the purposes of this exercise it is understood such assessments may be considered as SEA in Japan.

This type of assessment is termed a Stage 2 Assessment in accordance with the Design Manual for Roads and Bridges – Volume 11 Environmental Assessment and as such follows a relatively standardised approach. However, given the age of this proposal, the guidance at that time was the Manual for Environmental Appraisal and the key report to be produced was termed a Technical Appraisal Report. This was then subject to public consultation to inform the Minister of Transport on the preferred route.

3.14.1.3 Focus of this Case Study

The focus of this study is to illustrate how highway routing alignment issues are assessed in the UK.

3.14.2 BACKGROUND: CONTEXT AND ISSUES

3.14.2.1 Social and Environmental Setting

The settlement of Haltwhistle is situated on the main trunk road from Newcastle on the east coast of England to Carlisle on the west coast and is one of the few cross-country routes in the north of England. The road through the town is about 5.5 m wide making it extremely difficult for Heavy Goods Vehicles (HGV) traffic to pass. The footpaths are very narrow and properties abut directly without gardens. Traffic flows are about 10,000 AADT of which 2,200 are HGVs.

Haltwhistle is situated on the north side of the south Tyne Valley. To the west of the town is a wide glaciated valley with a stream that then joins the South Tyne in a floodplain. The embankment of a former railway and the Alston Arches Viaduct divides the South Tyne Valley at Haltwhistle. To the east the floodplain is dominated by post-war industrial development, while to the west it is primarily rural with isolated dwellings amongst which are historic buildings and protected land. The river, prone to flooding is a fishery, while the floodplain experiences elevated metal concentrations due to historic lead mining further up the valley.

3.14.2.2 SEA/Decision Making Process

Although historically, environmental issues played only a minor role in the engineering led process, the 1990 studies involved more environmental input in accordance with the Manual of Environmental Appraisal. As a result, the relationship between the assessment and the transport planning process was very close. Not only was the same consultancy company responsible for the assessment, transport planning and engineering design, but the guidance manual also required the exchange of information between engineers and those responsible for environmental issues.

The environmental manager was generally in attendance at internal management meetings and frequently involved in meetings with external organisations and the client.

3.14.2.3 Issues Material to the Case

Following a Technical Appraisal Report (TAR) prepared by Northumberland County Council in 1975, a public consultation was held in April 1978. In February 1982, the Minister announced that the outer southern route (the Green Route) was the preferred option. The Minister, however, indicated that no further work would be undertaken in view of the scheme's 'poor value for money'.

In 1987 a study was published that reviewed and updated the 1977 TAR, and to developed and appraised a further route (Orange) identified by the Department of Transport considered to be the only economic scheme. The public consultation exercise in 1988 exhibited a scheme that made use of land next to the railway, however, the rejected Green route received majority public support.

Following a topographic survey and ground investigation on the Orange route, engineering difficulties were identified and a new TAR was published in February 1989. Following publication of revised National Road Traffic Forecasts in 1989, these three routes were reviewed and after further public consultation early in 1990, the TAR was revised and re-published. The new TAR stated a preference for the Green south of Haltwhistle, which again received public support. The Green route was selected despite not being the economic choice to reflect the environmental benefits of traffic relief.

In 1992 the scheme design and environmental impact assessment was undertaken with the Environmental Statement being published in March 1993. A public exhibition was then held into the proposals and a public inquiry held in October 1994 under the Highways Act. The scheme was authorised in 1995 and construction commenced in April 1996.

The key issues associated with the project were:

- a) to provide environmental improvements to the residents of Haltwhistle without compromising the environmental qualities of the South Tyne Valley or its residents;
- b) to avoid increasing flood risk;
- c) to minimise visual intrusion; and
- d) to deal with areas of contaminated land.

One key constraint was an area of land that had been assigned to the National Trust as inalienable land and could not be acquired for the scheme in the ordinary way. The National Trust objected and generated an alternative alignment (the brown route) that was rejected at the public inquiry.

3.14.3 APPROACH AND METHODS USED

3.14.3.1 Information Assembly

At this stage detailed field surveys were not undertaken and readily available data sets were collected and reconnaissance surveys were undertaken. Using traffic data initial estimates of noise and air quality and public amenity issues were explored. During this period, no great attention was given to mitigation, although no such opportunities along with opportunities for enhancements are generally considered in the preferred route selection stage.

3.14.3.2 Development of Alternatives

Seven different alternative corridors were developed over the period from 1977 to 1989 (see A69 Alternatives.pdf). These were developed from an engineering perspective. Once the public view was accepted and the EIA commenced a further alternative within the same corridor was developed. Other

technical alternatives were developed to deal with the manner in which the bridges would increase the risk of flooding risk and affect the ecology of the river.

The alternatives explored during the several attempts at this project were generated by highway engineers without environmental input. This was not surprising during this period. Also unsurprising was the adverse public reaction such engineering led alternatives generated. During the actual EIA for the project, which followed the public's preference, the environmental team suggested making the scheme slightly longer to minimise the visual impact and minimise net environmental disturbance. This had the advantage of lowering scheme costs as it resulted in cheaper bridges. Even then at the public inquiry, a further alternative was generated by an objector to protect their interest, but it was straightforward to show that it was unacceptable on engineering, cost and environmental grounds.

3.13.3.3 Impact Analysis

The environmental impact assessment was undertaken in accordance with the Department of Transport's Manual on Environmental Assessment which was applicable at that time and addressed the following topics:

- | | |
|-------------------------|--|
| a) Policy framework; | h) Agricultural impact; |
| b) Traffic appraisal; | i) Cultural heritage; |
| c) Landscape impact; | j) Recreation and amenity; |
| d) Aquatic environment; | k) Contaminated land and waste disposal; |
| e) Noise; | l) Interaction and cumulative impacts. |
| f) Air quality; | |
| g) Nature conservation; | |

While some of the assessment topics are broadly examined in the same manner, the current Design Manual for Roads and Bridges Volume 11 provides a more streamlined structure to the application of different assessment tools and their data needs.

The EIA resulted in a realignment of the road in order to reduce visual intrusion by cutting through the former railway embankment at an angle and to exploit a river terrace. This resulted in the scheme being slightly longer but at a lower cost as the two bridges were then set at a less of an acute angle to the river. Various mitigation measures to deal with heritage, flood risk, visual intrusion and noise were also incorporated into the scheme.

The assessment of the alternative alignments was based upon readily available environmental information. This included the location of designated sites of recognised interest. Field reconnaissance surveys were undertaken. Table 33 provides a summary of the data that is collected at this stage in highway delivery.

Table 33 Typical Stage 2 Design Agent Consultations

Typical Stage 2 Design Agent Consultations ****		
Stage 2 Topics	Issue	DMRB Reference
Air Quality	No consultations	Volume 11 Part 1
Heritage	Confirm no new sites and whether further studies are needed	Volume 11 Part 2: 8.15
	Obtain English Heritage/CADW 'in confidence' views	Volume 11 Part 2:8.15&8.25
	Confirm no new listed buildings or designated areas and obtain 'in confidence' views of statutory bodies	Volume 11 Part 2: 13.9
	Discuss with Local Planning Authority the need to avoid archaeological or historic landscapes	Volume 11 Part 3: 3.5
Construction	Inform WRA*** about borrow and surplus fill and discuss with Local Planning Authority removal or treatment of toxic wastes	Volume 11 Part 3: 3.5
Nature Conservation	Check designation of new sites	Volume 11 Part 4: 7.7
	Confirmation absence of need for survey from relevant statutory body	Volume 11 Part 4: 7.7

	Report in-confidence views of the officers from statutory body on implications of route options on sites, areas or species of interest	Volume 11 Part 4: 7.8
Landscape	Confirm any new designations with Local Planning Authority	Volume 11 Part 5: 9.7
	Where Countryside Commission or CADW have an interest it is essential that they are consulted at the earliest stage	Volume 11 Part 5: Annex II 2
Land Use	Obtain information on the number of users of sites affected by land take	Volume 11 Part 6: 4.5
	Identify potential land take from areas designated by LPAs for future development and obtain in-confidence officer views	Volume 11 Part 6: 5.8
Agriculture	Obtain MAFF\WOAD views at early stage	Volume 11 Part 6: 10.7
Noise & Vibration	No consultations	Volume 11 Part 7:
Pedestrians etc	No consultations	Volume 11 Part 8:
Driver Stress	No consultations	Volume 11 Part 9:
Water Quality & Drainage	Confirm Stage 1 assessment with WRA* and identify most sensitive locations	Volume 11 Part 10: 6.7
	Consider views of River Authority** on design flood return period	Volume 4: Part 10:2.8
	Acceptable afflux should be decided in consultation with River Authority**	Volume 4: Part 10:2.12
	Consult British Waterways on canal navigation rights	Volume 11 Part 10: 2.5
Geology & Soils	Check with relevant body and LPA that they are not now designated sites or areas of contamination have been identified and confirm no further work needed with statutory body	Volume 11 Part 11: 7.7
Plans & Policies	Obtain LPs, UDPs Part II, Minerals and Waste Plans	Volume 11 Part 11: 4.8
	Obtain in confidence views of LPA officers	Volume 11 Part 11: 4.9

Note: * WRA - Water Regulatory Authority - The Environment Agency

** River Authority - The Environment Agency

*** WRA - Waste Regulatory Authority - The Environment Agency

**** Based on 1997 DMRB Volume 11

During the work for the EIA, extensive environmental surveys were undertaken on the ecological habitats, noise and landscape. Traffic data was used to forecast noise and air quality. That is related to the Stage 3 assessment activities in which the EIS is prepared. The word extensive was taken to imply that a wide range of survey were undertaken, including archaeological desk studies and detailed soil surveys and vegetation surveys.

