

Chemical Facilities

EIS Guideline

**New South Wales
Department of Urban Affairs and Planning**

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Executive summary

This guideline identifies some important factors to be considered when preparing an environmental impact statement (EIS).

The preparation of the EIS should be preceded by early effective consultation and technical discussions with relevant government agencies and councils.

A high priority should be given to:

- considering environmental factors in site selection
- evaluating alternative sites
- ascertaining the suitability of the intended location.

There should be an early evaluation of alternatives, taking into consideration the factors in Part 4 of this guideline.

The analysis of alternative design, processing and management practices should consider the environmental implications of options. The justification for the selection of the preferred options should consider biophysical, social and economic factors, and the consistency with ecological sustainability principles.

The assessment process should focus on key environmental issues. These issues should be identified early in the environmental impact assessment (EIA) process, usually at a planning focus meeting and through consultation with the community. The assessment process should clearly identify the environmental (including biophysical, social and economic) costs and benefits of the proposal.

Key issues for chemical facilities usually include:

- hazards issues
- soil contamination
- air and water quality
- transport.

The EIS should outline commitments to the ongoing environmental management of the proposal, including monitoring.

The level of analysis of individual issues in the EIS should reflect the level of significance of their impacts. The analysis should focus on key issues. The information in the EIS should be accurate and presented clearly and concisely. There should be emphasis on quality and not quantity. The EIS need not be long.

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1. Purpose and scope of the guideline

1.1 Introduction

A major function of an Environmental Impact Statement (EIS) is to provide information on the potential environmental impacts of a proposal. This Practice Guideline outlines matters which may need to be included in an EIS to fulfil the information requirement for the assessment of environmental impacts from chemical facilities. The Guideline will also assist the applicant in the selection of an appropriate site. As well as providing advice to applicants, the guideline will also be of assistance to government authorities responsible for the approval or regulation of chemical facilities.

A broad spectrum of chemicals and related manufacturing, processing and handling practices may be used in the industry. These have the potential to generate a variety of chronic or acute impacts on the environment. The significance of impacts is often influenced by factors such as:

- the characteristics of the location
- the type of chemicals and the quantity on site
- the throughput of chemicals
- the physical size of the facility.

The application of a life cycle analysis approach and cleaner production principles reinforce the concepts of ecologically sustainable development.

Controlling the risks to people and the biophysical environment from the operation of specific processes and the storage of chemicals is also an important aspect in making a development acceptable.

Not all matters outlined in this guideline will be applicable to every proposal. The EIS should be tailored to suit the potential impacts of the proposal. It is essential to focus only on key issues. If the relevant matters identified in this guideline are addressed, there should be sufficient information for the appraisal of most chemical facility proposals.

For the purpose of this guideline, chemical facilities refer to

- chemical industries or works
- chemical storage facilities.

1.2 Operations related to a chemical facility

Chemical facilities may involve the production or storage of chemical substances (including reactive, toxic or flammable liquids, vapours, gases and solids) and may include one or more of the following:

- facilities related to chemical reactions and isolation of the product (distillation, filtration, dewatering)
- drying, crushing, formulation, blending and packaging facilities
- storage facilities for raw materials, products and by-products including containers, bulk storage facilities, stockpiles and dumps
- material transfer and transport related facilities
- related waste management and reprocessing facilities.

Figure 1 (next page) illustrates general pollutant flows and possible sources of environmental impact from a generalised chemical facility.

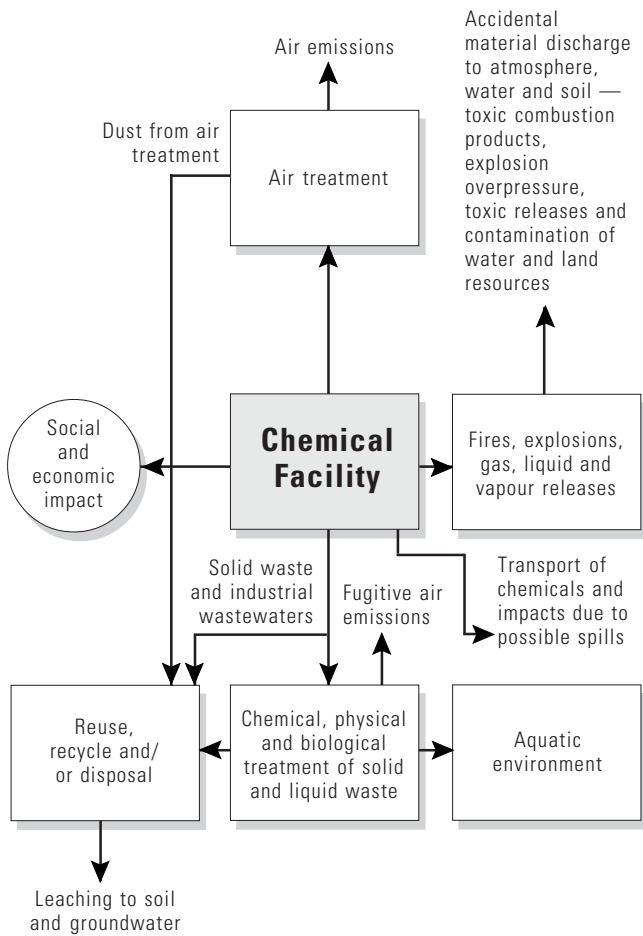
1.3 When is an EIS required?

An EIS must be prepared for proposals which have the potential to significantly affect the environment. Part 4 and Part 5 of the *Environmental Planning & Assessment (EP&A) Act 1979* specify the legal requirements for environmental impact assessment. The assessment and approval process is summarised in the flowchart in Appendix 2 of this guideline.

Under Part 4 of the *Environmental Planning and Assessment Act 1979*, chemical facilities may require development consent under a local environmental plan or other planning instrument.

The consent authority is normally the local council, but could be a Minister (under SEPP 34 or Section 101 of the EP&A Act), the Director-General of Urban Affairs and Planning or another authority under certain circumstances. The applicant should consult the council in the first instance to ascertain the consent authority.

Figure 1. Possible Sources of Environmental Impact from a Typical Chemical Facility Operation



Where consent is required, Schedule 3 of the Environmental Planning and Assessment Regulation (EP&A Regulation) 1994 applies. Schedule 3 introduces thresholds for designation of chemical industries or works and chemical storage facilities based on the size and type of operation or the sensitivity of the affected or local environment. (See Appendix 6 for full designation). If a development is designated, then an EIS must be lodged with the development application. If a proposal for a chemical facility

requires consent, but is not designated, a statement of environmental effects (SEE) must be submitted with the development application. The Guideline is equally applicable for identifying the range of issues which may need to be addressed in a SEE.

Part 5 of the EP&A Act applies to any proposal not requiring development consent but requiring an approval from government authorities. Under Part 5, a determining authority (i.e. an authority required to grant a licence, lease or approval for funding) must consider whether the proposal has the potential to cause significant environmental impacts.

If significant impacts are likely to result, an EIS must be prepared. The publication *Is an EIS required?* (Department of Planning, 1995) provides guidance on how to decide whether an EIS is required for proposals falling under Part 5 of the Act. If an EIS is required, this guideline should be used. If an EIS is not required, a review of environmental factors (REF) should be prepared to assess impacts and proposed mitigation strategies. This guideline is equally applicable for identifying issues which may need to be addressed in a REF prior to granting an approval.

1.4 Potentially hazardous and offensive developments

For some chemical facility proposals, the absence of technical or operational controls may pose unacceptable levels of off-site risks to people, property or the biophysical environment. Such activities would be defined as potentially hazardous or potentially offensive under State Environmental Planning Policy No.33 — Hazardous and Offensive Development (SEPP 33).

The guideline *Applying SEPP 33 — Hazardous and Offensive Development Application Guidelines* (Department of Planning, 1994a) defines terms and outlines the policy for managing potentially hazardous and offensive industries under this policy. The guideline also provides assessment procedures which link the permissibility of the proposal to safety and pollution control performance.

1.5 Application of SEPP 33

For proposals falling under Part 4 of the Act, the applicability of SEPP 33 must be verified with council. If the proposal is considered potentially hazardous under SEPP 33, a Preliminary Hazard Analysis (PHA) must be submitted with the EIS or with a SEE accompanying the development application.

Where appropriate, a PHA may also be required by the Department of Urban Affairs and Planning, when the Director-General is formally consulted for Director-General's requirements for an EIS.

The PHA should be prepared in accordance with *Hazardous Industry Planning Advisory Paper No. 6 — Guidelines for Hazard Analysis* (Department of Planning, 1992b), which sets out the general requirements for the preparation of a PHA. The purpose of the PHA is to:

- identify all potential hazards associated with the proposal
- analyse all hazards in terms of their consequences (effects) on people and the biophysical environment, and their likelihood of occurrence
- quantify resultant risks to surrounding land uses and the environment
- assess the risks in terms of location, land use planning implications and existing criteria, and ensure that the proposed safeguards are

adequate and demonstrate that the operation will not impose an unacceptable level of risk.

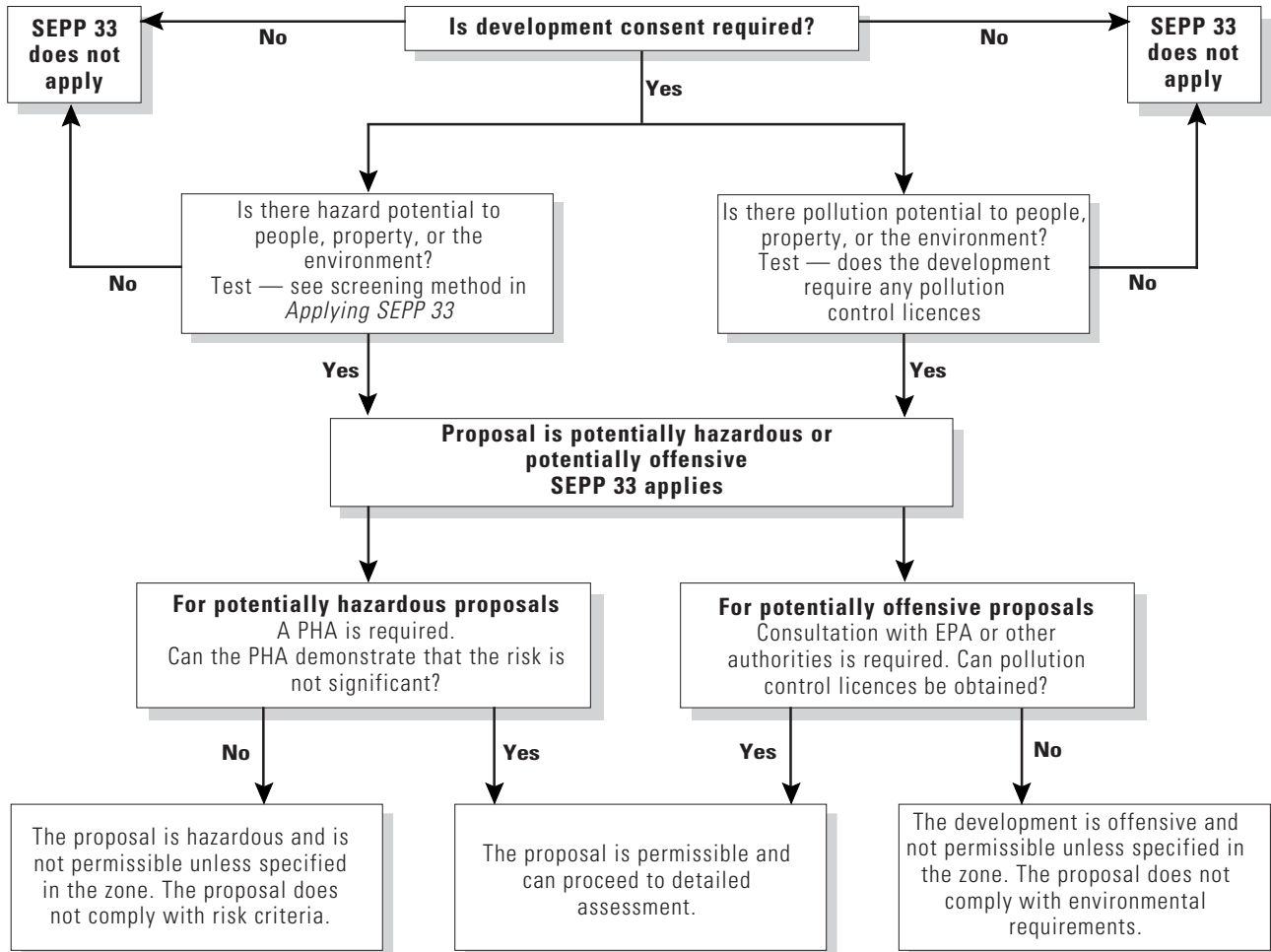
When a proposed development is considered to be potentially offensive (in accordance with SEPP 33), the applicant should consult the EPA (or other appropriate authority) and develop the necessary control measures for obtaining the appropriate licences under the relevant Acts such as under the Clean Air Act from the EPA.

Figure 2 outlines the assessment procedures for the application of SEPP 33. For proposals assessed under Part 5 of the EP&A Act, even though SEPP 33 does not strictly apply, the procedures set out in the guidelines should be considered to be 'best practice' and should be followed when appropriate.

1.6 Hazardous and offensive developments

If the PHA demonstrates that the risks to people, property or the biophysical environment are unacceptable in terms of the criteria adopted in NSW and set out in detail in *Hazardous Industry Planning Advisory Paper No. 4 — Risk Criteria for Land Use Safety Planning* (Department of Planning, 1992a), the development will be considered hazardous or offensive. Such developments would usually be prohibited in most zones.