3.14.3.4 Comparison of Alternatives

An evaluative framework was prepared to summarise the significant effects of the brown route. At the time of the assessment, the guidance required that reporting be set out in terms of the following topics:

- a) **Group 1: Travellers:** Time savings, vehicle operating costs, accident savings, driver stress, maintenance costs, pedestrian amenity, severance and safety.
- b) **Group 2: Local People and Their Communities:** Residential or commercial properties, farming, amenity space, demolished, noise, visual impact, severance, construction disturbance.
- c) **Group 3: Cultural and Natural Environment:** Heritage, nature conservation.
- d) **Group 4: Users of Facilities:** Retail, tourists, sports and recreation.
- e) **Group 5: Policies and Plans:** National, regional and local policies.
- f) **Group 6: Finance:** Scheme costs and benefits.

Hence the assessment of alternatives was undertaken in line with a structure defined in Highways Agency guidance (see attached file – HaltFram.doc).

Not being able to insert a table that presents the data for each alternative here, but it is prepared to support the public inquiry following preparation of the EIA. The structure of the table was defined by the government guidance and was a product of its time.

The analysis revealed a trade-off between the effects upon people from a noise, air quality and landscape perspective and the main advantage on heritage considerations of the brown route. This was considered a fine balance given the 60 properties involved affected by the brown route and the potential requirement for noise insulation measures on many of these.

The key trade-off was between alignments that increased the risk of noise, air quality and visual intrusion upon the residents of Haltwhistle as such alignments were closer to the settlement, and those that were more distant but which encroached into the river valley causing impacts associated with landscape, heritage, flood risk and pollution. As there was strong public support for a scheme that minimised noise and as the other impacts, could, to a degree be mitigated, there were no problems in making such trade-offs. The exception was that the preferred route required the acquisition of land that had been given to the nation and held by the National Trust. This conflict was a principal reason for the public inquiry that followed the EIS.

3.14.3.5 Public Participation

Extensive public involvement was involved with four separate public exhibitions and consultations periods on the alternative alignments.

3.14.3.6 Monitoring, Uncertainty and Cumulative Effects

Monitoring, uncertainty and cumulative effects were not addressed at this stage., but later in stage 3 of the highway planning process in which the Environmental Impact Statement and alignment details are examined. While the EIS provided such information, issues of implementation were not commonly considered at that time. Cumulative effects were considered through a matrix of environmental topics and locations experiencing multiple environmental impacts. Uncertainty was explicitly considered by the means of the residual effects tables which commented upon the probability of the anticipated impact arising.

3.14.4 RESULTS AND LESSONS

3.14.4.1 Contribution to Decision-Making

Accepting that in UK terminology this was not a SEA, the environmental assessment nevertheless provided crucial elements to inform public debate on the selection of the route. The key items of information at this point were the noise, air quality and landscape assessments.

3.14.4.2 Outcome

Even with an extensive examination of alternatives extending over many years, this did not prevent an alternative route being proposed during the public inquiry that required a rapid appraisal. Public opinion and environmental input was subsequently crucial in delivering the eventual scheme and were ultimately responsible for the adoption of a scheme that was more environmentally acceptable than the original proposal.

3.14.4.3 Conclusions for SEA Good Practice

This case study reveals the following key issues were responsible for the 22 years taken to deliver the scheme from the time that it entered the programme:

- a) Scheme economics conflicting with public aspirations;
- b) Repeated public participation exercises;

- c) Engineering constraints being investigated late;
- d) Changes to traffic forecasts affecting scheme economics.

A factor that contributed towards the eventual success of this project was the close involvement of environmental team within the engineering design team and recognition that the community desired a bypass rather than a cost-effecting online solution.

3.14.5 OTHER INFORMATION

Supporting files provide an aerial photograph of the area and the alternative alignments that were examined.

3.15. M6 WIDENING JUNCTIONS 11-16

3.15.1 INTRODUCTION

3.15.1.1 Nature of the Plan

This case study sets out the approach adopted to determine how to widen the existing 3-lane motorway to 4 or 5 lanes over a 52 km section passing through urban and rural areas between Birmingham and Manchester. The SEA was undertaken as an integral part of the transport study.

3.15.1.2 Role of the SEA

In England this form of assessment is not considered a Strategic Environmental Assessment, but a Stage 2 Environmental Assessment which is required on policy grounds to help assist the Minister of Transport in determining the best highway option to be subject to detailed design and a formal EIA.

3.15.1.3 Focus of this Case Study

The focus of the study is to show how the environmental assessment was instrumental in determining the preferred widening strategy for the motorway.

3.15.2 BACKGROUND: CONTEXT AND ISSUES

3.15.2.1 Social and Environmental Setting

The M6 between Junction 11-16 was constructed in the early to mid-1960's and is the strategic motorway route up the western side of England connecting Scotland, the North West to the Midlands, and then to London and the South East. The motorway currently carries between 90,000 and 100,000 vehicles per day. About 28% of that traffic is heavy goods vehicles and over half of all traffic is long distance traffic passing between Junction 11 and 16. Staffordshire Police receive 6,000 to 7,000 notifications of abnormal loads per year on M6, 20% of which receive police escorts. At peak hours, congestion occurs causing delay and increasing the risk of accidents.

Most of the land through which the M6 passes is improved agricultural land and is of low ecological value. Eighty ecological sites of county importance occur within 500m of the M6, but only 29 are within 10m of the motorway. Over half of the sites occur in five separate areas. Three sections of the motorway, equal to about 19 km, are devoid of recognised sites. Several protected species of animals and plants, as well as deer herds occur within the vicinity of the M6. Areas of archaeological, heritage, community value and of landscape interest are all represented along the motorway corridor.

3.15.2.2 SEA/Decision Making Process

In normal circumstances a Technical Appraisal Report (TAR) is prepared in which different corridors are evaluated. This exercise essentially focused upon differences within one corridor. The depth of the study needed to determine environmental differences between widening options is, therefore, at a resolution of tens of metres rather than hundreds of metres. This inevitably makes the task of environmental appraisal more complex.

The assessment followed a revised approach to that presented in the Design Manual for Roads and Bridges Volume 11, in order to determine the relative performance of the different options essentially occurring within the same corridor. As a result, a more detailed level of assessment was undertaken than normally the case for a Stage 2 Assessment.

The environmental assessment was an integral part of the decision-making process, particularly as transport economics and to a degree construction costs were not able to inform the choice of which side to widen. Hence environmental factors were crucial in determining how to widen the motorway.

3.15.2.3 Issues Material to the Case

None.

3.15.3 APPROACH AND METHODS USED

3.15.3.1 Information Assembly

In order to conduct this assessment, a corridor 500m either side of the motorway was selected in which information on environmental constraints were identified through consultations with the local authorities and statutory environmental bodies. While no detailed surveys were undertaken, reconnaissance surveys were performed to appreciate the environmental context of the M6 corridor.

3.15.3.2 Development of Alternatives

Widening of the motorway could be undertaken only by a limited number of means and hence to undertake the assessment the following assumptions were made regarding the land take required for each:

- a) Narrow Lanes: No land take;
- b) Symmetrical: No land take;
- c) Symmetrical: With land take up to 10-15m on each side;
- d) Asymmetrical: Up to 20m on one side or the other;
- e) Parallel: Up to 50m;
- f) Collector/distributor: Up to 50m on both sides, but with greater flexibility;
- g) Off line corridors: When parallel to the motorway, with a distance of 100m.

In order to examine the implications of the various options, the following assumptions were made:

- a) The narrow lanes option would have few effects on structures, earthworks, junctions or planting, as no extra land is required. It is assumed that extra land would be available for landscape treatments, restricting works to the corridor and off-site planting by agreement. As a result, the full benefits of an integrated design solution would not be achieved.
- b) The symmetrical with no land take option requires no additional land, but it has the disadvantage of removing existing screening vegetation on both sides of the motorway. It has been assumed that this option would result in retaining structures or steeper batter slopes.
- c) The symmetrical with extra land take option has the disadvantage of removing existing screening vegetation, but extra land take could provide opportunities for ameliorating the effect.
- d) Widening options involving land take on one or other side of the motorway, such as asymmetrical or parallel options, offer opportunities for the retention of environmental features and protection of important landscape elements or areas of high landscape value and adjacent settlements. The widened side of the motorway would offer opportunities for extensive landscape treatment and acoustic screening. In addition, surplus land arising from these options could provide opportunities for landscape and acoustic improvement, as well as the introduction of appropriate creative conservation measures. In some locations, however, increased land take could be a disadvantage, due to the increased scale of associated earthworks.

- e) The collector/distributor option would affect both sides of the motorway, and would not retain existing screen planting or avoid environmental constraints.
- f) Off line options away from the existing motorway would affect a new area which could have the disadvantage of disrupting the physical and visual environment. With careful design these effects could be minimised, but the effect on a high quality landscape would not be desirable. An off line route closely aligned to the existing motorway may have the disadvantage of isolating parcels of land and severing communities.

In addition to the decision on the type of widening, a decision was to be taken as to which side of the existing motorway widening should take place where parallel or asymmetrical options were proposed.

3.15.3.3 Selection of Issues and Indicators

The environmental characteristics examined during preparation of the TAR reflect only those aspects considered of importance to the selection of the widening options. A wider and more detailed examination of these and other issues was required during preparation of the Environmental Statement.

During the appraisal of the environmental effects of different widening options, the objective was to ensure that each topic was addressed in isolation in order to avoid double counting. The importance of individual topics also varied from one part of the M6 corridor to another.

The topics that were examined in accordance with Highways Agency guidance were:

- a) Planning and development policy framework;
- b) Land take from settlements and residential properties;
- c) Community and recreational facilities;
- d) Industrial and commercial properties;
- e) Landscape;
- f) Traffic noise;
- g) Nature conservation;
- h) Cultural heritage;
- i) Agriculture and forestry;
- j) Mineral resources and contaminated land;
- k) Aquatic resources;
- l) Environmental enhancement opportunities.

3.15.3.4 Impact Analysis

The assessment method employed a checklist of issues by which to structure the information assembly process. This assembly process was undertaken for a 500m zone either side of the motorway. Initially, details of protected sites, such as Sites of Special Scientific Interest (SSSI) were identified and an initial preference for widening was prepared. Following discussions with the consultees, further information on sites of local significance and a comprehension of the strategic development and environmental situation was gained. Site visits were also undertaken.

Using a defined set of significance criteria, the consequences of the different widening options upon individual sites and issues were assigned appropriate levels of significance. For example, the loss or partial loss of a SSSI was regarded as a severe effect, i.e. it is likely to threaten the viability of the widening options. Where doubt regarding the boundaries of sites existed, as in the case of archaeological resources, a buffer zone was employed. Further site surveys are under way to aid the detailed design process and preparation of the Environmental Statement.

The significance criteria adopted to assess the relative constraints to widening posed by landscape considerations was based on a measure of the change in physical and visual characteristics resulting from the different widening options. These criteria are presented in Table 34.

For each of the widening options the potential impacts were described and the significance assigned for sections of the corridor that were essentially defined by environmental and highway characteristics. Table 35 presents the manner in which the different impacts were reported.

Table 34 Landscape Significance Criteria

Significance	Criteria	
	Visual Effect	Physical Effect
None	No change to visual amenity envisaged.	No loss of vegetation or disruption of landscape topography
Minor	Some views of the M6, but no significant change to current level of intrusion.	Small loss of screening vegetation. Slight disruption of landform or increase in scale of earthworks. Level of visual intrusion or obstruction not increased.
Moderate	M6 constitutes an important landscape feature and widening options would result in increased intrusion.	Notable loss of screening vegetation, disturbance of hedgerows and woodland. Notable increase in disruption of landform and scale of earthworks, small diversions of major watercourses required. Increase in intrusion or obstruction. Some downgrading of the character of important landscape features.
Major	M6 constitutes a prominent landscape feature.	Notable loss of screening vegetation and disturbance of vegetation adjacent to motorway exposing areas of settlement and recreation to visual intrusion or obstruction. Significant disruption of landform, field pattern and townscape. Increase in scale of earthworks to form prominent landscape features. Long diversions of major watercourse required. General downgrading to character of important landscape features. Large increase in intrusion or obstruction in surrounding landscape.
Severe	Change in the landscape character of an area.	Introduction of major new landforms into the landscape. Irreversible downgrading or damage to character of important landscape features.

3.15.3.5 Comparison of Alternatives

Following an examination of the various environmental issues, a preferred widening option was identified for each topic based on the relative performance of the different widening options, although in some cases, there is little to choose between options. Through this exercise it was possible to identify conflicting environmental objectives. The relative trade-offs between such conflicting objectives were then explored.

Apart from providing a view on the preferred type of widening at particular locations, the environmental output also included a map illustrating the preference for the side on which widening should take place. Figure 7 illustrates the strength of preference for either southbound or northbound widening for each of the topics. From this figure it is evident that trade-offs were needed between different environmental topics.

As each environmental feature of importance that risked being affected had been identified and the significance of the likely effect judged according to a pre-defined set of significance criteria, the exercise of

evaluating the options was undertaken at two levels. The first was to split the 53km section of motorway under consideration into a series of sections that were broadly homogeneous from an environmental point of view. Motorway junctions were also locations where the motorway was broken into sections. Then for each environmental topic for each section each alternative was ranked in order of environmental performance. This essentially was the basis of the map illustrated in Figure 7. This map was then used as the basis for discussion amongst environmental and highway engineering experts. Other experts challenged each preference for a particular topic for an individual section, particularly where their preference differed. Through this process of challenge, the robustness of the preference could be explored and a decision at that location was made as to the type of widening.

Through this process we were able to arrive at a trade-off among environmental issues for individual sections, however, other trade-offs were needed across several adjacent sections as it was not possible for the engineer to accept frequent changes to the widening strategy due to issues of cost and road safety. To make these trade-offs, it was often necessary for those environmental experts responsible for particular topics to make difficult decisions in which they had to choose between protecting one feature within one section or another elsewhere. In difficult situations these decisions were made following discussions with the government environmental agencies.

3.15.3.6 Public Participation

The collection of information on environmental issues associated with the M6 widening has involved consultation with a wide variety of statutory consultees. Once the technical process of evaluation was completed, then public exhibitions were held at venues throughout the corridor at which the public could ask questions and express a preference for the type of widening.

3.15.3.7 Monitoring, Uncertainty and Cumulative Effects

There was no monitoring as the Minister for Transport was to determine which form of widening should be pursued with an EIA then being undertaken along with the design of the project.

Uncertainty was addressed by adopting various land take assumptions and through the use of buffer zones such as in the case of archaeology.

The cumulative effects upon a resource along sections of the motorway were examined in order to assist in determining which side gave rise to the least overall impacts, although in some cases this necessitated affecting a greater number of sites in order to protect others of greater value. At this stage of assessment, the cumulative effects simply noted the number of features, primarily ecological and heritage features that were affected along the length of the project. This analysis was considerably extended during the EIA for the preferred alternative.

3.15.4 RESULTS AND LESSONS

3.15.4.1 Contribution to Decision-Making

The environmental assessment was essential to the decision-making process in that it contributed to the selection of the overall preferred widening option (although traffic delay costs were a major factor). The environmental assessment was, however fundamental to the identification of those areas where parallel widening should not be undertaken and to the identification of the locations where widening should cross from northbound to southbound or visa versa. The results of the assessment were also made public and contributed to the support for the proposed approach to widening.

3.15.4.2 Outcome

In considering how to widen the motorway, a detailed assessment was made of the engineering and environmental constraints. Alternative methods of widening were then compared in terms of design standards, environmental effects, traffic disruption during construction and cost.

In August 1993, the Secretary of State announced his decision to widen the motorway to 4 lanes by parallel widening. Following extensive investigations, parallel widening was selected providing a dual 4-lane motorway by constructing a new and separate carriageway alongside the existing motorway. One of the existing carriageways is then modified to provide the second new carriageway. All existing overbridges would be demolished and replaced and underbridges widened, strengthened or replaced. Disruption and associated traffic delays are reduced to a minimum. Additional land would generally be required on one side of the motorway only and the choice of the widened side takes account of important engineering and environmental features, while providing for extensive landscape treatment and noise screens.

The main advantages of parallel widening are that the new 4 lane carriageways are moved away from large areas of housing and other sensitive sites creating space to provide new earthmounds, noise barriers and landscape planting to protect adjacent areas. It can also be constructed with minimal disruption to traffic, and greater safety to both motorway user and construction workers, although it needs more land than other options. Parallel widening also provides for part of the existing motorway to be kept as a service road for use by maintenance and emergency vehicles.

3.15.4.3 Conclusions for SEA Good Practice

The main conclusions to draw from this case study is the need to make environmental trade-offs that are robust and ultimately defensible at a public inquiry even though detailed design information is not available. Making assumptions explicit and adopting buffer zones where uncertainty was high, as in the case of archaeology is also a key conclusion.