Figure 2. The SEPP 33 Process for Potentially Hazardous and Potentially Offensive Development



2. Factors to consider when preparing an EIS

The aim of environmental impact assessment (EIA) is to enable the approving authority, the public, the local council, government authorities and the proponent to properly consider the potential environmental consequences of a proposal. It is important to provide sufficient information for the approving authority to make a decision on whether to approve a proposal and if so, under what conditions. The EIS provides the basis for sound ongoing environmental management.

It is the proponent's responsibility to identify and address, as fully as possible, the matters relevant to the specific proposal and to comply with the statutory requirements for EIS preparation. The following factors are important when preparing an EIS.

2.1 Early consideration of the strategic context

The need for the proposal should be clearly identified along with its relationship to broader strategic plans and goals. Consideration of the strategic context is essential when selecting options for the proposal. Strategic mechanisms such as policies and plans which illustrate how the proposal has been developed, should be discussed in the EIS so that the information is available and relevant. It is not the role of the project EIS to undertake an environmental assessment of strategic mechanisms related to the proposal. However the EIS should report upon and apply them to the proposal.

Any existing relevant cumulative or strategic environmental studies should be considered when formulating and justifying undertaking a proposal. Air and water quality studies, state of the environment reports and local and regional environmental studies should also be taken into consideration as applicable.

2.2 Early assessment of options

The objectives for the proposal should be developed to fulfil any identified need and should encompass the principles of ecologically sustainable development (ESD). ESD principles (outlined in Appendix 1) should be considered when identifying options for all aspects of the proposal. All feasible alternatives that could satisfy the objectives of the proposal should be considered. When weighing up options, the biophysical, economic and social costs and benefits throughout the whole life cycle of the proposal should be considered. The 'do nothing' option should also be included in these considerations.

Careful option selection can lower community concerns and reduce potential costs of mitigation and management required to control environmental (including social) impacts. Early adoption of ecologically sustainable strategies can reduce possible conflicts, and additional costs and delays at later stages of the approval process.

2.3 Identifying issues

The general framework for an EIS is prescribed in Schedule 2 of the EP&A Regulation (see Appendix 1). The Director-General's requirements provide specific matters to be addressed in an EIS. In addition to the specific legal requirements, the proponent has a broader responsibility to consider all potential environmental issues in relation to the proposal.

As a precursor to identifying potential environmental issues, the proponent must be able to outline:

- the important characteristics of the project which will determine the scope of the potential impacts
- the proposed site and a preliminary assessment of the sensitivity of the site.

If either the project characteristics or the site should change, then the potential impacts may also change. If at any time changes occur, the scoping process for the EIS should be reviewed. If major changes occur, the Director-General may need to be reconsulted to amend their requirements.

In addition to the issues outlined in this guideline, other sources of information which may assist in the identification of potential issues include:

- any relevant guidelines produced by other NSW government authorities, e.g. *Environmental Noise Control Manual* (EPA, 1994a), other States or overseas
- EISs for similar projects, and any relevant commission of inquiry report, determination report and conditions of approval
- relevant research and reference material on similar proposals.

There are a number of approaches or mechanisms which help identify issues relating to a particular proposal in a particular location. They may involve fairly unstructured mechanisms with a low level of consultation or a structured process with a high level of consultation with all stakeholders. The choice of the approach should depend on the scale and type of proposal and the sensitivity of the environment. These may include:

- consultation outlined in Part 3
- checklist, matrix, network, GIS or overlay methods or similar approaches such as the tables in *Is an EIS required?* (Department of Planning, 1995)

2.4 Prioritising issues

The EIA process generally will benefit from focusing attention on key issues of concern. Not all issues identified will have the same degree of relevance for all proposals. The relative importance placed on different issues will vary from case to case, and is a function of the type and size of the proposal and the sensitivity of the receiving environment. Issues should therefore be prioritised according to their importance in the decision-making process.

When prioritising issues, consideration should be given to the potential severity, temporal and spatial extent of any beneficial and adverse

effects; their direct impacts as well as any indirect, secondary, tertiary or cumulative impacts; and whether the effects are continuous or intermittent, temporary and reversible or permanent and irreversible.

The outcome of the identification and prioritisation process should result in:

1. a list of all issues with a preliminary estimate of the relative significance of their impacts
2. identification of the key issues
3. an explanation as to why other issues are not considered to be key.

The EIS should address the key issues as fully as practicable. However the level of analysis should reflect the level of significance of the impacts and their importance for the proposal. Lesser attention should be given to those issues which have lesser significance. For these latter issues, there should be sufficient analysis to develop a sustainable mitigation strategy for any potential adverse impacts.

2.5 Impact analysis, prediction and presentation

Discussion of likely impacts should include predictions of the nature and extent of potential impacts and the effectiveness of mitigation strategies. This information is fundamental to deciding the potential ecological sustainability and hence the acceptability of a particular proposal.

a) Presentation

Information provided should be clear, succinct, objective and where appropriate, supported by maps or other descriptive detail. Repetitive or general non-specific data is distracting and is not relevant to the decision-making process. The use of jargon should be avoided. It is recommended that the EIS be edited to ensure consistency of style and accuracy of transference of information from any appendices to the main document. External review of technical analysis will help ensure that the information to be included is relevant.

The EIS should make reference to all relevant studies and investigations that have been carried out in support of the proposal or other studies, reports or literature used in the EIS. These should be made available during the public display of the EIS.

b) Baseline information

Where baseline data is to be collected first-hand, careful consideration must be given to the design of the sampling program. Matters to consider include:

- the degree of understanding of the processes in question
- the reasons for the data collection program
- sampling program design
- data collection procedures
- data analysis methodologies
- relevant quality assurance procedures.

The need for long-term sampling to discern the variability of the environment should also be assessed as early as possible so that it is not overlooked or avoided due to time constraints. Assumptions and extrapolations used to draw conclusions from the data should be justified.

In some circumstances, there may be sufficient existing data available for assessment purposes without the need for additional data collection. Where existing data is used, its adequacy and appropriateness for impact assessment of the proposal should be reviewed and discussed, taking into consideration the above points for first-hand data collection. Shortfalls or uncertainty in knowledge should be clearly identified.

In all cases, sampling programs and analysis procedures should reflect current scientific approaches. Peer review of study design, sampling methodology, data analysis and interpretation of results may help identify inadequacies.

c) Predictions of impacts and mitigation

Impact prediction should consider magnitude, duration, extent, direct and indirect effects, beneficial and adverse effects and whether impacts are reversible or permanent. All predictions of impacts and the likely success of mitigation strategies have an element of uncertainty associated with them. The proponent should identify and, where possible, indicate the

level of uncertainty associated with these predictions and mitigation measures. This information is fundamental in developing appropriate management strategies and informs the proponent, community, government agencies and the decision-maker of the degree of risk associated with the proposal and the importance of that risk.

When predicting impacts, a clear distinction must be made between those impacts which can be assessed quantitatively and those for which only a qualitative assessment can be made. Predictive models used should be justified in terms of appropriateness for the task, outlining its strengths and weaknesses. Whenever conclusions and recommendations have been made based substantially on judgements instead of facts or objective analytical results, the basis of the judgements should be clearly identified. A precautionary approach should be adopted where there is a significant chance a proposal may lead to irreversible consequences.

d) Reference to standards or indicators

Where possible, discussion of impact assessment and mitigation measures should make reference to recognised standards or indicators for sustainability. Standards such as the *Australian Water Quality Guidelines for Fresh and Marine Waters* (ANZECC, 1992) will provide a useful reference against which to measure the acceptability of potential outcomes. In some cases, indicators may have been developed for a region or area, for instance by the Healthy Rivers Commission for specific catchments. In other cases they may be developed as a result of regional strategic environmental or cumulative studies. Some indicators for sustainability may relate to the specific characteristics of the location and can only be developed as a result of the analysis undertaken in the EIS.

e) Mitigation strategies

Mitigation strategies must be considered both in relation to individual impacts and collectively for all impacts. This helps to avoid conflict between mitigation strategies and ensures that measures applied with respect to one (or more) potential impacts do not increase the magnitude or significance of other likely impacts. The mitigation strategy should include the

environmental management principles which would be followed in the planning, design, construction and operation of the proposal and include:

- a compilation of locational, layout, design or technology features described in the EIS
- an outline of ongoing environmental management and monitoring plans.

Predictions made in the EIS should be monitored in an environmental management plan (EMP). With projects with potentially controversial environmental impacts, it may be appropriate to:

- consult with government authorities, council and the community when preparing the EMP
- establish a community committee to consult in relation to the ongoing management of the proposal
- exhibit an annual environmental management report outlining the environmental performance of the proposal.

It is not expected that a detailed EMP be prepared for the EIS. However an outline of the content and structure and commitment to prepare an EMP is required.

2.6 A question of adequacy

The NSW Land and Environment Court has made a number of observations about the adequacy of EISs during its judgements (see Gilpin, 1995). Gilpin's summary of the Court's observations includes:

- The purpose of an EIS is to bring matters to the attention of members of the public, the decision-maker, and the Department of Urban Affairs and Planning so the environmental consequences of a proposal can be properly understood
- The purpose of the EIS is to assist the decision-maker. An EIS is not a decision-making end in itself, but a means to a decision-making end

- The EIS must be sufficiently specific to direct a reasonably intelligent and informed mind to possible or potential environmental consequences
- The EIS should be written in understandable language
- The EIS should contain material which would alert both lay persons and specialists to potential problems
- An EIS would be unacceptable if it was superficial, subjective or non-informative
- An EIS would be acceptable if it was objective in its approach and alerted relevant parties to the environmental effects and community consequences of carrying out or not carrying out the proposal.

2.7 Ecologically sustainable development

Under the EP&A Regulation, it is necessary to justify the proposal having regard to biophysical, economic and social considerations and the principles of ecologically sustainable development (ESD).

Ecological sustainability requires a combination of good planning and an effective and environmentally sound approach to design, operation and management. The proponent should have regard to the principles of ESD throughout the whole project life cycle, and especially:

- when developing the objectives for the project
- during project formulation, planning and design
- when considering project options and alternatives
- during construction
- for the operational life of the proposal
- afterwards during decommissioning, site rehabilitation and reuse.

Continual reference should be made to the question 'Is this proposal ecologically sustainable?'

3. Consultation

Early consultation with the local community, industry, councils and government agencies can be of great assistance in making a preliminary assessment of the potential viability of a proposal at a particular site. It can also assist in ensuring that the EIS is focused on those matters which will add value to the decision-making process.

Effective consultation should enable an applicant to:

- clarify the objectives for the proposal in terms of community needs and concerns, and the relationship of the proposal to any relevant strategic plans, government policy directions and statutory or planning constraints
- identify feasible alternatives (in particular alternative sites) and clarify their relative merits in terms of biophysical, social and economic factors
- identify environmental issues to:
 - prioritise the issues and identify those key to the decision-making process
 - establish the scope of the studies for key issues so that there will be adequate information for the decision-making process
 - where possible, identify performance objectives or indicators for key issues
 - when appropriate, identify experts (in government agencies or from other sources) who can assist in guiding the assessment of a key issue or peer review the assessment
- if appropriate, identify processes for continued community involvement.

The following consultation procedures are recommended:

3.1 Consultation with government agencies

It is intended that this guideline should replace the need to undertake routine consultation with government agencies on general matters to be included in an EIS, statement of environmental effects (SEE) or review of environmental factors (REF).

However, consultation with councils and relevant government agencies is recommended to help identify alternatives and to provide a preliminary view on their acceptability within the strategic context. To maximise the benefits of consultation with government authorities, requests for advice should be accompanied by adequate information on the proposal and proposed locations. The consultation request should be targeted towards identifying key issues, and should specifically relate to the particulars of the location, design and operation of the proposed facility.

To facilitate consultation with relevant government agencies, it may be appropriate to hold a planning focus meeting (PFM). The Department recommends that PFMs be held for all major or potentially controversial proposals. The principal approval authority would usually be responsible for organising the PFM. In addition to including government authorities which have an approval role, other agencies with expertise in the area, catchment management committees or independent technical experts may also need to be included depending on the location, site characteristics and management options.

For a chemical facility proposal, the following organisations should be invited to a PFM or otherwise consulted:

- relevant local councils
- Department of Urban Affairs and Planning
- Environment Protection Authority
- WorkCover New South Wales
- NSW Health
- Fire Brigade
- Department of Land and Water Conservation
- the relevant waste management authority.

Appendix 4 lists other organisations who may need to be consulted to identify key issues for particular proposals.

For smaller projects, less formal meetings or discussions with relevant authorities, particularly the local council, should be undertaken. Issues such as whether a proposal is consistent with the council's strategic plan for the area and is permissible at the particular site should be clarified at the outset.

3.2 Formal consultation required under legislation

Under the provisions of the EP&A Regulation, an applicant or proponent must formally consult the Director-General of the Department of Urban Affairs and Planning (DUAP) regarding the content of an EIS. It is recommended that the PFM or preliminary discussions with council occur before the proponent consults the Director-General and that the minutes of the PFM or issues canvassed in the discussions be forwarded to DUAP when the Director-General's requirements are requested.

If a proposal is on land that contains a 'critical habitat' or is likely to significantly affect threatened species, populations or ecological communities or their habitats, the Director-General of National Parks and Wildlife should be consulted regarding the contents of a species impact statement (see Appendix 3 for further information).

3.3 Consultation with the community

The community likely to be affected, whether directly or indirectly, should be informed of the proposal and consulted early in the EIA process. Consultation should aim to include affected individuals, community groups and groups with special interests such as local Aboriginal Land Councils.

For major or controversial projects, a program of community consultation may need to be undertaken as part of the preparation of the EIS. This program would usually include two phases, one seeking to inform the community (for instance involving public meetings, public displays or newsletters) and one seeking to gain input on issues of community concern, to identify community values and to identify and evaluate alternatives (for instance involving community focus meetings, 'issues' workshops and community surveys).

4. Site selection procedures

Principles of site selection for chemical facility proposals

Consideration must be given to whether:

- the land use is permissible
- environmentally sensitive areas are avoided
- the use is compatible with nearby land uses
- initial site investigations indicate the fundamental suitability of the site

4.1 Site selection

Operational and engineering considerations are important factors when selecting sites for new chemical facilities. For example, the proximity to transport, raw materials, markets and waste disposal options need to be considered. The environmental and social characteristics of the location also need to be considered. The greater the potential for adverse effects, the more important the site selection process.

Site selection principles may also need to be considered where a development is proposed for an existing facility.

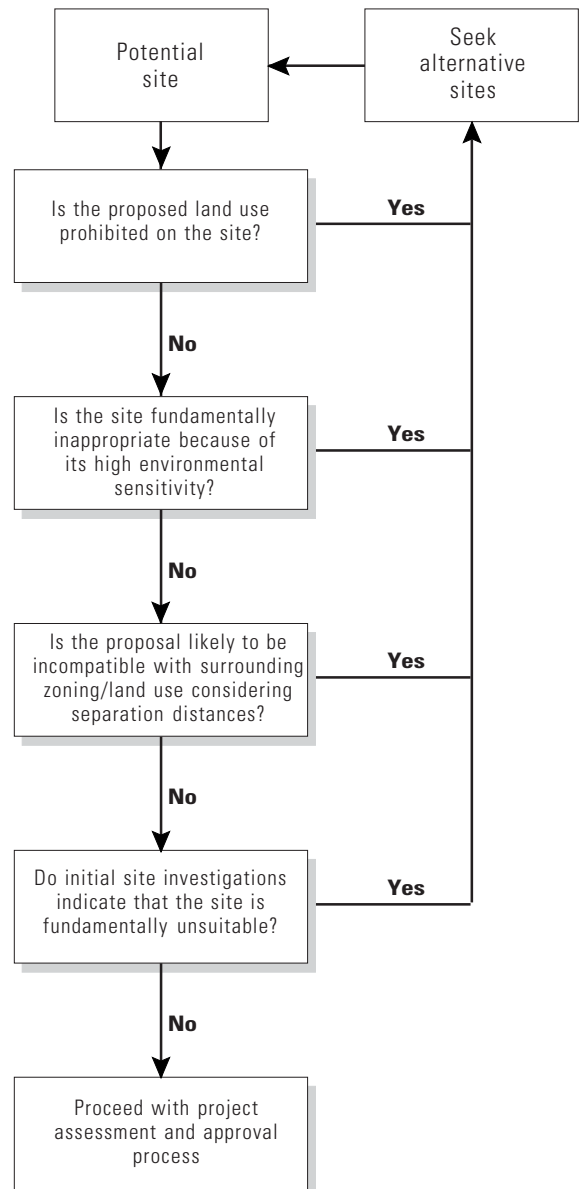
Careful site selection for smaller chemical facilities may remove the need for an EIS, or otherwise will help minimise the environmental impacts and reduce the need for expensive infrastructure or technically complex treatment facilities. Appropriate site selection can avoid or reduce many of the environmental problems inherent with chemical facility proposals and:

- reduce the need for technically based environmental and health risk mitigation measures and costly ongoing management measures
- result in substantial savings in establishment and operating costs
- reduce levels of public concern
- avoid potential delays in approval processes.

A systematic and rigorous approach to site selection based on '4 principles' is therefore recommended as set out in Figure 3.

The potential for chemical facility proposals to generate impacts requires that a precautionary approach to site selection be adopted. In general, if a chemical facility with pollution and hazards risks incorporates mitigation measures with high levels of certainty of performance in the design, there will be wider site selection options.

Figure 3. Site Selection



Environmental impacts may be minimal where wastes, spills, contaminated water and emissions are further processed on- or off-site to reduce the impact. Subsequent disposal according to approved procedures will also contribute towards minimising any impact.

4.2 Permissibility of land use

At a very early stage in the site selection process it is essential to check with the local council to determine if the proposed land use is permissible on a particular site under the provisions of the LEP, other planning instruments or government policy. If the proposal is not permissible, discussions should be held with council to determine its attitude towards rezoning the site.

4.3 Environmentally sensitive areas

At an early stage, the site selection process should also determine whether a potential site is likely to adversely affect areas of such high environmental value that the site should be excluded from any further consideration. The following are examples of areas of high environmental sensitivity:

- national parks, world heritage areas, historic and heritage areas, wilderness areas
- areas reserved for environmental conservation (e.g. aquatic, nature, karsts)
- areas mapped under LEPs, REPs and SEPPs for protection
- areas under conservation agreements or identified as critical habitats under the *Threatened Species Conservation Act 1995*
- drinking water catchments or areas overlying aquifers which contain drinking water quality groundwater which is vulnerable to pollution (consult DLWC for criteria for determining the vulnerability of groundwater)
- areas within 40 metres of a permanent or intermittent water body (rivers, bays, lakes or wetlands)
- areas prone to subsidence or land slippage
- areas close to sensitive land uses such as schools, nursing homes and hospitals.

4.4 Compatibility with land uses

Another important consideration is the compatibility of the proposal with existing or proposed surrounding land uses. Conflicts often arise when the community's amenity is

threatened by health, safety, noise, water or air quality impacts. Any potential conflicts and possible options for reducing or preventing conflicts should be considered, in particular, the adequacy of buffer zones and the potential land uses within the buffer zones.

The extent of buffer areas should be determined on a case specific basis. Factors to consider include the size of the plant, the type of chemicals and the level of risk associated with the operation of the facility. Table 1 suggests land uses which might require separation from nearby chemical facilities, and performance objectives which could be used to determine an appropriate separation distance.

In considering separation distances, the local meteorological conditions and topography should be considered. If the proposal is potentially incompatible with surrounding land uses, consideration should be given to acquiring sufficient land to provide adequate on-site separation from nearby land uses. Where possible, the buffer area should be owned or controlled by the owner of the facility.

As the establishment of buffer areas around chemical facilities can lead to unacceptable land sterilisation, separation distances should not be viewed as a primary means of ameliorating impacts. Instead, separation distances should be seen as a backup to ensure that the amenity of existing land uses can be maintained. The EPA does not accept impact reduction by separation distances (by dilution) for air or water pollution. The role of site separation as an impact mitigation measure should simply reinforce the impact mitigation measures provided by other means.

4.5 Initial site investigations

The purpose of initial preliminary site investigations is to provide an early indication of the suitability of the proposed site in terms of the criteria in Table 2.

The initial investigations can help ensure a potential site's fundamental suitability for a chemical facility before proceeding with a more detailed assessment in an EIS. The initial site investigations should exclude fundamentally unsuitable sites. Factors to be considered are listed in Table 2.

The initial investigations can provide a basis for the comparative evaluation of a number of potential sites and can help substantiate the

feasibility of the proposal at a particular site. These investigations can serve as a cost-effective device to determine if any particular sites should be excluded from further consideration based on environmental factors.

In addition to assessing the suitability of new sites, site feasibility studies should be undertaken to assess the acceptability of any existing chemical facilities being extended or altered. In these cases, investigations should consider any monitoring results from the existing facility.

The level of detail at the initial investigation stage should be commensurate with the scale of the proposal, the potential environmental risks associated with the proposal and the potential sensitivity of the location. Results of the initial investigations should be assessed to determine if a site is fundamentally suitable or unsuitable for proceeding with a development application.

In some circumstances, the acceptability of a site may be still uncertain following an initial site

investigation, and more detailed assessment will be required to establish acceptability. A precautionary approach should be adopted with these types of 'marginal' sites. The availability of impact mitigation measures alone to alleviate serious site deficiencies should not be used to conclude that a site is suitable. Before proceeding with these types of sites, the views of the EPA and any relevant authorities should be sought regarding:

- the nature of the environmental constraint and its significance to the proposal's likely impacts
- the availability of impact mitigation measures
- the comparative merits of alternative sites.

A balanced judgement should be made taking account of all environmental factors. If a site is deemed to be suitable, the EIS should include results of the initial investigations and a full explanation of the rationale for selecting the site and for concluding that the site is suitable for the chemical facility.

Table 1. Performance Objectives and Factors to be Considered to Determine Separation Distances

Land use	Performance objectives	Factors for determining appropriate separation distances
Residential areas, hospitals or schools	<ul style="list-style-type: none"> • Protect residential amenity and health: odour, fumes, visual amenity, noise, dust, seepage 	<ul style="list-style-type: none"> • What is the likelihood of the performance objectives being achieved by the mitigation measures alone? • What is the likelihood of the mitigation measures failing? • What is the likelihood of an 'incident' (e.g. accident, system failure, natural disaster) which will result in a failure to meet the performance objectives? • What 'backup' mitigation measures are available? • What is the likely geographic extent of impacts, taking into consideration the proposed performance of mitigation measures and the local environment (e.g. topography, climate)? • What is the likely geographic extent of the impacts if mitigation measures fails or an 'incident' occurs taking into consideration the local environment (e.g. topography, climate)? • What separation distances are required to achieve the performance objective: <ul style="list-style-type: none"> ó under normal operational and mitigation performance conditions ó if mitigation measures fail or an 'incident' occurs?
Surface waters	<ul style="list-style-type: none"> • Ensure that surface waters are protected from pollutants • Ensure that no existing or likely future uses of surface waters are compromised • Ensure that no significant impacts occur to flora and fauna which use the waters • Ensure that the ecological value of the waters will be maintained 	
Groundwater recharge zones	<ul style="list-style-type: none"> • Ensure that there is no deterioration in the quality of the groundwater • Ensure that no existing or likely future uses of groundwater are compromised 	
Environmentally sensitive areas	<ul style="list-style-type: none"> • Ensure that environmental qualities of the particular area are not compromised 	

Table 2. Environmental Criteria for Site Selection

Operational requirements	<ul style="list-style-type: none"> • Does the site provide sufficient land area for present and future requirements? • Is there easy access and transport networks of an appropriate standard? Does the site provide for safe truck entry and exit and on-site queuing of trucks? • Is this an efficient site relative to the products' markets and raw materials suppliers and waste management facilities if appropriate? • Can services be efficiently supplied to the site e.g. power, water, gas? Are there feasible corridors to supply the site if the utilities need to be supplied to the site or augmented? Will the costs of augmenting or supplying utilities justify the benefits of using this particular site? Can the utilities services provided to the proposed location meet the long-term needs of the facility considering the projected future demand from the facility and other users?
Air, topographic & meteorological issues	<ul style="list-style-type: none"> • Is there an existing air quality problem within the local or regional air catchment? Is this problem expected to increase over the lifetime of the proposed facility? Will the facility in this location contribute to the existing problem? • Are the rainfall patterns or prevailing wind directions likely to cause environmental management difficulties taking into consideration leachate generation and odour dispersal? • Are the local climatic conditions (e.g. air movement, rainfall) in combination with the topography likely to result in microclimatic conditions which will adversely increase impacts on the community (consider land slope, wind strength and directions, and potential for katabatic drift)?
Water issues	<ul style="list-style-type: none"> • Are there any site constraints which make on-site water management difficult (including both process water and stormwater)? • Are there risks of surface water pollution because of the proximity to watercourses and natural wetlands, in particular watercourses used for drinking water or aquaculture downstream, or catchments of coastal estuaries intermittently open to the sea? • Are there risks to groundwater because of shallow or rising groundwater tables, or because of the proximity to groundwater recharge areas or to areas classified as having a high vulnerability to pollution? (This will require consultation with the Department of Land and Water Conservation) • Is the site subject to flooding? • Can any separation requirements from waterbodies (under any relevant legislation or guidelines) be complied with?
Soil issues	<ul style="list-style-type: none"> • Are the soils highly erodible? Are there likely to be sedimentation management problems? • Are there risks of infiltration to groundwater because of highly permeable soils? • Are there environmental risks associated with the underlying strata (for example significant seismic risk, landslide, subsidence or other structural instability)? • Are there existing soils problems, for example contaminated soils or acid sulfate soils? • Are there any topography or geological characteristics which will assist in minimising impacts?
Flora and fauna assessment	<ul style="list-style-type: none"> • Does the vegetation on the site provide an effective visual screen which also can help control dust and odour? • Can clearing of natural vegetation be avoided? Can clearing of vegetation of high significance be avoided e.g. vegetation used for visual screening, riparian vegetation, vegetation used as corridors for the movement of fauna? Will a development application for vegetation clearing be required under SEPP 46? • Are threatened flora or fauna species, populations and ecological communities or their habitats likely to be affected? Will a SIS be required? • Is the site located so that any incident (natural, accidental or due to system failure) is likely to put the ecological systems (particularly threatened species, populations or ecological communities) at unacceptable risk?
Transport issues	<ul style="list-style-type: none"> • Can the standard and capacity of the road network accommodate traffic likely to be generated by the proposal? Can truck traffic avoid residential areas? Can residential areas be avoided? • If dangerous chemicals will be transported, can routes be selected to minimise the risks to residential communities or the potential for pollution of rivers or waterways in the event of an accident? • If inadequacies exist, can the road network or traffic management be changed to minimise any impacts particularly on residential areas? • Are there possible uses of other modes of transport such as sea and rail?
Community issues	<ul style="list-style-type: none"> • Is the proposal likely to be compatible with surrounding existing or proposed land uses, particularly residential zones and any special land uses such as hospitals, schools or airports? • Is the proposal likely to pose health risks, including from air or water pollution or through contamination of the surrounding land? • Is the proposal likely to affect the heritage significance of any Aboriginal or non-Aboriginal heritage items found or likely to be found on the site? • Is there likely to be a problem in meeting sustained compliance with odour, noise, water quality or health requirements? • Is the site highly visible? Will there be significant visual impacts? • Can all separation requirements (under any relevant legislation or guidelines) be complied with? • Is the site located so that any incident (natural, accidental or due to system failure) is likely to put the community at unacceptable risk?
Cumulative issues	<ul style="list-style-type: none"> • Is the proposal likely to contribute to any existing cumulative impacts?