Table 35 Effects on Physical Landscape: Topography Junction 11 - 12

	NARROW LANES	SYMMETRICAL NO LAND TAKE	SYMMETRICAL WITH LAND TAKE	ASSYMETRICAL SOUTH BOUND	PARALLEL	COLLECTOR/ DISTRIBUTOR	OFF LINE CORRIDOR SOUTH BOUND
Saredon Hill	NO EFFECT	Increase in angle of side slopes/possible retaining structures on both sides or increase in angle of cut. MINOR EFFECT	Increase in angle of side slopes/ possible retaining structures on both sides or increase in angle of cut. MINOR EFFECT	Increase in angle of side slopes/possible retaining structure on one side or increase in angle of cut. MINOR EFFECT	Extension of cutting into eastern side of hill widening the cutting. MODERATE EFFECT	Extension of cutting on both sides, widening of cut. MAJOR EFFECT	New cutting into hill with significant scar. SEVERE EFFECT
General	NO EFFECT	Possible increase in embankments and introduction of retaining walls. MODERATE EFFECT	Possible increase in embankments along lower lying areas. MINOR EFFECT	Possible increase in embankments along lower lying areas. MINOR EFFECT	Possible increase in embankments along lower lying areas. MINOR EFFECT	Possible increase in embankments along lower lying areas. MINOR EFFECT	Introduction of earthworks where none at present. MAJOR/ SEVERE EFFECT

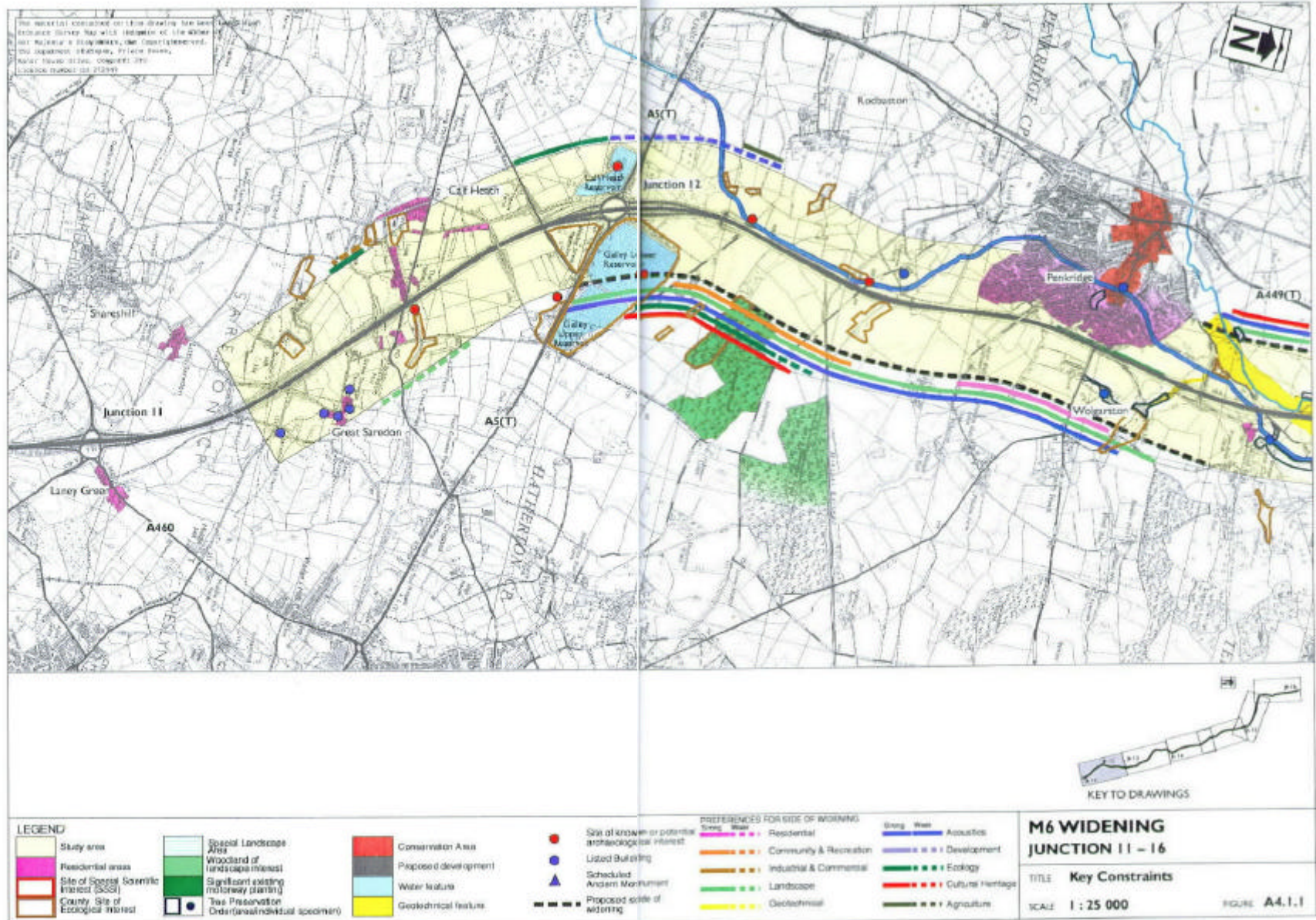


Figure 7 the strength of preference for either southbound or northbound widening

3.16. SOUTH WEST AREA MULTI-MODAL STUDY (SWARMMS)

3.16.1 INTRODUCTION

3.16.1.1 Nature of the Plan

In order to plan more effectively for the future of transport, the Government commissioned a series of major transport studies throughout England that examined current transport problems and issues, how these might change in the future, and what transport solutions might best address them. The largest of these studies is known as SWARMMS (London to the South West and South Wales Multi-Modal Study). Figure 8 shows the location of the plan area. It was commenced April 2000 and completed May 2002. And The SEA was integral to the plan making activity.

The overall aim of the study is to make recommendations for a long-term strategy to address passenger and freight transport needs within the M4/M5/A303/A30/A38 key transport corridors incorporating the parallel rail routes. This includes a plan of prioritised, specific interventions to address existing and predicted strategic transport problems in this area.

Figure 8 Location of the SWARMMS Plan Area (source: SWARMMS Newsletter)



3.16.1.2 Role of the SEA

A SEA process based on Government guidance (GOMMMS) was used throughout the study to:

- Assess four possible alternative strategies;
- Assess the emerging strategy and the final preferred strategy; and
- Assess detailed measures to deliver the strategy.

The SEA is part of an integrated approach that examines the traffic, economic, safety elements along with an integration theme that examines the extent to which interchange between transport modes is aided as well as the extent to which integration with other local and national objectives is achieved.

The SEA was essentially used to refine the alternative strategies and measures to ensure that the strategy selected would be the best in terms of solving the problems, meeting local objectives, reducing environmental impact and maximising economic opportunities in the area in a sustainable way.

3.16.1.3 Focus of this Case Study

The focus for this study is to show how a strategic transport study can be conducted in a large and environmentally complex study area. In particular, the study highlights a top-down approach to the formulation of transport solutions and their assessment. Other studies adopted a bottom-up approach.

3.16.2 BACKGROUND: CONTEXT AND ISSUES

3.16.2.1 Social and Environmental Setting

The study commences with an appreciation of the problems and issues facing transport in the study area. Some of the most important issues to emerge were:

- a) severance, noise and poor air quality caused by roads passing through or close to communities;
- b) The large designated areas of high environmental value and vulnerability;
- c) High accident rates on some single carriageway sections of the route corridors;
- d) Congestion on the trunk road network, particularly around the Greater Bristol area, Taunton, Exeter and Reading to M25 in the peak periods;
- e) Seasonal congestion on the main transport corridors to and from the South West;
- f) The peripherality of Devon and Cornwall;
- g) Unreliability of travel times, on both the road and rail networks;
- h) Lack of intermodal freight facilities;
- i) Low frequency of public transport services (away from the Bristol–London corridor).
- j) Difficulties in accessing main public transport networks particularly in rural areas;
- k) Poor levels of provision for walking and cycling, and for disabled people, in accessing the main transport corridors.
- l) Lack of connectivity between different travel modes, particularly bus/rail;
- m) Poor information and difficulties in achieving ‘seamless’ travel between different travel modes;
- n) That land use patterns accentuate dependence upon the car.

Geographically, the South West is the largest of the English regions, extending to almost 24,000 km² or approximately 15% of England’s land area. The region contains a rich diversity of both natural landscapes and those influenced by human activity, with some of the most beautiful and distinctive landscapes in the country. These range from high moorlands, heath and grasslands, and wooded valleys to limestone hills, deep gorges and rugged coastline. The area comprises:

- a) Two National Parks, Dartmoor and Exmoor, covering some 1,647 km² (7% of the region). The New Forest, a small part of which extends into the region, is also currently undergoing designation as a National Park.
- b) Twelve Areas of Outstanding Natural Beauty, and parts of two others, extend to 7,121 km² (30% of the region).
- c) 638 km of designated Heritage Coast, 61.3% of the total Heritage Coast in England.
- d) Four green belt areas covering some 1,056 km² (4% of the South West’s land area).

The South West also has a rich heritage of historic buildings, ancient monuments, boundary features and settlement patterns with two World Heritage sites, Stonehenge & Avebury and the historic spa city of Bath.

3.16.2.2 SEA/Decision Making Process

The study followed the guidance contained in GOMMMS (Guidance on Methodology for Multi Modal Studies, DETR, 2000). The overall SEA/decision making process is summarised in Figure 9.