5. Summary of EIS requirements

The statutory requirements for an EIS are prescribed in Schedule 2 of the EP&A Regulation (Appendix 1).

A summary of the specific requirements for an EIS for a chemical facility are provided in the box on the right. These requirements are discussed in detail in Part 6. All issues nominated will not have the same degree of relevance for all proposals. Depending on the characteristics of the proposal, some of the requirements may need to be addressed in greater detail than others. The EIS should be tailored to the specific proposal and should focus on the key issues.

Summary of requirements

A. Executive summary

B. The proposal

1. Objectives of the proposal
2. Description of chemicals and fuels
3. Description of the proposal
4. Site layout plans
5. Site preparation and construction
6. Interfaces with any previous or existing facilities
7. Rehabilitation
8. Consideration of alternatives and justification for the preferred proposal

C. The location

1. Planning context, site description and locality information
2. Overview of the affected environment

D. Identification and prioritisation of issues

1. Overview of the methodology
2. Outcomes of the process

E. The environmental issues

1. Energy issues
2. Hazards issues
3. Transport and traffic issues
4. Water issues
5. Air issues
6. Soil issues
7. Noise issues
8. Visual issues
9. Economic issues
10. Social issues
11. Health issues
12. Flora and fauna issues
13. Heritage issues
14. Cumulative issues

F. List of approvals and licences

G. Compilation of mitigation measures

H. Justification for the proposal

6. Specific requirements for an EIS

A. Executive summary

The executive summary should briefly outline the nature of the proposal and potential environmental impacts. A short discussion of the major findings and recommendations in the EIS should be presented to demonstrate the extent to which the proposal complies with acceptable environmental and hazards criteria. The summary should be in succinct, non-technical language accompanied by a clear map or aerial photograph of the location and general site layout details, to facilitate understanding of the proposal by the general public.

B. The proposal

1. Objectives of the proposal

The objectives of the proposal should be clearly stated and justified in terms of ecological sustainability. The statement should refer to:

- a) the size and type of the facility; the chemicals used or stored on-site; the nature of the processes and the products, by-products and wastes produced
- b) a life-cycle approach to the production, use or disposal of products
- c) the anticipated level of performance in meeting required environmental standards and cleaner production principles
- d) the staging and timing of the proposal and any plans for future expansion
- e) the proposal's relationship to any other industry or facility.

2. Description of chemicals and fuels

Information on major chemical substances and all dangerous goods used, stored or produced on-site must be provided, indicating:

- a) maximum quantities stored on site and annual throughput
- b) the dangerous goods (DG) class, Packaging Group (or Packing Group) and UN numbers (the number assigned to the dangerous goods

by the UN Committee of experts on the transport of dangerous goods) and proper shipping name of all DGs associated with the site

- c) any petroleum, including gas fuels, received in bulk or piped to the site
- d) pack size, phase (solid, liquid or gas), storage pressure and temperature for all materials (in particular for DGs)
- e) any possible significant adverse effects from the chemicals under storage, process and incident (fire, flood, process malfunction) conditions — indicate effects of any atypical interaction between chemicals.

3. Description of the proposal

The following issues need to be addressed when describing the chemical facility's operations. Give details appropriate to the stage of project development at the EIS stage.

Production process

Outline:

- a) the receipt, storage and on-site management systems for all materials (in particular those classified as dangerous goods); the maximum capacity for all storages
- b) the production process together with plant and equipment including:
 - i) transfer systems for chemicals between the storage facilities and the production processes
 - ii) all chemical processes, particularly those involving exothermic reactions, liquefied gases, high pressures, temperatures or unstable, toxic or explosive materials
 - iii) facilities related to isolation of the product (distillation, filtration, dewatering) and the drying, crushing, formulation or processing of the products
 - iv) facilities related to packaging of products
- c) the environmental mass balance for the production process with diagrammatic illustrations of each stage and product line — the diagrams should quantify in- and outflows of materials, points of discharge to the

environment and their respective destinations (sewer, stormwater, atmosphere, recycling, landfill, storage, customer, other processes)

- d) any life-cycle strategies, for instance any measures to manage empty packaging, or waste from users or products past their shelf life.

Cleaner production considerations

Outline:

- a) protection and safety practices to manage environmental impacts from materials storage, transfer and production facilities, including provisions to deal with spills or accidental releases; environmental protection and safety aspects of:
 - i) delivery, dispatch and transfer control systems
 - ii) production control systems
 - iii) storage control systems
- b) the potential characteristics and volume of solid, liquid or gas by-product or waste, and indicate if it is hazardous (e.g. flammable, toxic, radioactive, explosive) — the EIS should cross-reference to the detailed information and analyses in the PHA
- c) measures to minimise the production of waste, typically through source reduction approaches such as changes to product or process; product changes may involve alteration in the composition or use of raw materials, intermediates, by-products or end products resulting in a reduction of waste from manufacturing operations
- d) proposals for use or recycling of by-products or wastes; chemical processes and the plant and equipment for the recycling or reuse process
- e) proposed methods and location of temporary or permanent disposal of solid or liquid waste including provisions to manage leachate; proposed transport arrangements and whether the waste facility is licenced to receive the types of materials; any proposed trade waste arrangements
- f) air management systems including all potential sources of air emissions; proposals to collect, treat, use or recycle gaseous emissions; the air quality standards of any emissions; discharge points
- g) the water management system including all potential sources of water pollution; the water quality standards of any wastewater discharged from the site to sewer, stormwater or natural drainage system; discharge points

- h) soil contamination prevention systems, including all potential sources of soil contamination.

Hazard management considerations

Outline:

- a) operational and organisational safety controls and their basis
- b) commitments for hazard, operational and transport studies to be undertaken as an integral part of the design process, including provisions for an ongoing review and update procedure
- c) fire prevention and protection measures, with the basis upon which they have been formulated, including the outcome of consultations with the NSW Fire Brigade
- d) safety management systems proposed.

Other operational factors

Outline:

- a) the location and elevation of buildings and tanks
- b) hours of operation, including times of peak activity (particularly truck movements) and use of outdoor lights (during construction and operation)
- c) the number of employees, including for transport; the workforce both during construction and operation
- d) the layout of the internal road system; the means of site ingress and egress; parking areas and associated facilities
- e) details of the administration and maintenance compound, laboratory, stores, washdown areas, parking, weighbridge, security systems and other infrastructure needs
- f) landscaping or visual, dust or noise barriers.

4. Site layout plans

Provide site layout and schematic plans for all components of the facility, including:

- a) receipt, transfer and storage areas
- b) traffic ingress and egress, parking spaces and queuing areas, weighbridge, washdown areas
- c) all plant associated with the production process and dispatch system, including control and alarm systems
- d) administration, testing and R&D laboratories, maintenance and machinery storage buildings
- e) any discharge points for air and water emissions
- f) the water management system including bunding, drains, first flush system,

contaminated water retention system, sumps or reservoirs

- g) the solid waste management system
- h) details of landscaping; any significant vegetation to be cleared or disturbed.

5. Site preparation and construction

Outline construction works including:

- a) any decommissioning of old plant or equipment, including demolition of buildings and disposal and reuse of cleared material; consider possible risks from:
 - i) residual quantities of hazardous materials in old equipment or structures; the possibility of fugitive emissions or contaminated run-offs
 - ii) any existing soil contamination and potential risks of contaminated dust or run-offs, and implication on the transport, disposal or use of spoil from the site; soil remediation implications
- b) any earthworks or site clearing including any vegetation; disposal or reuse of cleared material
- c) the construction timetable and any staging of the construction, hours of construction works; proposed construction methods; equipment and access roads to be used; all dangerous goods such as liquid fuels, LP Gas, explosives or pesticides that may need to be temporarily stored or used on site
- d) pollution control systems such as erosion and sediment control systems, bunding, wastewater and contaminated fire water holding tanks, noise mitigation measures.

As part of the development approval process, the Department of Urban Affairs and Planning may require the proponent to prepare, prior to commencement of construction, a construction safety study in accordance with *Hazardous Industry Planning Advisory Paper No. 7 — Construction Safety Study Guidelines* (Department of Planning, 1992c). The need for such a study will largely depend on the nature, scale and location of the proposal.

6. Interfaces with any previous or existing facilities

Where applicable, outline:

- a) the nature of any past or existing chemical or related facilities on the proposed site

- b) past environmental performance including:
 - i) previous controls which applied on the site
 - ii) the impacts of the operation on the environment and the effectiveness of any impact mitigation
 - iii) a historical record of spills and incidents if applicable
 - iv) environmental licences obtained for the operation of the previous or existing facility
- c) the relationship of the proposed development to previous or existing operations
- d) an evaluation of the site in terms of the principles in Part 4.

It is important to be aware that performance requirements for new licences may be more stringent than requirements for licences granted for existing developments. Where the proposal is for additions or modifications to an existing development, the applicant should verify with the approving authority if current standards are likely to be imposed on the total operation. If so, the total operation should be considered in the assessment in the EIS.

Where a PHA must be submitted, the incremental risk due to interactions of the proposal with existing facilities and operations should also be evaluated where significant, in addition to evaluating the risks from the proposal.

7. Rehabilitation

The following issues should be considered:

- a) the proposed final use of the site, including final land formation plans for the site following closure of the chemical facility
- b) the general suitability of the soil for future proposed land uses; whenever land is proposed to be redeveloped, rezoned or subdivided for other uses after closure of the chemical facility, the level of land contamination will need to be addressed. The planning issues involved and the practices which need to be followed are outlined in *Contaminated land: planning guidelines for contaminated land* (Department of Urban Affairs and Planning and the Environment Protection Authority, 1995)
- c) if appropriate, any contaminated land remediation works
- d) final drainage patterns and erosion control measures
- e) the monitoring and maintenance program.

8. Consideration of alternatives and justification for the preferred proposal

Consideration should include an assessment of the environmental consequences of adopting alternatives, including alternative:

- a) sites and site layouts, having regard to the results of the site evaluation process described in Part 4
- b) truck routes and access
- c) materials handling and production processes
- d) waste and water management
- e) impact mitigation measures, particularly air quality and noise measures
- f) energy sources.

Consideration should be given to the consequences of not carrying out the proposal.

The selection of the preferred option should be justified in terms of:

- a) the ability to satisfy the objectives of the proposal; the relative environmental, economic and social costs and benefits of each alternative — significant non-monetary and non-quantifiable costs and benefits should be described and qualitatively assessed
- b) the acceptability of environmental impacts including biophysical, economic and social (including health) impacts
- c) the acceptability of any environmental risks or uncertainties, particularly in meeting environmental standards and minimising public health risks; the reliability of individual environmental impact mitigation measures; the ability of the options to tolerate abnormal events such as fire, explosions, gas leakage, accidental discharge of chemicals, flooding, bushfire, earthquake or other natural hazards
- d) the efficiency with which the proposal meets present demand; the flexibility of the proposal to meet future demand
- e) the efficient use of land, raw materials, energy, water and other resources; the opportunity to maximise the recycling and reuse of wastes or by-products

C. The location

1. Planning context, site description and locality information

The following information should be provided:

- a) zoning, permissibility
- b) the compatibility of the proposal with any planning provisions or land use constraints including:
 - i) any easements or other restrictions affecting the site, including any heritage or environmental protection provisions
 - ii) any relevant provisions of any state environmental planning policies, regional or local environmental plans, or development control plans
 - iii) any relevant catchment management plans, regional strategies or management plans for the area
- c) title details; land tenure; owner's consent (if not the proponent); where Crown land is involved, any constraint associated with the form of lease or tenure
- d) maps, plans or aerial photographs clearly identifying the location of the proposal in relation to:
 - i) the surrounding roads, adjoining communities or dwellings and any land use or natural features likely to be affected by the proposal
 - ii) utilities including transmission lines, pipelines, cables or easements
 - iii) sight-lines from dwellings or public places such as roads
 - iv) other surrounding activities which in combination with the chemical facility have the potential to generate significant cumulative impacts (such as traffic, air, noise or water impacts).

2. Overview of the affected environment

An overview of the affected environment should be provided in order to place the proposal in its local and regional environmental context. This overview should be general. Specific details should be provided when assessing the environmental impacts of the proposal.

General information to be provided includes an overview of:

- a) meteorological characteristics which may influence dust or noise impacts
- b) the use and vulnerability of any natural water bodies likely to be affected by the proposal; general water quality characteristics
- c) the use and vulnerability of groundwater; general water quality characteristics
- d) characteristics of land likely to be affected in terms of general soil characteristics
- e) predominant vegetation communities in areas to be disturbed, their potential habitats and conservation values
- f) the heritage, conservation, archaeological, historical, cultural, scientific, or scenic significance of any buildings, items, places or areas likely to be affected.