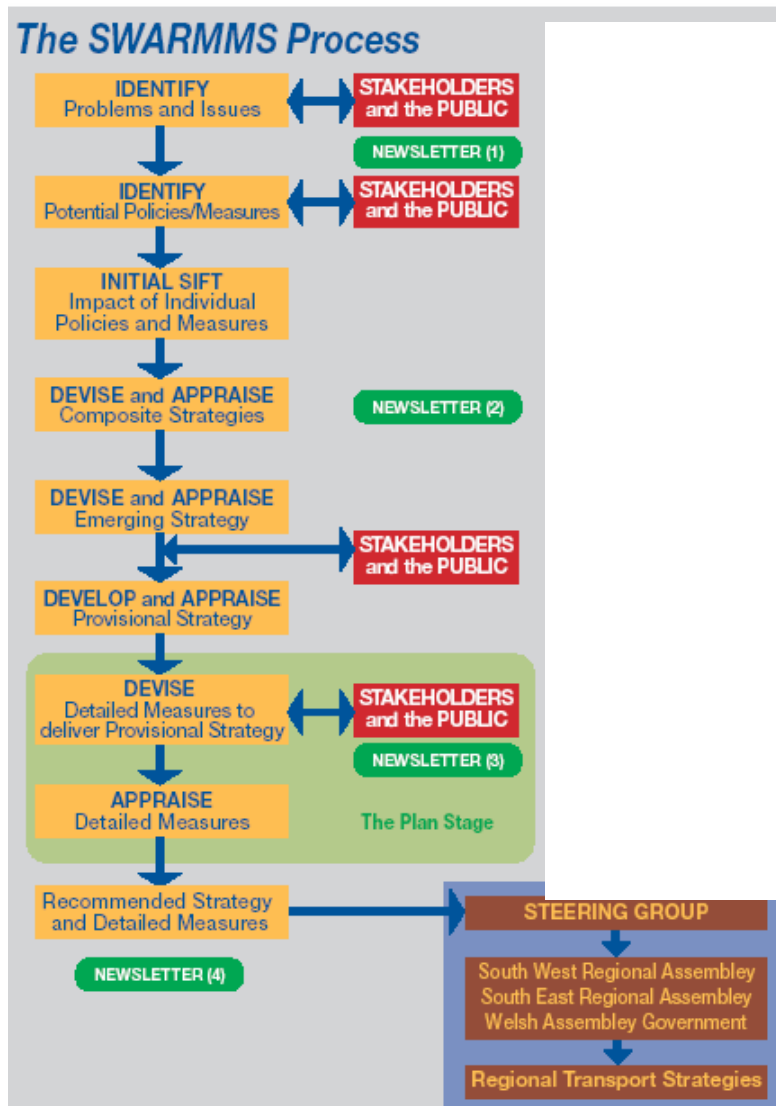


Figure 9 SWARMMS Assessment and Decision Making Process

(Source: SWARMMS Newsletter)

3.16.2.3 Issues Material to the Case

None.

3.16.3 APPROACH AND METHODS USED

3.16.3.1 Information Assembly

The SWARMMS consultants generally followed the guidance set out by the Department for Transport in the Guidance on Methodologies for Multi-Modal Studies with some adaptations to reflect the large size of the study area. Data was assembled primarily by bringing together existing data held by national and local government organisation. However, in relation to transport, it was necessary to obtain from transport operators and infrastructure providers details of the planned future operations. In addition, surveys were undertaken to update the data needed to construct the multi-modal transport model.

Environmental data was gathered from the local development plans which detailed areas of environmental protection and areas identified for future land use change. Information on nationally designated areas with environmental protection was obtained from the government environmental agencies, although many aspects of the information are also accessible from internet sites. For example flood risk maps are available on the Environment Agency web site.

(Details of the information assembly activities can be found in the following report CompositeStrategiesAppraisalTECHNOTE.pdf)

3.16.3.2 Development of Alternatives

The consultants choose to develop four Composite Strategies, each of which would be subject to assessment in order to aid the development of an the Emerging Strategy. Consequently the Composite Strategies were sufficiently different from one-another so that the relative merits of alternative approaches to addressing the study area's problems and issues could be examined. As each Composite Strategy needed to be a legitimate and holistic attempt at addressing the problems and issues, so each was multi-modal in approach, albeit with different elements.

The different Strategies are represented in Figure 10, while Table 36 provides a summary of the relative contribution of different measures to each strategy.

The study did not consider the no action alternative as the alternative strategies that were examined were generated as a result of consultations with stakeholders. The stakeholder identified the type of transport measures that they thought would contribute to the resolution of the problem, the task was to group these into various strategies. The consultants choose the themes that are presented in Figure 10, however it was possible for the consultants to characterise the strategies according to other criteria such as cost or in terms of whether they deliver a specific objective e.g. economic development or tourist development etc.

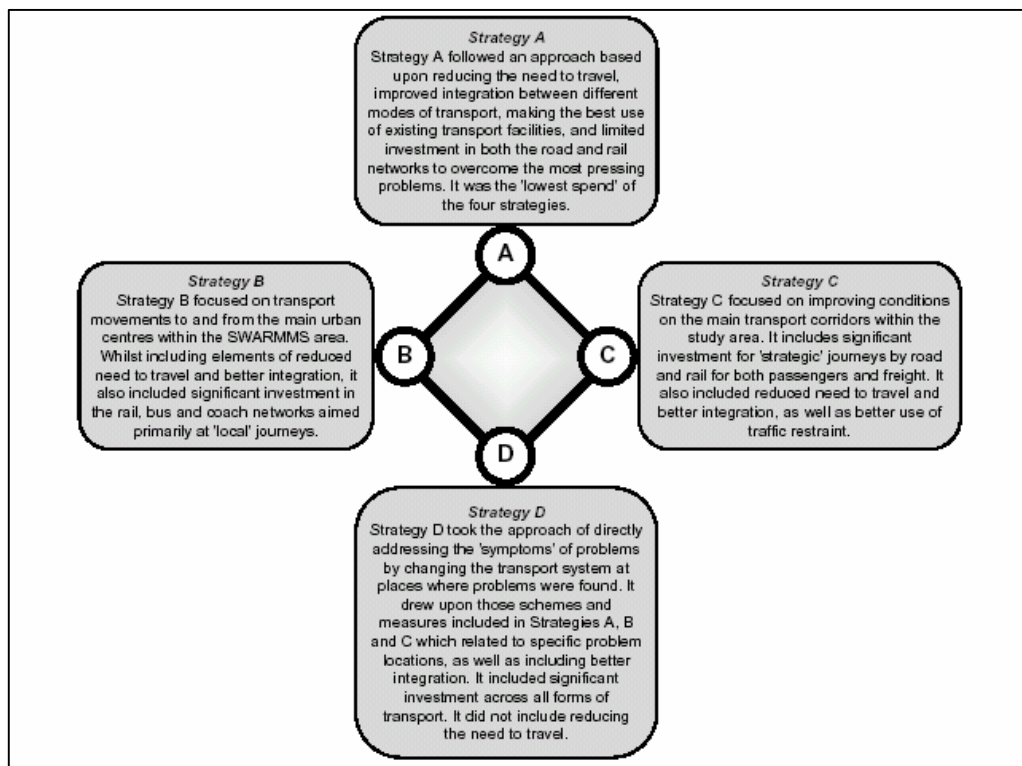


Figure 10 SWARMMS Composite Strategies (source: SWARMMS Newsletter)

Following comments a Preferred Strategy was constructed and then a series of detailed measures identified that would be needed to deliver the Preferred Strategy. This was termed the Plan Stage and involved the definition of the earlier assumptions used in the Composite Strategy appraisal, demonstrating feasibility, priorities as well the measures and policies to be recommended.

Table 36 Contributions of Different Measures to the Composite Strategies

Measures	Strategy A	Strategy B	Strategy C	Strategy D
Changing Travel Demand	***	**	**	-
Integration measures	***	**	**	**
Next Generation Developments	**	**	**	*
Local Action	**	***	*	**
Demand Management	**	*	**	**
PT Rail	*	**	***	***
PT Coach	**	*	***	***
Highway Schemes	*	*	**	***
Freight	*	*	***	***
Tourism measures	*	*	**	**
Airport and Air Services	*	*	**	**

Key

- *** Major component of strategy
- ** Significant supporting component of strategy
- * Minor component of strategy

The Preferred Strategy represented the consultant's recommendations on the structure and content of the transport measures based around the following themes:

- a) Reducing the need to travel;
- b) Better integration for public transport;
- c) Promote use of public transport to/from main urban areas;
- d) Traffic restraint within main urban areas;
- e) New road and rail infrastructure;
- f) Provide more opportunities to travel by rail;
- g) More opportunity for freight to use rail;
- h) Improve coach and express bus networks and facilities;
- i) Demand responsive public transport in rural areas;
- j) Smarter use of existing roads;
- k) Local road safety and other measures;
- l) Expand air and sea networks; and
- m) Specific measures to assist tourism.

3.16.3.3 Selection of Issues and Indicators

The issues and indicators used in the assessment were in the main derived from the guidance set out in GOMMMS, however, the consultants varied some of the indicators or the manner in which they were assembled in order to reflect the characteristics of the study area. The issues for which assessments were made comprised:

- a) Noise;
- b) Local air quality;
- c) Greenhouse gases;
- d) Landscape;
- e) Townscape;
- f) Heritage of historic resources;
- g) Biodiversity;
- h) Water environment;
- i) Physical fitness; and
- j) Journey ambience (pleasantness).

As the studies were designed to identify the preferred strategy needed to address existing and emerging transport problems, neither the no action alternative or a business as usual alternative were acceptable as a way forward. Hence these alternatives did not feature in the SEA.

3.16.3.4 Impact Analysis

Some of the impacts are predicted in a quantitative manner while others are based more on descriptions and expert judgement. For example noise, air quality and greenhouse gases can be predicted in a numerical way using forecast changes in traffic flow. Others such as landscape, heritage and townscape are more subjective and are predicted in a more descriptive qualitative way by the relevant experts aided by consultation with the statutory environmental bodies.

In performing the impact analysis, a series of assumptions were made relating to specific schemes and measures (such as locations of new railway stations and associated train services). This was necessary to feed into the modelling tools and appraisal methodologies as a representation of the composite strategies that the technical processes can assimilate. The Composite Strategies Appraisal Technical Note makes available to the public details of the assessment techniques employed by the consultants. This not only presents an overview of the environmental assessment method, but also economic, safety, economy, accessibility and integration assessments.

(The methods adopted in the impact analysis are detailed in the following report: CompositeStrategiesAppraisalTECHNOTE.pdf.)

3.16.3.5 Comparison of Alternatives

Following an assessment of the relative performance of the Composite Strategies, the relative performance of each strategy against the Government's objectives for transport was assessed from a technical perspective and then reported to the public and decision-makers for review (see: Emerging Strategy.pdf).

Reporting of the results was undertaken in accordance with the guidance presented in GOMMMS which comprises four elements:

- a) The **Appraisal Summary Table** (AST) - This analyses the degree to which the five Central Government objectives for transport (environment, safety, economy, accessibility and integration) would be achieved.

The Environment objective identified within GOMMMS is concerned with protecting the natural and built environment, by seeking to reduce the direct and indirect impacts of transport facilities and their use on the environment of both users and non-users. Ten sub objectives are considered, namely:

- Noise;
- Local Air Quality;
- Greenhouse Gases;
- Landscape;
- Townscape;
- Heritage of Historic Resources;
- Biodiversity;
- Water Environment;
- Physical Fitness; and
- Journey Ambience.

- b) An assessment of the degree to which the **local and regional objectives** would be achieved.
- c) An assessment of the extent to which the **problems** identified would be ameliorated.
- d) **Supporting analyses** of distribution and equity, affordability and financial sustainability, and practicality and public acceptability.

Appendix 1 shows the completed AST for the preferred strategy.

Each of the methods presented for the individual topics involved a series of steps. For example, in the case of noise, for each transport link within the multi-modal modal the difference in the average noise emission was calculated by a simplified calculation procedure based upon traffic characteristics. These changes were then related to the population likely to be exposed and hence the population likely to be annoyed was calculated for both rail and road transport. However, no attempt was made to explore the extent to which mitigation measures could be applied to reduce such impacts.

It is worth recognising that often the purpose of assessment within SEA is to compare alternative strategies and hence the focus of interest is in their relative performance rather than their absolute

performance against external factors. This makes the task of prediction and assessment considerably easier.

Weighting: The general approach is that weights are the domain of elected politicians rather than consultants, hence the results are presented without weighting. However, the consultants may employ sensitivity testing in which for confidential analysis, they seek to determine whether the answer would change if different weights were assigned. In this way it is possible to indicate to the decision makers which factors likely to be important in the decision. There is no evidence that factors were weighted in the SWARMMS report that are in the public domain.

Significance Score: The government guidance on methodologies for multi-modal studies requires that the magnitude of the impact be translated into a 7 or 8 point score to reflect the significance of the impact. The objective is then to ensure that there is some consistency in not only the assessment across the different topics, but also that there is a consistency across the multi-modal studies. Details of the significance criteria can be found in the guidance manual available on the Department of Transport web site (www.dft.gov.uk).

3.16.3.6 Public Participation

As indicated by Figure 10 above, the study was accompanied by extensive opportunities for public involvement. Not only were four newsletters produced, but also public questionnaires and exhibitions were held across the study area, all supported by a study website. In addition a series of topic based meetings and discussions with local authorities were also undertaken. A report detailing the consultation process associated with the problems and issues stage illustrates the approach adopted (*see [ConsultationReport.pdf](#)*).

3.16.3.7 Monitoring, Uncertainty and Cumulative Effects

There were no proposals made for the environmental monitoring of the predictions made in the SEA.

A series of “what if” tests were also undertaken to address issues associated with the key decisions to be taken by Ministers and the Regional Assemblies, but no other explicit approach was adopted to deal with uncertainty. As noted above, it is expected that sensitivity tests were applied to the transport model and to other quantified elements of the assessment. However, this is often an internal technical exercise rather than one made public. Details of the SWARMMS sensitivity testing are not readily available.

Cumulative effects were considered in a subjective manner in that a significance score was assigned to reflect the overall impact of the measures within each of the composite strategies as well as in the preferred strategy. No guidance was available to enable an assessment of the cumulative effects of different impacts occurring on at the same location or on particular social groups. No explicit consideration of cumulative effects was presented in the reporting of the assessment undertaken by the consultants. However given that it was necessary to report a single assessment score for each topic for individual transport measures that in reality would give rise to a wide range of impacts, there was at least some implicit view on the overall environmental performance of individual transport measures. It was also necessary too report the impact of each strategy which themselves were a summary of the impacts of their component transport measures. This aspect is one of the key areas where the SEA was not particularly transparent and improved guidance is needed.

3.16.4 RESULTS AND LESSONS

3.16.4.1 Contribution to Decision-Making

The SEA contributed throughout the process. It was used to appraise alternative strategies and also appraise the final strategy and proposals. This led to the emergence of several environmentally positive strands of the final strategy including:

- a) Reducing the need to travel;
- b) Integrating public transport;
- c) Promoting the use of public transport;
- d) More rail travel, better stations, services, rolling stock, etc;
- e) More freight facilities – less main road HGV traffic, but could be some concentrated HGV traffic around depots;
- f) Improved coach facilities – which could remove some car traffic;
- g) Demand responsive public transport in rural areas – which could have a very beneficial impact on rural communities; and
- h) Specific measures to assist tourism.

3.16.4.2 Outcome

The SWARMMS study was dealing with some particularly sensitive transport/environment problems none more than the proposed dualling of the A303 through the Blackdown Hills Area of Outstanding Natural Beauty. Among the statutory environmental bodies there was a view that despite consultation opportunities that were frequently tightly constrained, there was little evidence that their views had been taken onboard by the consultants, although they did propose a further study to address an alternative for the A303 problem.

As a result of the sensitive environmental conditions, the statutory environmental bodies commissioned consultants to review the SWARMMS reports and these were made available as additional evidence to the South West Regional Assembly. The key messages that the statutory environmental bodies presented included:

- a) A lack of linkage between the transport measures and other strategies and policies, particularly those associated with land use;
- b) Options are not adequately explored some being dismissed without supporting evidence;
- c) An inadequate assessment of environmental impacts with a questionable assumptions and assessment scores;
- d) Lack of consideration of the ability of mitigation measures to resolve existing problems and the impacts caused by the proposed measures;
- e) Lack of evidence to support the view that road improvements would deliver increased economic benefits, while the trade-off between real environmental resources and potential economic benefits are not explored;
- f) Lack of importance given to nationally important environmental resources.

Despite these comments and the existence of an alternative to the A303 problem, the South West Regional Assembly determined not to accept the consultants recommendations. Instead they

recommended to Government that two of the highway projects with major environmental constraints be dualled. A decision by the Government is awaited.

3.16.4.3 Conclusions for SEA Good Practice

The main positive points of the GOMMMS process as used by SWARMMS are:

- a) That problems and issues to be tackled by the strategy are clearly identified. The assessors then must report how the suggested strategy solves these problems;
- b) That local objectives taking account of the problems and issues and also the objectives of other plans and organisations;
- c) That an assessment of alternatives is delivered that assists with the selection of individual measures;
- d) That worksheets aid transparency;
- e) That the AST assists in the presentation of the issues; and
- f) Opportunities are provided for the involvement of the public and environmental bodies so that the study is aware of the variety of views that exist.

However, there are some elements of the process that could be strengthened.

- a) There was a lack of transparency as to how the problems, issues and the local objectives linked to the alternative strategies and how the alternative strategies were developed.
- b) Some of the problems and issues are presented in a very general way and little concrete evidence is given to highlight some of the problems.
- c) The allocation and aggregation of scores within topics is unclear. There has been improved government guidance on this issues since the production of SWARMMS (DTLR, 2002).

3.16.5 REFERENCES

- DETR (March 2000): Guidance on the Methodology for Multi Modal Studies.
<http://www.dft.gov.uk/itwp/mms/index.htm>
- DTLR (2002): GOMMMS Supplement - Accumulating Environmental Impacts.
<http://www.roads.dft.gov.uk/roadnetwork/heta/aeimpact/index.htm>
- All SWARMMS documents can be found on the internet at <http://www.swarmms.org.uk>