D. Identification and prioritisation of issues

1. Overview of the methodology

Outline the procedures or methodology used to identify and prioritise issues. Factors to consider include:

- a) the outcome of a review of relevant sources of information on potential issues including:
 - i) any relevant guidelines produced by NSW government authorities, other relevant States or overseas guidelines
 - ii) any industry guidelines
 - iii) EISs for similar projects, any relevant commission of inquiry reports, determination reports and conditions of approval
 - iv) relevant research or reference material
 - v) relevant strategic plans or policies
 - vi) relevant preliminary studies or pre-feasibility studies
- b) the outcome of consultation with stakeholders including:
 - i) planning focus meetings, community focus meetings, community workshops or issues groups
 - ii) meetings with stakeholders (e.g. government agencies particularly EPA, councils, major market representatives)
- c) use of methodology such as DUAP's guideline *Is an EIS required?* (Department of Planning, 1995) or checklists, matrices or similar approaches.

2. Outcomes of the process

Summarise the outcome of the identification and prioritisation process including:

- a) all the issues identified
- b) the key issues which will need a full analysis in the EIS (including comprehensive baseline assessment)
- c) the issues which will not need a full analysis in the EIS although they may be addressed in the mitigation strategy; the justification for the proposed level of analysis.

E. The environmental issues

The following issues are potentially important when assessing impacts, and for decision-making in relation to chemical facilities. The outline of the issues is not exhaustive and the degree of relevance of each will vary. The EIS should only deal with relevant issues as applicable to the particular proposal.

Assessment of potential impacts

The following information should be included for any potential impact which is relevant for the assessment of a specific proposal:

- a description of the existing environmental conditions (baseline conditions)
- a screening level assessment which should be undertaken before a detailed assessment, to identify potential impacts of concern
- when potential impacts of concern have been identified, and when sufficient information is available, a detailed analysis of these potential impacts on the environment; the analysis should indicate the level of confidence in the predicted outcomes and the resilience of the environment to cope with the impacts
- the proposed mitigation, management and monitoring program, including the level of confidence that the measures will effectively mitigate or manage the impacts.

With each issue, the level of detail should match the level of importance of the issue in decision-making.

1. Energy issues

The following should be considered:

- a) energy requirements; the efficiency of energy use; alternatives with respect to design measures, energy use management, off-peak use, alternative sources of power and co-generation
- b) electricity requirements; any new or upgraded transmission facilities including lines and substations; potential impacts from the provision of these services; on-site power generation and the type of installation to be used
- c) gas or diesel requirement; if natural gas, any new or upgraded pipelines; potential impacts from the provision of these services; if LP Gas or diesel, the storage facilities including safety provisions
- d) an assessment of impacts from a power or gas supply failure in terms of damage to the plant and consequential risks to people, property and the biophysical environment; any standby electricity or gas supply provisions
- e) an assessment of the impacts of energy usage and potential greenhouse implications.

2. Hazards issues

Consider the following potential hazards:

- a) operational events (including accidental release of toxic substances, explosions or fires)
- b) natural events (including bushfire, landslide, lightning strike, flooding or subsidence).

All potential hazards and associated scenarios should be identified, and the significance of their consequences assessed.

For chemical facilities with a risk of fire, explosion, or release of chemical substances, the need for a preliminary hazard analysis (PHA) should be considered. The procedure identified in *Applying SEPP 33* (Department of Planning, 1994a) should be considered. If a PHA is required, it should be prepared in accordance with *Hazardous Industry Planning Advisory Paper No 6 — Guidelines for Hazard Analysis* (Department of Planning, 1992b), and *Hazardous Industry Planning Advisory Paper No 4 — Risk Criteria for Land Use Safety Planning* (Department of Planning, 1992a). The most important elements of a PHA include:

- a) identifying the hazard scenarios associated with the use or storage of chemical

substances, and the likelihood of occurrence of potentially hazardous incidents, considering:

- i) the dangerous goods classification of all substances to be used, stored or disposed of on-site, and their quantities and throughput rate
 - ii) the climate, surrounding topography, vegetation, geological formation
 - iii) the proposed location, design and management regime
 - iv) interfaces with existing facilities and cumulative effects
- b) a quantified risk assessment of the most relevant hazards; the consequences in relation to public safety or impact on the environment if an operational or natural hazardous event were to occur; the likely consequences, taking into consideration:
 - i) location
 - ii) design and layout
 - iii) transportation
 - iv) protocols to reduce the risks, including provision for training and maintenance
 - c) identifying risk mitigation measures; assessing the adequacy of operational and emergency procedures involving dangerous and hazardous goods, and their effectiveness in reducing risk and environmental impacts
 - d) assessing cumulative risk levels expected from the proposed development, domino effects and safety implications for surrounding land uses.

The adequacy of the proposed safeguards should be evaluated against the risk levels and the criteria for surrounding land uses as set out in the *Hazardous Industry Planning Advisory Paper No. 4 — Risk Criteria for Land Use Safety Planning* (Department of Planning, 1992a). When assessing hazards involved with the storage and transportation of chemicals, the proposed hazards management measures should be demonstrated to be feasible. The following matters also need to be addressed:

- a) toxic combustion emissions from potential fires (including any toxic particle fallout, decomposed and undecomposed active ingredients)
- b) leakages and contamination issues or toxic releases from volatile spills in the container holding area, on internal roadways or at any liquid storage depot
- c) the operation of automatic safety systems in the event of a fire
- d) heat radiation levels from possible fires and

- their impact for firefighting services (i.e. setback distances that may restrict firefighting)
- e) the reactivity of chemicals with each other, including chemicals belonging to different or the same hazard classes (e.g. incompatibility of different oxidising agents)
 - f) the reactivity of different chemicals with water, and their impact on storage and firefighting measures
 - g) the management of temporary goods stacking
 - h) detection and firefighting equipment
 - i) the site management plan, covering on-site materials management, day-to-day operation, drainage control and emergency plans
 - j) the containment of contaminated firewater and other run-off, including an outline of means to prevent contaminated water entering the environment, and measures for:
 - i) directing and collecting water
 - ii) containing spills
 - iii) ensuring the segregation of clean stormwater from contaminated water.

3. Transport and traffic issues

In addition to general traffic and transportation issues for a chemical facility, the transport of raw materials, finished products and waste can pose significant hazards issues because of the nature of the materials being transported. These hazards issues should be adequately addressed. The department's draft *Route Selection Guidelines* should be consulted.

A road traffic impact study should be undertaken for all proposals involving significant numbers of vehicle movements during establishment or operation, including:

- a) transport requirements for raw materials, products, by-products, wastes, fuels and employees; routes, modes (shipping, trucking, air, rail or pipelines) and, if applicable, interchanges — consider alternative routes or transport modes (including public transport options for employees)
- b) traffic movement generated by the construction of the facility
- c) an assessment of the ability of the different modes of transport to handle the additional traffic, considering:
 - i) the suitability of the network(s) for transport of the material
 - ii) constraints on the transport of dangerous goods
 - iii) any upgrading proposals or requirements to handle the traffic; the potential impact of the proposal on the infrastructure maintenance
- d) with respect to movement of materials by pipeline, the impact on the community and the biophysical environment from construction or any incidents such as rupture, leakage or fire
- e) with respect to road transport:
 - i) current traffic on roads leading to the site, including volumes and vehicle types
 - ii) the estimated average and maximum daily and weekly truck movements to be generated by the proposal during construction and operation
 - iii) an assessment of the adequacy of the road network to deal with chemical facility traffic; identify:
 - noise, vibration and hazard sensitive land uses along the route such as schools, hospitals, nursing homes; potential impacts on these land uses
 - potential conflicts with other major road users or with school buses
 - areas of high traffic risk, including any sight distance constraints in relation to access to the site, existing congestion or traffic hazards
 - iv) potential risks associated with the transport of any hazardous substances given the road and traffic regime; any emergency procedures or protocols to be established to manage spillages, fires or release of chemicals on route
 - v) proposed measures to improve safety; the need for turning bays, additional traffic management devices, road upgrades.

4. Water issues

When dealing with water issues, the primary objective should be to minimise the impact or demand on existing waterbodies and systems.

Surface water issues

If waterbodies are at risk of contamination because of the proximity or pathways (including the stormwater system) to the waterbody, issues to consider include:

- a) a description of baseline information including locations, use, drainage and flow characteristics and existing water quality
- b) an outline of potential pollution from designed

and accidental sources as well as pathways including:

- i) the overflow from drains, first flush or holding tanks
 - ii) the run-off from stockpiles, storage areas, roads, parking areas or any disturbed areas
 - iii) the run-off of contaminated stormwater
 - iv) any discharge points for wastewater into stormwater or the environment — all such discharges should be of a quality acceptable to the EPA
- c) assessing the adequacy of water management systems to prevent impacts on water quality, taking into consideration the average rainfall and storm patterns, including:
- i) the yard drainage system; the performance of the system including the ability of the system to minimise the quantity of 'dirty' water or water resulting from firefighting or other emergencies; the locations, capacity, management and maintenance of bunding, drains, first flush, sumps and storage tanks; the proposed use or disposal of both 'clean' and 'dirty' yard water; any connection of the yard system to the wastewater system; any discharge points including pre-treatment and monitoring
 - ii) the wastewater system; performance including the design, capacity, management and maintenance of wastewater collection systems, treatment and holding tanks systems; proposals for use of the wastewater at the facility, water balance/ storage requirements; if disposal is required, the proposed treatment before disposal and discharge points (sewer, stormwater, environment)
- d) assessing the potential impacts of the proposal on water quality, particularly in relation to water users identified as being sensitive to loss of water quality
- e) management and monitoring practices to manage adverse impacts, including the location of any monitoring stations; nomination of an acceptable level of water quality at monitoring locations; proposals for remedial action if these levels are exceeded.

Groundwater issues

If groundwater is vulnerable because of its depth, overlying geological characteristics or the presence of recharge areas in the vicinity of the site, or if local groundwater is used as drinking

water, or is reversibly connected to surface waters and thereby aquatic ecosystems, issues to consider include:

- a) baseline information on groundwater aquifers including a description of the groundwater system(s) operating; the existing quality of the groundwater; flow direction(s), existing users, and interaction with groundwater-related environments
- b) potential sources of pollution from designed and accidental sources as well as potential pollution pathways, including contamination from seepage from holding tanks, fuel or chemical storage facilities or from contaminated surface water or wastewater disposal practices
- c) the adequacy of proposed measures to prevent groundwater contamination, including the bunding of fuel and chemical storages, and the production area or sealing of the site
- d) the potential impacts on the groundwater, groundwater-related environments, and any existing users
- e) management and monitoring practices to manage adverse impacts, including monitoring the integrity of all sealed surfaces, bunding systems and maintenance of inground collection and storage tanks; installing groundwater monitoring devices up and down hydraulic gradients of the site; proposals for remedial action if pollution occurs.

Flooding issues

For sites located in flood prone areas, the following issues should be considered:

- a) flooding status including the likely frequency of flooding and the depth of flooding
- b) if flood liable:
 - i) the direction of flood flow; assess the vulnerability of the storage, production and waste management facilities
 - ii) potential impacts from inundation of the facility, including the level, position and integrity of underground and surface facilities; the management of contaminated waters and issues of firefighting during the flood
 - iii) the potential for the proposal to increase the flood liability of surrounding land; the assessment of potential impacts of any increased flooding levels
 - iv) measures and management plans to

mitigate the impacts of floods including any levees — in the first instance, local council should be consulted regarding any specification

- v) any proposed flood mitigation measures that may influence the impacts of the proposal on the environment.

Water supply issues

Consider:

- a) water requirements including proposed usage rates or on-site reserves required for production, cooling, cleaning, firefighting, dust suppression, effluent dilution, drinking and toilets, landscaping or other purposes
- b) potential water supply sources including:
 - i) proposed on-site storage, stormwater reuse, sewer mining, groundwater sources, water recycling and reuse sources
 - ii) proposed off-site water sources, quality and treatment processes (if applicable); any requirement for new supply pipelines or water treatment works, and the discussion of their impact on the local environment
- c) any adverse impacts in the event of a major water supply failure in terms of damage to the plant and consequential risks to people, property and the biophysical environment; any standby water supply provisions
- d) proposals to minimise on-site water usage and recycle on-site water in the process
- e) assessing the efficient use of water in the operation of the facility
- f) assessing the adequacy of the water supply sources and the potential impact on any community water supply or groundwater resource, or on the water balance in any natural water system; the need to upgrade or augment the water supply or reticulation system.

Stormwater management issues

Consider:

- a) aspects of the proposal which will alter the effects of stormwater on neighbouring properties, including the need to divert natural flow channels
- b) the effectiveness of on-site stormwater management, including storage and reuse of stormwater.

5. Air issues

Issues to consider include:

- a) a review of the local air quality; any existing cumulative air quality issues (consult with EPA regarding any regional air quality monitoring); any nearby land uses likely to be sensitive to changes in air quality
- b) all mobile or fixed designed and accidental sources of air pollution during the construction and operation of the facility; all potential gas or particulate emissions and their characteristics including toxicity, flammability, odour, corrosive nature, deposition rate, likelihood to explode
- c) assessing the performance of the air quality management system in relation to:
 - i) vehicle operations, such as sealing of trafficable areas, limiting speeds, washing down of vehicles, windshields at unloading and open stockpile areas; water sprayers; sweeping or washing down of operational areas
 - ii) enclosure of potential gas or dust generating activities; collection and air filter systems (such as bag filters) including the performance criteria in relation to any EPA or NHMRC standards or guidelines and the maintenance regime
 - iii) mechanisms to minimise the impacts of gas or dust emissions in the event of system failure, including the location of any system outlet points, any alarm or indicator systems and shut-off valves to avoid spillage during any stage of the operation
- d) assessing the potential impacts on air quality; gas or dust dispersion, particularly in relation to land uses identified as being sensitive to reduced air quality; the likely chronic or acute risks on human health and the natural ecology; if significant, include:
 - i) likely quantity, characteristics, frequency and times of emissions taking into consideration hourly production peak rates
 - ii) dispersion characteristics having regard to the influence of local topography and weather — this may involve the modelling of dispersion contours
- e) mitigating management and monitoring practices to manage impacts, including the location of any monitoring stations; nominating acceptable levels of air emissions

at various locations taking into consideration EPA or NHMRC standards or guidelines; proposals for remedial action if these levels are exceeded

6. Soil issues

If earthworks are proposed, if the site was previously a landfill site, if irrigation of effluent is proposed or if soil contamination is likely, issues to consider include:

- a) surface characteristics including contours, slope gradient and length, terrain stability; characteristics of the soil, identifying any soil constraints such as erodibility, permeability, contamination; problems with load-bearing capacity or presence of acid sulfate or potential acid sulfate soils
- b) any likely effects during the construction or operation of the facility — this should include the likelihood of:
 - i) disturbing any existing contaminated soil (the local council should be consulted to determine if the site is considered 'potentially contaminated')
 - ii) contamination of soil by the operation of the facility including seepage from storage or pipelines
 - iii) subsidence or instability
 - iv) soil erosion
 - v) disturbing acid sulfate or potential acid sulfate soils
- c) assessing the effectiveness or adequacy of any soil management and mitigation measures during construction and operation including:
 - i) erosion and sediment control measures
 - ii) if land is contaminated, present proposals for site remediation — see *Contaminated land* (Department of Urban Affairs and Planning and the Environment Protection Authority, 1995)
 - iii) if acid sulfate soils or potential acid sulfate soils are present, proposals for the management of these soils — see *Assessing and Managing Acid Sulfate Soils* (Environment Protection Authority, 1995a)
- d) any proposed management, maintenance and monitoring proposals.

7. Noise issues

Issues to consider include:

- a) the existing acoustic environment including meteorological conditions, topographical

features and buffer zones which will influence the noise impacts; nearby land uses, particularly sensitive uses likely to be affected by noise from the facility

- b) proposed times when noise impacts are likely; potential fixed and mobile noise sources, including safety or security systems during:
 - i) construction and site works
 - ii) operation of the facility
 - iii) transport operations
 - iv) environmental and waste management activities
- c) predicting noise levels at potentially affected dwellings and at the site boundary
- d) all noise management measures, including design, management and training measures in relation to the chemical facilities plant and vehicles — consider:
 - i) the location of site access
 - ii) the design of the site so that noisy activities are far from sensitive land uses, or within acoustical enclosures or behind screens or bunds
 - iii) developing protocols for the use of horns, safety or security signals; the use of silencers on equipment
 - iv) control hours of operation
- e) assessing the adequacy of mitigation and management measures to control the generation of noise to meet appropriate noise standards such as the *Environmental Noise Control Manual* (EPA, 1994a)
- f) the proposed monitoring program, including the location of monitoring sites

8. Visual issues

For chemical facilities located in areas where visual impacts are likely to be a concern, issues to consider include:

- a) the visibility of the proposal from the surrounding areas; considering the proposal in the context of any landscapes of local or regional significance
- b) visual impacts caused by clearing of vegetation, stacks, towers, the production facility, bins or other structures, lights, dust on access roads; views to the site from nearby land uses, as well as from strategic locations adjacent to and in the vicinity of the site, particularly from higher elevations — any night time impacts due to lighting should also be identified

- c) proposed mitigation and management measures to reduce visual impacts such as:
 - i) layout, design, colour scheme, fencing, screening or visual treatment
 - ii) landscaping; species to be planted, taking into consideration the potential soil conditions
 - iii) protocols for transport vehicles.

9. Economic issues

Issues to consider include:

- a) costs and benefits to the community of the facility, taking into consideration environmental impacts identified in the EIS as well as the project factors; significant non-monetary costs and benefits should be described and qualitatively assessed — if economic issues are a major factor, the analysis should consider:
 - i) any economic implications on resources in the region and on infrastructure, residential or industrial development or activities in waterbodies (e.g. aquaculture or the fishing industry) likely to be affected by the proposal
 - ii) flow-on costs from the need to augment any infrastructure; the offset of contributions under section 94 of the EP&A Act or other contributions for the provision or upgrading of infrastructure
 - iii) flow-on benefits and costs to business or industry in the area or region
 - iv) any additional employment as a result of the proposal
 - v) potential impact on property values; the economic impact of establishing 'restricted use buffer' zones around any facilities
- b) any proposal for a performance bond — any bond could consider failure of safeguards resulting in a significant environmental impact.

10. Social issues

For chemical facility proposals located to pose potential social impacts, there is a need to consider the beneficial and adverse consequences on the community. The following include issues to be addressed:

- a) a review of any community consultation process; any issues raised in community consultation

- b) an assessment of the effect of the proposal on future community development in the area; the potential impact on the community's demographics, profile, structure, cohesion and income distribution
- c) an assessment of the impacts on the social welfare of the community; the need for additional social service requirements or housing; the need for additional release of land for housing development
- d) the potential impacts of the construction or operation on the amenity of the area considering factors such as noise, vibration, dust, traffic
- e) social equity considerations such as the means to offset any inequities.

11. Health issues

Issues to consider include:

- a) the public health risk associated with any existing facilities
- b) the potential health implications of the proposal, including potential chronic and acute risks associated with the controlled and accidental release of chemicals — the information included in the PHA should be referred to when ascertaining the potential health implications of the proposal; consider:
 - i) the likelihood of the facility increasing any existing health problems in the community
 - ii) air quality, water quality, road safety or soil contamination issues likely to affect health
 - iii) the nature of the chemical, its toxicity, its environmental pathway after release, its concentration and exposure mode (e.g. time, inhalation, absorption)
- c) if there is a likely health risk, a full health risk assessment considering the transport and exposure modes of the particular chemicals with health risk implications — in determining the need for a full health risk assessment, factors such as the toxicity of the chemicals and the likelihood for exposure will need to be considered
- d) assessing the adequacy of proposed design, management, mitigation and monitoring measures with regard to health risks
- e) assessing the adequacy of buffer zones from dwellings, recreational areas and public roads given the potential health risk
- f) assessing the potential improvements to community health as a result of the proposal.

12. Flora and fauna issues

This section is of particular relevance when terrestrial or aquatic vegetation is to be cleared, disturbed or affected by a change in water quality or quantity, or fauna habitats are likely to be disturbed. Issues to consider include:

- a) identifying plant and animal habitats and ecological communities, and where appropriate, populations and species in areas that may be directly or indirectly affected by the proposal
- b) indicating the local and regional scarcity of these habitats, ecological communities, populations and species. If relevant identify the following, indicating their incidence on the site:
 - i) threatened species, populations or ecological communities listed in Schedule 1 or 2 of the *Threatened Species Conservation Act 1995* (see Appendix 3)
 - ii) rare plant species listed in Rare or Threatened Australian Plants (ROTAP)
 - iii) areas protected under SEPP 14 — Coastal Wetlands, SEPP 26 — Littoral Rainforest, SEPP 44 — Koala Habitat Protection or other environmental planning instruments
 - iv) vegetation or fish species protected under the *Fisheries Management Act 1994*; the economic significance of any potentially affected fish species
 - v) trees listed in councils' Significant Tree Registers
- c) potential impacts on species, populations or ecological communities or their habitats (particularly in relation to the chronic or acute release of chemicals):
 - i) directly through changes in the number, distribution and size of habitats or the number of species, populations or ecological communities
 - ii) indirectly through changes in surface or groundwater quantity or quality or changes in air quality
- d) the sensitivity of species or communities to disturbance; the potential impacts of disturbance on biodiversity; the potential for recolonisation following rehabilitation — if relevant assess the significance of the area for koalas under the provisions of SEPP 44 — Koala Habitat Protection
- e) the significance of flora or fauna for other biota, including biota not directly affected by the proposal but which interact with potentially disturbed flora or fauna
- f) landscaping and rehabilitation proposals and their role in mitigating impacts, such as rehabilitation with indigenous species; the provision of new appropriate habitats; opportunities for colonisation; timing of major disturbances
- g) identifying potential weed and introduced species and describing measures to control and prevent infestations at the site and to control spread into localities adjacent to the proposal
- h) proposed monitoring to determine the effectiveness of mitigation and to verify predictions.

Note: Appendix 3 provides guidance on determining when a species impact statement (SIS) is required. An SIS must accompany any proposal in critical habitats or where there is likely to be a significant effect on threatened species, populations or ecological communities or their habitats.

External review of the SIS will help ensure that the information included is relevant.

13. Heritage issues

This section is relevant if land clearing, earthworks, disturbance of existing items (buildings, works, relics or places) or reduction of the heritage curtilage will occur as a result of the proposal. Issues which may need to be considered include:

- a) identifying any items of heritage significance on the site (including underwater) and in the area affected by the proposal. This should include two steps:

Step 1: collate information from any relevant heritage study or conservation plan for the site or area — this source may need to be supplemented with information from the following:

 - i) relevant historical research on the area
 - ii) consultation with the Aboriginal Land Council, local historical societies and the local council
 - iii) inspection of heritage registers, schedules, databases or lists, Heritage Council Register, heritage and conservation registers (various government agencies), local or regional environmental plans, archaeological zoning plans, Aboriginal Sites Register (National Parks and Wildlife Service (NPWS)), National Estate Register (Australian Heritage Commission), other

registers (National Trust, Institution of Engineers Australia, Royal Australian Institute of Architects)

Step 2: survey the area likely to be affected, to identify any items of potential heritage significance.

For non-Aboriginal heritage:

- a) assess the significance of any non-Aboriginal heritage items identified on the site, using criteria for assessing heritage significance published in the *NSW Heritage Manual 1996*
- b) assess the potential impacts of the proposal on the heritage significance — non-Aboriginal heritage items, protected under the *Heritage Act 1977* or a conservation instrument, require approval from the Heritage Council before disturbance can be undertaken; items identified in planning instruments require the consent of the nominated consent authority (usually council); shipwrecks protected under the *Historic Shipwrecks Act 1976* require the approval of the Director of the NSW Heritage Office
- c) propose measures to mitigate impacts or to conserve items of heritage significance — if items of significance are to be disturbed a conservation management plan may need to be prepared in consultation with the Heritage Office.

For Aboriginal heritage:

- a) assess the archaeological and anthropological significance of any Aboriginal relic or place identified on the site in consultation with the Land Council, Department of Aboriginal Affairs and NPWS
- b) assess the potential impact of the proposal on the heritage significance; Aboriginal relics or places cannot be disturbed without written consent from the Director-General of National Parks and Wildlife
- c) propose measures to mitigate impacts or to conserve the heritage significance of the area, relic or place — if items of significance are to be disturbed, a conservation management plan may need to be prepared in consultation with the NPWS, Land Councils, the Department of Aboriginal Affairs and the Heritage Office.

For natural heritage:

- a) assess the heritage significance of any natural areas including geological or palaeontological features or ecological communities
- b) assess the potential impact of the proposal on the heritage significance (note: items identified in planning instruments or in conservation areas require the consent of the nominated approval authority)
- c) propose measures to mitigate impacts or to conserve the heritage significance — if natural areas of heritage significance are to be disturbed a conservation management plan may need to be prepared in consultation with the relevant authorities.

Consider the acceptability of impacts on heritage significance and assess the adequacy of the measures to mitigate impacts during all stages of the proposal.

14. Cumulative issues

Cumulative impacts result from the incremental impacts of a number of developments or development components added to other past and foreseeable future developments. They may also be caused by the synergistic and antagonistic effects of different individual impacts interacting with each other. They may be due to the temporal or spatial characteristics of the activities and impacts. Some of the limitations associated with the assessment of cumulative impacts include the lack of detailed monitoring information and scientific understanding of natural systems' phenomena. Cumulative impacts may need to be considered based on the information available and development forecasts which can be made at the time of the assessment.

Issues to consider in relation to chemical facilities are:

- a) the extent to which the surrounding environment is already stressed by existing development; the potential for cumulative impacts from:
 - i) other existing chemical facilities in the site, area or region
 - ii) other activities with similar impacts

- b) any advantages or disadvantages from clustering industry in this area considering the environmental characteristics
- c) any likely long-term and short-term cumulative impacts having regard to air quality, noise or traffic disturbance, visual impacts, surface water and groundwater issues, public health or loss of heritage items, vegetation or fauna habitat
- d) consideration of the air and water quality objectives for the area or region.

F. List of approvals and licences

All approvals and licences required under any legislation must be identified. This is to alert relevant authorities as early as possible to their potential involvement in the project and to ensure an integrated approach to the granting of approvals. This list also provides the community with details of relevant authorities involved in the assessment and regulation of the proposal.

If the proposal is of a nature that triggers SEPP 33, advertising and other administrative procedures must also satisfy requirements under SEPP 33.

G. Compilation of mitigation measures

A critical component in the EIS is the mitigation strategy which demonstrates how the proposal and its environmental safeguards would be implemented and managed in an integrated and feasible manner. It also demonstrates that the proposal is capable of complying with statutory obligations under other licences or approvals.

The mitigation strategy should include the environmental management and cleaner production principles which would be followed when planning, designing, establishing and operating the proposal. It should include:

- specific locational, layout, design or technology features (which are described under each of the key issues)
- an outline of ongoing management and monitoring plans
- an outline of how the management of this project will be integrated into the environmental management system (EMS) for the organisation.

Mitigation strategies for the establishment and operational stages of the project should be distinguished, and in some circumstances, separate environmental management plans should be prepared.