Option: Halcrow Interim Preferred Strategy (HIPS) - Sub-option 2: A303/A30 Dualling		Description: Balanced strategy initiatives covering the study area for SWARMMS (see Ch.1 Introduction to HIPS Appraisal Report)	Problems: see Ch.1 Introduction to HIPS Appraisal Report	Present Value Cost To Government £M
OBJECTIVE	SUB- OBJECTIVE	QUALITATIVE IMPACTS	QUANTITATIVE MEASURE	ASSESSMENT
ENVIRONMENT	Noise	In 15th year: 33 zones 'losers'; 37 zones 'winners' Indicates benefits and disbenefits are spread across the region	Change in estimated population annoyed in 15th year with Strategy compared with present Do Minimum: +10974	Change in estimated population annoyed in 15th year with Strategy compared with future Do Minimum: +8567
	Local Air Quality	With regard to NO2, 7 of the winning zones but 1 of the losing zones have existing air quality problems (indicated by declared Air Quality Management Area status). Thus the benefit of the strategy is more than suggested by the AST scores. With regard to PM10, 7 of the winning zones and none of the losing zones have existing air quality problems (Air Quality Management Area). Thus the benefit of the strategy is more than suggested by the AST scores. LAQ includes rail and road emissions.	NO2: 65 zones 'winners' NO2: 7 zones 'losers' NO2: 0 zone no change PM10: 66 zones 'winners' PM10: 4 zones 'losers' PM10: 2 zones no change	Emissions Estimate NO2: -22,762,400 Emissions Estimate PM10: -1,544,249
	Greenhouse Gases	Includes both rail and road emissions	68 zones with decrease 4 zones with increase 0 zones with no change	Reduction of 1,741,568 tonnes of CO2 per year (-9.3%)
	Landscape	The landscape of the Blackdown Hills AONB will be substantially damaged, and the AONBs of Cranbourne Chase and West Wiltshire Downs, and Bodmin Moor will also be damaged. Highway schemes along the A358 and A303 in Wiltshire and Somerset, the A30 in Cornwall, and the M5 around Exeter, would be visually intrusive and will adversely impact on the landscape.		Moderate Adverse (Negative) Impact
	Townscape	Minor negative impact on the parts of the townscape resource within the study corridor. Where a scheme would impact upon the setting of several conservation areas (e.g.A303 between Sparkford and Ilchester), it would result in a slight adverse impact. Certain elements of the strategy will have positive benefits on the townscape of villages, where new road alignments now bypass their location, for example to Chicklade.		Slight Adverse Impact
	Heritage of Historic Resources	Moderate negative impact on elements of the cultural heritage resource. The historic landscape of the Cranbourne Chase and West Wiltshire Downs, the Blackdown Hills, Bodmin Moor, and the mid Cornwall landscape. Potentially around 50 Scheduled Ancient Monuments(SAMs). Potentially direct and indirect impacts on heritage assets of county and local importance. County designated sites of High Archaeological Potential may be compromised between Ilminster and Marsh (A303), particularly between Marsh and Honiton. There are positive benefits to listed buildings, where new road alignments bypass their location, e.g. A303 Chicklade to Mere and A303 Monkton between Marsh and Honiton.		Large Negative Impact
	Biodiversity	Very serious negative impact on areas of biodiversity within the study corridor - potentially indirect impacts on two internationally important biodiversity sites. Newlyn Downs SAC and Exe Estuary SPA/Ramsar Site, from highway improvements on the A39 and the M5 Junction 30 to 31. At least ten Sites of Special Scientific Importance will be adversely affected by highway schemes. Impacts on approx 50 County Wildlife Sites. A303 Ilminster to Honiton will have direct impacts on County Wildlife Sites bordering the existing carriageway. Whilst not designated, there is an abundance of valuable hedgerows and woodland adjacent to road schemes, which would be destroyed by online improvements.		Very Serious Adverse (Negative) Impact
	Water Environment	Overall impacts generally remain localised with, in many cases, the opportunity for mitigation. Road and rail developments following existing routes may provide opportunities for benefits (positive impacts) through the introduction of, for example, modern drainage practices. Movement of freight from road to rail may reduce pollution potential from accidental spillage.		Insignificant Impact
	Physical Fitness	Aims to reduce growth of traffic and substantially improve public transport services which could either increase or decrease physical fitness depending on the activities which are substituted for car travel and replaced by public transport usage. If cycling, walking or other physical activity increases this could be positive but the effect of the Strategy on 'Physical Fitness' remains unclear.		Uncertain Impact
	Journey Ambience	Some benefits to journey ambience in terms of improving integration, implementation of next generation factors and local schemes. Greater improvements to public transport will improve 'Traveller Care'. The new roads (assuming well-designed) and traffic management will also reduce traveller stress. Reduction of HGV volumes will also reduce stress and fear of accidents.		Large Beneficial Impact
SAFETY	Accidents	Significant accident savings associated with reduced highway demand and new highway infrastructure (greater than sub-option 1).	Savings: Fatal 149 Serious 884 Slight 3510	PVB £157M
	Security	The provision of help points, lighting and CCTV at unstaffed interchanges will help to improve personal security. Easing of traffic congestion at key points in the study area as a result of the strategy will reduce the fear of crime and the vulnerability of car users.		Moderate Beneficial Impact
ECONOMY	Transport Economic Efficiency	Excludes impact of additional rail passenger fare revenue and potential public sector income arising from fiscal traffic restraint measures.		User Benefits: NPV £M Private Providers: NPV -£M Public Providers: NPV -£M Other Government: NPV -£M
	Reliability	Improvements to the strategic highway network, demand management proposals, measures to encourage a mode shift from car to public transport and social changes would enhance capacity and restrict demand, thus improving journey time reliability. Proposals for new rail services and stations matched by increase in track/signalling capacity to enable more robust rail operations.		Moderate Beneficial Impact
	Wider Economic Impacts	The strategy enhances the strategic rail and road links between the regeneration zones within the study area (Cornwall and parts of Devon) and the rest of the country, which assists with overcoming peripherality.		Positive Impact
ACCESSIBILITY	Option Values	Assumption of up to ten new rail stations provides strong beneficial effects at the local level for each station, and combined will provide overall study area wide opportunities, similarly for re-instatement of passenger rail services.		Moderate Beneficial Impact
	Severance	Provides direct relief from existing severance for around 950 people. Other places will experience increases in severance as a result of road upgrade to dual carriageway standard. However, these impacts are considered to be slight given that they pass through rural areas and pedestrian movement is likely to be low.		Moderate Beneficial Impact
	Access to the Transport System	Major effects associated with introduction of demand responsive public transport feeder services and new stations.	Do Min Access Index: 73 Strategy Access Index: 98	Large Beneficial Impact
INTEGRATION	Transport Interchange	The upgrading of existing interchanges, improved information for all travellers and coach network upgrades will provide a moderate beneficial impact to all interchanges in the study area. Similarly for freight facilities.		Moderate Beneficial Impact

	Land-Use Policy	Performs well against national and regional guidance, as well as LTPs and Structure Plans		Positive
	Other Government Policies	Consistent with policies relating to competitiveness, tourism and access to employment opportunity. Changing travel demand and modal shift to public transport & slower modes has positive implications for the protection of agricultural assets, air quality, and neighbourhood renewal.		Positive

PUBLIC INQUIRY FRAMEWORK: PREFERRED ROUTE AND DO-NOTHING

GROUP 1: TRAVELLERS			PREFERRED ROUTE		NATIONAL TRUST		COMMENTS
SUB GROUP	EFFECT	UNIT	High	Low	High	Low	
Car Users	Time savings	£m (PVB)	3.986	2.365	4.436	2.628	Present value of benefits (PVB) are for the period 1997-2028 and are discounted at 8% pa to 1988, at 1988 prices Figures based on 1993 traffic flows and 1988-1992 accident data
	Vehicle operating cost savings	£m (PVB)	0.099	0.084	-0.037	-0.054	
Users of Light Goods Vehicles	Time savings	£m (PVB)	1.077	0.588	1.199	0.654	
	Vehicle operating cost savings	£m (PVB)	0.025	0.018	-0.016	-0.020	
Users of other Goods Vehicles	Time savings	£m (PVB)	1.390	0.774	1.541	0.859	
	Vehicle operating cost savings	£m (PVB)	0.074	0.038	-0.152	-0.200	
Bus operators	Time savings	£m (PVB)	0.235	0.163	0.259	0.181	
	Vehicle operating cost savings	£m (PVB)	0.006	0.006	-0.003	-0.004	
All vehicle travellers	Value of accident savings	£m (PVB)	0.369	0.096	0.649	0.249	
	Reduction in casualties:-						
	Fatal	number	1	0	2	1	
	Serious	number	20	10	28	15	
	Slight	number	118	82	141	98	
	Driver Stress			Low		Low	
View from the road			Agricultural/Commercial		Agricultural/Commercial/ Residential		
Maintenance	£m (PVB)		0	0	0	0	Figures assume typical durations for future maintenance activities

GROUP 1: (continued) TRAVELLERS			PREFERRED ROUTE		NATIONAL TRUST		COMMENTS
SUB GROUP	EFFECT	UNIT	High	Low	High	Low	
Pedestrians and Equestrians	Change in amenity	Reduction in Traffic on Tyne View Road	Substantial relief for approx 80 properties fronting Tyne View Road, and some relief for 30 further properties		Substantial relief for approx 80 properties fronting Tyne View Road, and some relief for 30 further properties		Both routes remove through traffic. National Trust route removes more local traffic
	Safety		Removal of heavy goods traffic and other vehicles will improve safety		Removal of heavy goods traffic and other vehicles will improve safety		Particular locations for accidents include Tyne View and the Station area. National Trust route removes more local traffic from Tyne View
	Severance (New)		Diversion on 3 Rights of Way and one informal footpath. One footpath (PF25) will cross the bypass. Bridleway severed and new created on other side of river		One right of way affected		

GROUP 2: LOCAL PEOPLE AND THEIR COMMUNITIES

SUB GROUP	EFFECT	UNITS	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
Residential	Properties demolished	Number	0	0	
	Noise dB(A) L10, 18hr	Number of properties experiencing an increase of more than 3 < 5 5 < 10 10 < 15 > 15	23 4 3 2		The changes in noise are the difference between the forecast for 2011 and the 1996 levels. The units are in dB(A)L10 18hr (6am - midnight)
		Number of properties experiencing a decrease of 3 < 5 5 < 10 10 < 15	150-200 122 0		
	Visual Impact	Number of properties subject to: High Medium Low	3 8 6	(1992 NT Alternative) 14 56	Main intrusion of the Preferred Route is to Bellister Lodge, Highfield and Wollen Mills Farm. NT route have severe impact on Bellister Haugh, Castle Glen and properties fronting the river, Tyne View and Eden Lawn
	Severance (a) Relief to existing severance (b) Imposition of new severance			Substantial Slight	
	Disruption during construction			Minor	Minor