An environmental management plan (EMP)

An environmental management plan (EMP) is a document designed to ensure that the commitments in the EIS, subsequent assessment reports, approval or licence conditions are fully implemented. It is a comprehensive technical document which is usually finalised during or following detailed design of the proposal after approval of the development application.

Although this level of detail is usually not considered necessary for the EIS or statement of environmental effects, it should contain a comprehensive outline of the structure of the EMP with a summary of the environmental management and cleaner production principles which would be followed when planning, designing, constructing and operating the proposal. For issues where there are high levels of risk or uncertainty, it may be essential to present in the EIS, details of the proposals to manage these issues. At the development approval stage, it is essential for the applicant to establish that the environmental impacts can be managed in an integrated and feasible manner.

With major or controversial projects, it may be appropriate to:

- establish a community committee to consult on the ongoing management and monitoring of the proposal
- plan to exhibit an annual environmental management report outlining the environmental performance of the proposal.

The EMP should provide a framework for managing or mitigating environmental impacts for the life of the proposal. It should also make provisions for auditing the effectiveness of the proposed environmental protection measures and procedures. Two sections should be included, one setting out the program for managing the proposal (section a. below), and the other outlining the monitoring program with a feedback loop to the management program (section b. below).

a) Environmental management outline

The management strategy should demonstrate sound environmental and cleaner production

practices during the establishment, operation, rehabilitation and end use of the chemical facility, including:

- i) management of construction impacts; if appropriate include erosion and sedimentation management and revegetation plans for areas disturbed by construction activities
- ii) management of operational impacts; if appropriate include details of:
 - materials management
 - water and air management
 - waste management
 - transport management
 - maintenance and site security plans
 - contingency plans to respond to emergencies, incidents or any breakdown in environmental performance
- iii) strategies to feed information from the monitoring program back into the management practices and action plans to improve the environmental performance and sustainability of components of the chemical facility
- iv) training programs for operational staff and incentives for environmentally sound performance
- v) an indication of how compliance with licensing and approval requirements will be achieved and due diligence attained
- vi) if applicable, a reporting mechanism on environmental performance, and the performance bond and relevant performance parameters
- vii) if applicable, an indication of how the management of the facility complies with the organisation's EMS

b) Monitoring outline

This program should be carefully designed and related to the predictions made in the EIS and the key environmental indicators which would demonstrate the potential ecological sustainability of the proposal. The EIS should outline the need for and use of any proposed monitoring, monitoring intervals and reporting procedures.

Parameters which may be relevant include:

- i) performance indicators in relation to critical operational issues including:
 - quantity and characteristics of air and water emissions

- soil contamination indicators
 - noise indicators
 - any relevant public health indicators
- ii) waste management; performance indicators in relation to recycling and reuse
 - iii) monitoring of complaints received.

The program outline should describe the following monitoring details:

- i) the key information that will be monitored, its criteria and the reasons for monitoring (which may be compliance with regulatory requirements)
- ii) the monitoring locations, intervals and duration
- iii) procedures to be undertaken if the monitoring indicates a non-compliance or abnormality
- iv) internal reporting procedures and links to management practices and action plans
- v) reporting procedures to relevant authorities and, if appropriate, to the consent authority and the community

H. Justification for the proposal

Reasons should be included which justify undertaking the proposal in the manner proposed, having regard to the potential environmental impacts and compliance with the principles of ecologically sustainable development.

The principles of ecologically sustainable development are:

- a) the precautionary principle — namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation
- b) inter-generational equity — namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations
- c) conservation of biological diversity and ecological integrity
- d) improved valuation and pricing of environmental resources.

The sustainability of the proposal should be outlined in terms of the ability of the proposal to:

- a) meet project objectives
- b) demonstrate efficiency in meeting the short- and long-term requirements for the products and in the use or reuse of raw materials, by-products or waste
- c) meet environmental performance and cleaner production requirements, including improved conservation or protection of natural resources and reduced environmental costs
- d) meet site specific environmental performance requirements considering the vulnerability of the groundwater, surface waters, soil, ecological communities, heritage or social factors
- e) safeguard public health.

Appendix 1. Schedule 2 — Environmental Impact Statements

This appendix contains an extract from the Environmental Planning and Assessment Regulation 1994. Schedule 2 outlines the matters that must be addressed in an EIS pursuant to clauses 51 and 84 of the EP&A Regulation.

1. A summary of the environmental impact statement.
2. A statement of the objectives of the development or activity.
3. An analysis of any feasible alternatives to the carrying out of the development or activity, having regard to its objectives, including:
 - a) the consequences of not carrying out the development or activity; and
 - b) the reasons justifying the carrying out of the development or activity.
4. An analysis of the development or activity, including:
 - a) a full description of the development or activity; and
 - b) a general description of the environment likely to be affected by the development or activity, together with a detailed description of those aspects of the environment that are likely to be significantly affected; and
 - c) the likely impact on the environment of the development or activity, having regard to:
 - i) the nature and extent of the development or activity; and
 - ii) the nature and extent of any building or work associated with the development or activity; and
 - iii) the way in which any such building or work is to be designed, constructed and operated; and
 - iv) any rehabilitation measures to be undertaken in connection with the development or activity; and
 - d) a full description of the measures proposed to mitigate any adverse effects of the development or activity on the environment.
5. The reasons justifying the carrying out of the development or activity in the manner proposed, having regard to biophysical,

economic and social considerations and the principles of ecologically sustainable development.

6. A compilation (in a single section of the environmental impact statement) of the measures referred to in item 4 (d).
7. A list of any approvals that must be obtained under any other Act or law before the development or activity may lawfully be carried out.

Note: For the purposes of this Schedule, “the principles of ecologically sustainable development” are as follows:

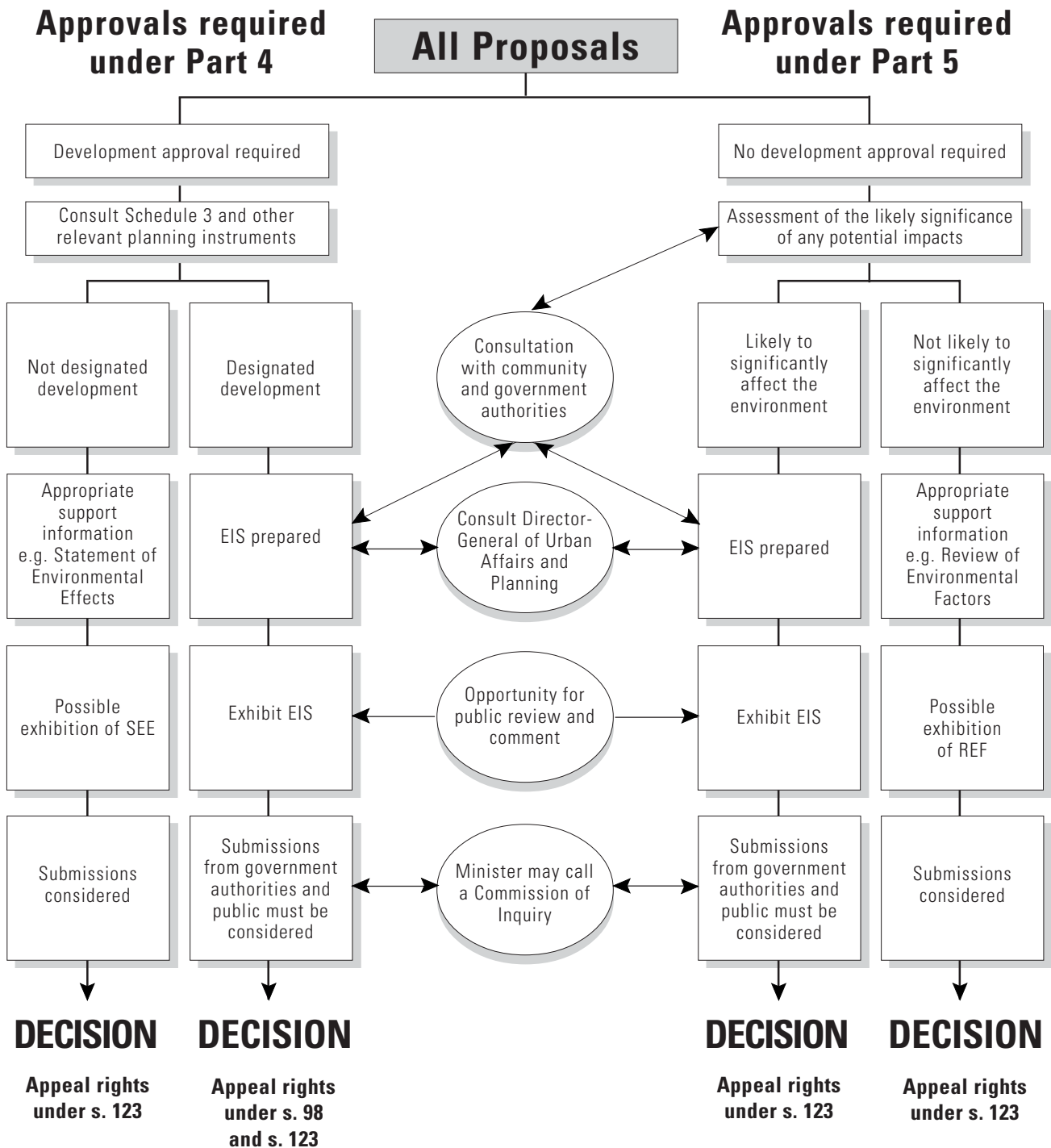
- a) The precautionary principle — namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- b) Inter-generational equity — namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.
- c) Conservation of biological diversity and ecological integrity.
- d) Improved valuation and pricing of environmental resources.

Note: The matters to be included in item 4 (c) might include such of the following as are relevant to the development or activity:

- a) the likelihood of soil contamination arising from the development or activity;
- b) the impact of the development or activity on flora and fauna;
- c) the likelihood of air, noise or water pollution arising from the development or activity;
- d) the impact of the development or activity on the health of people in the neighbourhood of the development or activity;
- e) any hazards arising from the development or activity;
- f) the impact of the development or activity on traffic in the neighbourhood of the development or activity;

- g) the effect of the development or activity on local climate;
- h) the social and economic impact of the development or activity;
- i) the visual impact of the development or activity on the scenic quality of land in the neighbourhood of the development or activity;
- j) the effect of the development or activity on soil erosion and the silting up of rivers or lakes;
- k) the effect of the development or activity on the cultural and heritage significance of the land.

Appendix 2. EIA procedures under the EP&A Act



Appendix 3. Threatened Species Conservation Act

This appendix contains an extract from the *Threatened Species Conservation Act 1995* and the provisions for assessing impacts on the conservation of critical habitats and threatened species, populations or ecological communities and their habitats.

What are critical habitats, threatened species, populations or ecological communities and threatening processes?

Critical habitats are prescribed in Part 3 of the *Threatened Species Conservation (TSC) Act 1995*. Threatened species, populations or ecological communities and threatening processes are prescribed in Part 2 and Schedules 1 and 2 of the TSC Act.

When is a Species Impact Statement required?

Under section 77 (3) (d1) and section 112 (1B) of the EP&A Act, if a proposal:

- is on land that contains a "critical habitat" or
- is likely to significantly affect threatened species, populations or ecological communities, or their habitats,

a species impact statement (SIS) must be prepared in accordance with Division 2 of Part 6 of the *TSC Act*.

Factors when deciding if an SIS is required

The following factors must be taken into account in deciding whether there is likely to be a significant effect on threatened species, populations or ecological communities, or their habitats:

- a) in the case of a threatened species, whether the life cycle of the species is likely to be

disrupted such that a viable local population of the species is likely to be placed at risk of extinction,

- b) in the case of an endangered population, whether the life cycle of the species that constitutes the endangered population is likely to be disrupted such that the viability of the population is likely to be significantly compromised,
- c) in relation to the regional distribution of the habitat of a threatened species, population or ecological community, whether a significant area of known habitat is to be modified or removed,
- d) whether an area of known habitat is likely to become isolated from currently interconnecting or proximate areas of habitat for a threatened species, population or ecological community,
- e) whether critical habitat will be affected,
- f) whether a threatened species, population or ecological community, or their habitats, are adequately represented in conservation reserves (or other similar protected areas) in the region,
- g) whether the development or activity proposed is of a class of development or activity that is recognised as a threatening process,
- h) whether any threatened species, population or ecological community is at the limit of its known distribution.

Form and content of an SIS

Under section 110 of the TSC Act, the general requirements on the form and content of an SIS are as follows.

General information

1. A species impact statement must include a full description of the action proposed, including its nature, extent, location, timing and layout and, to the fullest extent reasonably practicable, the information referred to in this section.

Information on threatened species and populations

2. A species impact statement must include the following information as to threatened species and populations:
- a) a general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action,
 - b) an assessment of which threatened species or populations known or likely to be present in the area are likely to be affected by the action,
 - c) for each species or population likely to be affected, details of its local, regional and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or threat abatement plan applying to it,
 - d) an estimate of the local and regional abundance of those species or populations,
 - e) a general description of the threatened species or populations known or likely to be present in the area that is the subject of the action and in any area that is likely to be affected by the action,
 - f) a full description of the type, location, size and condition of the habitat (including critical habitat) of those species and populations and details of the distribution and condition of similar habitats in the region,
 - g) a full assessment of the likely effect of the action on those species and populations, including, if possible, the quantitative effect of local populations in the cumulative effect in the region,
 - h) a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development,
 - i) a full description and justification of the measures proposed to mitigate any adverse effect of the action on the species and populations, including a compilation (in a single section of the statement) of those measures,

- j) a list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the species or population.