GROUP 2 Continued: LOCAL PEOPLE AND THEIR COMMUNITIES				
SUB GROUP	EFFECT	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
Commercial Premises	Properties Number demolished within 25m	0 Paint Works	Petrol Station 0	Loss of amenities for West bound traffic
	Number subject to noise increase of more than 5dB(A)L10	0	0	
	Number subject to noise decrease of more than 5dB(A)L10	0	0	
	Visual Impact: Number of properties within 300m of centreline subject to; High Medium Low	0 0 0	0 0 0	
	Severance a) Relief to existing severance b) Imposition of new severance	0 0		
	Disruption during construction	0	0	

GROUP 2 Continued: LOCAL PEOPLE AND THEIR COMMUNITIES				
SUB GROUP	EFFECT	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
Farming	Number of farms affected by landtake	3	0	
	Hectares of land: Grade 1 Grade 2 Grade 3A Grade 3B Grade 4	0.0 2.8 2.9 0.2 13.2	0 1.1 5.3 3.3 5.0	Based on MAFF land classification
Open Space a) Haltwhistle Football Ground	Hectares of land	0.7	No effect	Effect on users appears in Group 4 Pitch relocated
	b) Haltwhistle Cricket Ground	0.4	No effect	Effect on users appears in Group 4
	c) Allotments	0	0.003	

GROUP 3: THE CULTURAL AND NATURAL ENVIRONMENT				
SUB GROUP	EFFECT	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
Heritage a) Bellister Castle	Noise	Increase of 5dB(A) at east facade	No change	For note on noise see Group 1
	Severance	No effect	No effect	
	Visual Impact	Intrusion on setting	Intrusion on setting Landscape measures including false embankment and drystone wall proposed	Preferred route passes within 200m, National Trust route within 300m
b) National Trust Land	Land take (hectares) Alienable Inalienable	7.9 0 7.9	2.8 2.3 0.5	National Trust land is designated as inalienable which implies that the National Trust is the sole occupier and user of that land
c) Alston Viaduct	Visual Impact	Intrusion on setting from cutting of embankment and new bridge	Intrusion to views to NW	Cutting of embankment undertaken in sensitive manner and new bridge as at a low level
d) Conservation Area	Visual Impact	0	1	Visual inspection
e) Known Archaeological Sites	Number affected within 50m	1	1	Required during topsoil stripping
Nature Conservation a) Loss of habitat	Landtake from locally important habitat	✂ 0.1ha of hay meadow lost at Cricket Ground ✂ 2.0ha of unimproved pasture lost at 4 other sites ✂ Individual metallophytes along line of route directly affected	Adverse effect due to proximity to Tipalt Burn Loss of metal tolerant plants	Relocation of turves from hay meadow and translocation of plants proposed
	b) River South Tyne	Sedimentation of gravel areas used by sea trout and salmon	Low risk of disturbance to fisheries and release of contaminated sediments during construction	Low risk of disturbance to fisheries and release of contaminated sediments during construction Construction works would be undertaken to satisfaction of NRA

GROUP 4: USERS OF FACILITIES			
SUB GROUP: Users of:-	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
a) Town Centre Shops	Reduction in volume of through traffic in town centre	Reduction in volume of through traffic in town centre	Passing trade may be reduced but improved amenity may increase attractiveness of town to tourists. National Trust route provides easier access via Lanty's Lonnen
b) Bellister Castle Number of visitors	Reduction in amenity of castle	No change	Access to Bellister Castle restricted Special arrangements required for entry
c) Haltwhistle Cricket Ground Number of users?	Encroachment on site causing reorganisation	No change	Possible extension to cricket field required
d) Haltwhistle Football Ground	Severance of part of ground	No change	Relocation of pitches required
e) Haltwhistle Cemetery	Noise levels at south will not exceed those at north site	Noise levels at south will not exceed those at north site	Planting proposed along southern boundary of cemetery National Trust route passes 50m closer
f) Caravan Park	No significant change anticipated	No change	
g) River South Tyne	Route crosses River twice	Route crosses River twice	Footpath No.46 and other informal footways diverted under river bridges
h) Allotments	Planting proposed along southern boundary of the allotments National Trust route affects setting and air quality	Land take ha Access unaltered	

GROUP 5: POLICIES AND PLANS					
POLICY	AUTHORITY	INTEREST	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
1. National Roads, England 1989	Department of Transport	To assist economic recovery	Complies with policy	Complies with policy	National Trust route has increased economic return
2. National Roads, England 1989	Department of Transport	To relieve towns and villages of unnecessary traffic	Complies with policy	Complies with policy	National Trust removes more traffic from west end of town
3. National Roads, England 1989	Department of Transport	To reduce accidents	Complies with policy		National Trust route has greater reduction
4. Structure Plan Policy number T3	Northumberland CC	Proposes the improvement of the A69 at Haltwhistle	Complies with Policy T3 and would result in significant improvement at Haltwhistle	Complies with Policy T3 and would result in significant improvement at Haltwhistle	
5. Structure Plan (consultative draft) Policy number T15	Northumberland CC	Urges upgrading of the A69 and recommends that a Bypass be constructed at an early date	Complies with Policy T15 and would result in significant improvement at Haltwhistle	Complies with Policy T15 and would result in significant improvement at Haltwhistle	Contract duration the same for both schemes. Preferred route design is further advanced
6. Structure Plan (consultative draft) Policy T7	Northumberland CC	Reduce adverse impact of large, heavy vehicles on the environment and on amenity, safety and convenience of pedestrians and residents	Complies with Policy T7 and would reduce the environmental, amenity and safety concerns associated with the existing road	Complies with Policy T7 and would reduce the environmental, amenity and safety concerns associated with the existing road	Both routes remove through traffic. National Trust favours local commercial traffic
7. Structure Plan (consultative draft) Policy EQ1	Northumberland CC	Proposals for development required to present measures to minimise the effect of development and where possible lead to demonstrable environmental benefits	Complies with Policy EQ1 and would result in environmental, benefits in terms of noise, air quality, amenity and safety	Complies with Policy EQ1 and would result in environmental, benefits in terms of noise, air quality, amenity and safety	Landscape proposals are incorporated into the scheme design in order to minimise the effect on the environment and to enhance the scheme. National Trust has a greater visual intrusion on residential areas.
8. Structure Plan (consultative draft) Policy EQ2	Northumberland CC	Pollution emissions from development	Improvements in air quality in areas adjacent to existing A69	Improvements in air quality in areas adjacent to existing A69	National Trust route gives greater improvement to properties on Tyne View Road

GROUP 5: POLICIES AND PLANS					
POLICY	AUTHORITY	INTEREST	PREFERRED ROUTE	NATIONAL TRUST	COMMENTS
9. Structure Plan (consultative draft) Policy A2	Northumberland CC	Sites of archaeological importance	Crosses 2 potential sites of archaeological importance		Futher survey work required to determine actual effect and any mitigation measures required
10. Structure Plan (consultative draft) Policy A4	Northumberland CC	Development within designated Conservation Areas	Setting of Conservation Area may be improved by removal of heavy traffic	Setting of Conservation Area affected by tie-in	Preferred route gives greater benefits
11. Structure Plan (consultative draft) Policy A5	Northumberland CC	Implications of development proposals for historical/Listed Buildings	Intrusion on setting of Bellister Castle and the Alston Arches Viaduct	Intrusion on setting of Bellister Castle and the Alston Arches Viaduct	Preferred route passes 100m closer to Bellister Castle

*There is no statutory local plan for the Haltwhistle area. Tynedale District Council are currently preparing a district wide local plan. They expect to take this plan to public consultation in Spring 1994.

GROUP 6: FINANCE				PUBLISHED SCHEME		
SUB GROUP	INTEREST	UNITS	NO NEW ROUTE	Low	High	COMMENTS
Department of Transport	Construction Costs	£M		9.368		Costs at 1991 Quarter 2 prices
	Land Costs	£M	0	0.125		
	Total Costs	£M		9.493		
	Construction costs	£M(PVC)		6.568		Costs are discounted from year of expected expenditure to 1988 at 1988 prices (PVC = Present Value of Costs) (PVB = Present Value of Benefits) (NPV = Nett Present Value)
	Land costs	£M(PVC)	0	0.063		
	Increased maintenance	£M(PVC)		0.026		
	Total costs	£M(PVC)		6.657		
	Link benefits	£M(PVB)		4.882	7.897	
	Junction benefits	£M(PVB)		-0.219	-0.024	
	Accident benefits	£M(PVB)		-0.445	-0.517	
	Future maintenance benefits	£M(PVB)	0	+1.235	+2.261	
	Bridge maintenance benefits	£M(PVB)		+0.204	+0.204	
	Total Benefits	£M(PVB)	0	5.657	9.821	Includes savings in time, vehicle operation and accidents (Taken from Group 1)
	Net Present Value (low growth)	£M(PVB)	0	-1.000		
	Net Present Value (high growth)	£M(PVB)		+3.164		