Information on ecological communities

3. A species impact statement must include the following information as to ecological communities:
- a) a general description of the ecological community present in the area that is the subject of the action and in any area that is likely to be affected by the action,
 - b) for each ecological community present, details of its local, regional and State-wide conservation status, the key threatening processes generally affecting it, its habitat requirements and any recovery plan or any threat abatement plan applying to it,
 - c) a full description of the type, location, size and condition of the habitat of the ecological community and details of the distribution and condition of similar habitats in the region,
 - d) a full assessment of the likely effect of the action on the ecological community, including, if possible, the quantitative effect of local populations in the cumulative effect in the region,
 - e) a description of any feasible alternatives to the action that are likely to be of lesser effect and the reasons justifying the carrying out of the action in the manner proposed, having regard to the biophysical, economic and social considerations and the principles of ecologically sustainable development,
 - f) a full description and justification of the measures proposed to mitigate any adverse effect of the action on the ecological community, including a compilation (in a single section of the statement) of those measures,
 - g) a list of any approvals that must be obtained under any other Act or law before the action may be lawfully carried out, including details of the conditions of any existing approvals that are relevant to the ecological community.

Credentials of persons undertaking an SIS

4. A species impact statement must include details of the qualifications and experience in threatened species conservation of the person preparing the statement and of any other person who has conducted research or investigations relied on in preparing the statement.

State-wide conservation status

5. The requirements of subsections (2) and (3) [above] in relation to information concerning the State-wide conservation status of any species or population, or any ecological community, are taken to be satisfied by the information in that regard supplied to the principal author of the species impact statement by the NPWS, which information that Service is by this subsection authorised and required to provide.

Procedures for preparing an SIS

Under Section 111 of the TSC Act, the Director-General of National Parks and Wildlife must be consulted in writing for the requirements for an SIS. These requirements must be provided within 28 days from when a request is made.

Because of the circumstances of the case, the Director-General of National Parks and Wildlife may limit or modify the extent of matters prescribed in section 110. In other cases if the impacts are considered to be trivial or negligible, the Director-General of National Parks and Wildlife may dispense with the requirement for an SIS to be prepared.

An SIS may be prepared as a separate document or incorporated in an EIS. If the SIS is separate to the EIS, it must be exhibited concurrently with the EIS.

The SIS must be in writing and be signed by the principal author of the document and the applicant/proponent.

Appendix 4. Consultation and approvals

It is the responsibility of the person preparing the EIS to determine what approvals will be required as a result of the proposal and to demonstrate that the proposal can meet all approval and licensing requirements. In preparing the EIS, consultation with relevant parties should be undertaken early in the EIA process and their comments taken into account in the EIS.

Approvals or consultation which may be required include:

local councils for development approvals under Part 4 of the EP&A Act and any building approval under the *Local Government Act 1993*, also for any alteration to local roads or buildings or trees of local heritage significance

Department of Urban Affairs and Planning for concurrence if the proposal impacts on SEPP 14 — Coastal Wetlands, SEPP 26 — Littoral Rainforest, potential or actual koala habitat under SEPP 44 — Koala Habitat Protection

Environment Protection Authority for air, water and noise licences, approvals and certificates of registration under relevant pollution control legislation; regulation of waste generation, transportation and disposal; licences for transport of dangerous goods under the Dangerous Goods Act; licences for chemicals subject to chemical control orders under the Environmentally Hazardous Chemicals Act

Department of Land and Water Conservation Soil and Vegetation Management for information on soils; design and construction of erosion and sediment controls and rehabilitation; approvals on protected lands; State Lands Services regarding effect of development on any Crown land; for leasing, licence, or purchase; whether the land is subject to Aboriginal land claim or Native Title legislation; if Crown Reserves and dedicated lands exist, whether the proposal is compatible with the stated public purpose; State Water Management regarding impact on ground or surface water resources; clearing riparian vegetation; works within 40 metres of a stream;

Coastal and Rivers Management regarding flooding and coastal areas; Water Services Policy regarding approvals under the *Local Government Act 1993*

relevant service authorities such as water, electricity, gas, telecommunication, drainage, flood mitigation, sewerage or other utility organisations

National Parks and Wildlife Service if land clearing or impacts on natural vegetation are likely, particularly in relation to the provisions of the Threatened Species Conservation Act; or if sites of Aboriginal heritage significance or land managed by the Service are likely to be affected

NSW Fisheries if fish or fish habitat is affected (including dredging or reclamation works, impeding fish passage, damaging marine vegetation, desnagging, use of explosives or other dangerous substances in or adjacent to a waterway which may result in fish kills)

NSW Agriculture if the proposal is on land with high agricultural value or will cause dislocation to the agricultural industry

NSW Health Department with regard to the potential health hazard caused by the operation and siting of the facility

WorkCover for responsibilities regarding handling of dangerous goods and hazardous substances

Heritage Council of NSW if the proposal is likely to affect any place or building having State heritage significance or if the proposal is affected by Interim Conservation Orders (ICO) or Permanent Conservation Orders (PCO)

Department of Aboriginal Affairs if the proposal is in an area of significance to the Aboriginal community

Department of Mineral Resources if a resource management plan applies or if the proposal is in an area of important mineral resources, concerning its responsibilities under Sydney REP No 9 — Extractive Industry, and for safety and blasting

Mining Subsidence Board if the proposal is in an underground mining area

State Rail Authority (SRA) if the proposal impacts on SRA operations

Office of Marine Safety and Port Strategy on any activities on navigable waters

Roads and Traffic Authority if the proposal is likely to result in significant traffic impacts

State Forests of NSW in relation to impacts on State Forests

Department of Bushfire Services if the area is in a location of bushfire hazard

Catchment Management Committees or Trusts

Local Aboriginal Land Councils

relevant industry organisations

Commonwealth EPA, if Commonwealth land is likely to be affected or if Commonwealth funding applies

the owner or operator of any nearby airports and airport safety organisations.

Appendix 5. References

The following are some references that may be of assistance in preparing an EIS for chemical facilities. This list is by no means exhaustive.

APHA (1992) *Standard Methods for the Examination of Water and Wastewater including Bottom Sediments and Sludges*, 18 ed, New York: American Public Health Association, American Society Water Works Association and the Water Environment Federation

Australian and New Zealand Environment and Conservation Council (ANZECC) (1992) *Australian Water Quality Guidelines for Fresh and Marine Waters*

Briggs, J. D. and Leigh, J. H. (1988) *Rare or Threatened Australian Plants* (ROTAP), Special Publication 14, NPWS, Canberra, ACT

Cox, G. (1994) *Social Impact Assessment*, Office on Social Policy, NSW Social Policy Directorate

Department of Planning (1992a) *Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 — Risk Criteria for Land Use Safety Planning*, Department of Planning, NSW

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Department of Planning (1994a) *Applying SEPP 33 — Hazardous and offensive development application guidelines*, Department of Planning, NSW

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Department of Planning (1995) *Is an EIS required? Best practice guidelines for Part 5 of the Environmental Planning and Assessment Act 1979*, Department of Planning, NSW

Department of Urban Affairs and Planning and the Environment Protection Authority (1995) *Contaminated land: Planning guidelines for contaminated land*, Department of Urban Affairs and Planning and the Environment Protection Authority, NSW

Environment Protection Authority (1994a) *Environmental Noise Control Manual*, EPA, Sydney

Environment Protection Authority (1994b) *Water Quality Investigations Manual, Preferred Methods for Sampling and Analysis (Draft)*, EPA, Sydney

Environment Protection Authority (1995a) *Assessing and Managing Acid Sulfate Soils*, EPA, Sydney

Environment Protection Authority (1995b) *Environmental Guidelines: Solid Waste Landfills*, EPA, Sydney

Gilpin, A. (1995) *Environmental Impact Assessment: Cutting Edge for the 21st Century*, Cambridge Press, Melbourne

Harden, G. J. (1990) *Flora of New South Wales*, Volumes 1–4 University Press, Sydney

James, D. & Boer, B. (1988) *Application of Economic Techniques in Environmental Impact Assessment Preliminary Report*, prepared for the Australian Environment Council

McDonald, R. C., Isbell, R. F., Speight, J. G., Walker, J. & Hopkins, M. S. (1990) *Australian Soil and Land Survey Field Handbook*, Inkata Press, Melbourne

Northcote, K. H. (1979) *A Factual Key to the Recognition of Australian Soils*, CSIRO, Rellim Technical Publications, Glenside, SA

USA Environmental Protection Authority (1991) *Handbook: Groundwater Volume II Methodology (EPA 625/6-90/016b)*, US Government Printing Office

York, A., Binns, D. & Shields, J. (1991) *Flora and Fauna Assessment in NSW State Forests, Survey Guidelines Procedures for Sampling Flora and Fauna for Environmental Impact Statements*, Forestry Commission of NSW

Appendix 6. Schedule 3 — Designated development

This appendix is an extract from Schedule 3 of the EP&A Regulation 1994 and prescribes:

- (a) **chemical industries or works and**
- (b) **chemical storage facilities, which are designated under Part 4 of the EP&A Act.**

Chemical industries or works for the commercial production of, or research into, chemical substances at:

- 1) the following industries or works:
 - a) **agricultural fertiliser industries** that produce more than 20,000 tonnes per annum of inorganic plant fertilisers; or
 - b) **battery industries** that manufacture or reprocess batteries containing acid or alkali and metal plates and use or recover more than 30 tonnes of metal per annum; or
 - c) **explosive and pyrotechnics industries** that manufacture explosives for purposes including industrial, extractive industries and mining uses, ammunition, fireworks or fuel propellents; or
 - d) **paints, paint solvents, pigments and dyes, printing inks, industrial polishes, adhesives and sealants manufacturing industries** that manufacture more than 5,000 tonnes per annum of product; or
 - e) **petrochemical industries** that manufacture more than 2,000 tonnes per annum of petrochemicals and petrochemical products; or
 - f) **pesticides fungicides, herbicides, rodenticides, nematocides, miticides, fumigants and related products industries** that:
 - i) manufacture materials classified as poisonous in the Australian Dangerous Goods Code; or
 - ii) manufacture (excluding simple blending) more than 2,000 tonnes per annum of products; or
 - g) **pharmaceutical and veterinary products industries** that manufacture or use materials classified as poisonous in the Australian Dangerous Goods Code; or
- h) **plastics industries** that:
 - i) manufacture more than 2,000 tonnes per annum of synthetic plastic resins; or
 - ii) reprocess more than 5,000 tonnes of plastics per annum other than by a simple melting and reforming process; or
- i) **rubber industries or works that:**
 - i) manufacture more than 2,000 tonnes per annum of synthetic rubber; or
 - ii) manufacture, retread or recycle more than 5,000 tonnes per annum, of rubber products or rubber tyres; or
 - iii) dump or store (otherwise than in a building) more than 10 tonnes of used rubber tyres; or
- j) **soap and detergent industries** (including domestic, institutional or industrial soaps or detergent industries) that manufacture:
 - i) more than 100 tonnes per annum of products containing substances classified as poisonous in the Australian Dangerous Goods Code; or
 - ii) more than 5,000 tonnes per annum of products (excluding simple blending); or
- 2) industries or works:
 - a) that manufacture, blend, recover or use substances classified as explosive, poisonous or radioactive in the Australian Dangerous Goods Code; or
 - b) that manufacture or use more than 1,000 tonnes per annum of substances classified (but other than as explosive, poisonous or radioactive) in the Australian Dangerous Goods Code; or
 - c) that crush, grind or mill more than 10,000 tonnes per annum of chemical substances; or
- 3) industries or works located:
 - a) within 40 metres of a natural waterbody or wetlands; or

- b) in an area of:
 - i) high watertable; or
 - ii) highly permeable soil; or
- c) in a drinking water catchment; or
- d) on a floodplain.

This designation of chemical industries or works does not include:

- a) chemical industries or works where chemical substances listed in the NSW Dangerous Goods Regulation 1978 are stored in quantities below the licence level set out in that Regulation; or
- b) development specifically listed elsewhere in this Schedule.

Chemical storage facilities that:

- 1) store or package chemical substances in containers, bulk storage facilities, stockpiles or dumps with a total storage capacity in excess of:
 - a) 20 tonnes of pressurised gas; or
 - b) 200 tonnes of liquefied gas; or
 - c) 2,000 tonnes of any chemical substances; or
- 2) are located:
 - a) within 40 metres of a natural waterbody or wetlands; or
 - b) in an area of:
 - i) high watertable; or
 - ii) highly permeable soil; or
 - c) in a drinking water catchment; or
 - d) on a floodplain.

Are alteration or additions designated development?

Is there a significant increase in the environmental impacts of the total development?

- 1. Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly

increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.

Factors to be taken into consideration

2. In forming its opinion, a consent authority is to consider:

- a) the impact of the existing development having regard to factors including:
 - i) previous environmental management performance, including compliance with:
 - conditions of any consents, licences, leases or authorisations by a public authority; and
 - any relevant codes of practice; and
 - ii) rehabilitation or restoration of any disturbed land; and
 - iii) the number and nature of all past changes and their cumulative effects; and
- b) the likely impact of the proposed alterations or additions having regard to factors including:
 - i) the scale, character or nature of the proposal in relation to the development; and
 - ii) the existing vegetation, air, noise and water quality, scenic character and special features of the land on which the development is or is to be carried out and the surrounding locality; and
 - iii) the degree to which the potential environmental impacts can be predicted with adequate certainty; and
 - iv) the capacity of the receiving environment to accommodate changes in environmental impacts; and
- c) any proposals:
 - i) to mitigate the environmental impacts and manage any residual risk; and
 - ii) to facilitate compliance with relevant standards, codes of practice or guidelines published by the Department of [Urban Affairs and] Planning or other public authorities.