Roads and Related 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 roads and related facilities usually include:

- the strategic planning context
- traffic issues
- community issues, including noise and visual impacts
- air and water quality issues.

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.

Contents

1. Purpose and scope of the guideline

1.1 Background

A major function of an environmental impact statement (EIS) is to provide information on the potential environmental impacts of a proposal. This guideline outlines issues which may need to be addressed in an EIS for a road or related facility to fulfil this function. The guideline will also be relevant when assessing proposals requiring a lesser degree of environmental assessment.

Road proposals have the potential to result in significant effects on the social and economic aspects of the community as well as the biophysical environment. Careful site selection, design and management are necessary to ensure that the facility is constructed and operated in an ecologically sustainable manner. Consideration of the strategic context is essential when selecting alternatives and justifying the proposal. Any available information on the land use and transport planning policies, programs and strategies which have guided how the road has been developed should be considered in the EIS.

It is not the role of the project EIS to undertake a strategic environmental assessment of land use or transport plans or policies. Rather, it should report upon and apply them to the proposal.

Strategic or cumulative studies for land use or transport planning undertaken by the Department of Urban Affairs and Planning (DUAP), the Roads and Traffic Authority (RTA), the State Rail Authority (SRA), Department of Transport, State Transit Authority or local councils should be considered when formulating and justifying undertaking a proposal. Metropolitan air and water quality studies, state of the environment reports and local and regional environmental studies should also be taken into consideration.

The relevance of issues for a particular road proposal will depend upon the proposed location, the size and nature of the proposal and proposed operational regime. The greater the potential environmental impacts, the more carefully the site or route must be chosen and greater attention paid to environmental assessment.

The EIS should consider the issues which are important when making decisions on a particular proposal. The level of detail required to assess any particular issue should reflect the level of significance of the potential impacts on the environment. It is essential to focus on key issues. Not all matters outlined in this guideline will apply to every proposal. Equally, there may be other important matters not identified. If the EIS properly addresses the matters identified in this guideline, there should be sufficient information for the assessment of impacts of most roads and related facilities.

As well as providing advice to proponents of road proposals, this guideline will also be of assistance to government authorities responsible for the approval of roads and road facilities. This guideline should be read in conjunction with *Environment Manual Volume 3 — Environmental Impact Assessment Guidelines* (RTA, 1995a).

1.2 Road and road related facilities covered by this guideline

For the purposes of this guideline, a road is defined as a public way intended for vehicular and pedestrian travel, including the entire area within the right-of-way. Road proposals requiring the preparation of an EIS can vary in size from road widening works through to construction of a multi-lane motorway in a new road corridor. The nature and extent of construction activities will vary considerably and may include the establishment of temporary or ancillary activities as well as the rehabilitation of disturbed areas.

Road and related facilities may include but are not limited to:

- tollways, freeways, highways, expressways, parkways, frontage roads, streets and local roads, tunnels (including ventilation systems), bridges, causeways, fords, road-ferry facilities including bank stabilisation works
- sidewalks, walkways, cycleways, pedestrian bridges, bus ways or lanes with associated loading and unloading facilities located within a roadway

- traffic control devices such as signs, signals, markings, devices erected for the purpose of regulating, warning or guiding vehicular traffic or pedestrians, or regulating parking and stopping; traffic calming devices
- areas or devices to separate traffic or manage impacts including medians, lane separators, traffic islands, other channelisation devices, intersections, roundabouts, interchanges, grade separation devices, ramps, shoulders, curbs, gutters, drains, underpasses, noise and visual barriers, landscaping
- administration buildings, tollbooths, truck weighing facilities, rest areas, parking, lookouts, safety ramps, emergency facilities, maintenance depots, construction compounds.

Throughout the remainder of this document a road or related facility is referred to by the generic term 'road'.

1.3 When is an EIS required for a road?

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 (EIA). Appendix 2 provides a summary of EIA procedures. It is important to consult with the relevant local councils to determine whether roads are permissible in the proposed location and if development consent is required.

a) EIA under Part 4

Under Part 4 of the EP&A Act, a road may require development consent under the provisions of an environmental planning instrument. If consent is required, developments which are likely to significantly affect the environment may be designated under Schedule 3 of the EP&A Regulation 1994 or under an environmental planning instrument. Unless extensive extractive industry works are involved, the types of road proposals assessed under Part 4 are not normally designated development. However, environmental planning instruments can designate roads such as those which pass through environmentally sensitive areas mapped under State Environmental Planning Policy (SEPP) 14 —Coastal Wetlands, or SEPP 26 — Littoral Rainforests.

If a road proposal is designated, an EIS must be prepared and lodged with a development application, usually to the local council. If a road proposal (which requires development consent) is not designated, a Statement of Environmental Effects (SEE) which assesses the impacts of the proposal must be submitted with the development application. This guideline will help identify the range of issues which should be addressed in a SEE.

b) EIA under Part 5

The provisions of Part 5 of the EP&A Act applies when proposals do not require development consent and are not prohibited under the provisions of a environmental planning instrument. Certain types of development are exempt from the need for development consent under the provisions of environmental planning instruments. For example, SEPP 4 — Development Without Consent exempts 'classified roads' and 'toll works' from the need for development consent. In addition, most Local Environmental Plans (LEPs) which have adopted the EP&A Model Provisions (1980 or earlier versions) exempt certain road works from the need for consent. As a result, most road projects undertaken by the RTA or local councils do not usually require development consent. This exemption only applies to ancillary works that are associated exclusively with road proposals and, because of their scale and nature, can be considered to be ancillary and subsumed in the road proposal.

Under Part 5, a determining authority must consider whether the proposal has the potential to significantly affect the environment, prior to granting an approval or carrying out the project. If a determining authority considers significant impacts are likely, an EIS must be prepared and examined before an approval is granted.

The guideline *Is an EIS required?* (Department of Planning, 1995) will help government authorities to decide if an EIS is required. For all projects (except those which have minor impacts which can be easily assessed in *Is an EIS required?* (ibid) without further documentation), a review of

environmental factors (REF) should be prepared as a precursor to deciding if an EIS is required. If it is decided that an EIS is not required, the environmental issues and proposed mitigation identified in the REF can be used to fulfil the obligations under section 111 of the EP&A Act when making any determination in relation to the proposal.

c) Assessment under both Part 4 and Part 5

In some circumstances, components of a proposal may require development consent under the provisions of an environmental planning instrument and fall under Part 4 of the Act, while other components may not require consent and fall under Part 5. In these circumstances, the provisions of both Part 4 and Part 5 apply.

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 road or related facilities proposal, the following organisations should be invited to a PFM or otherwise consulted:

- **relevant local councils**
- **Department of Urban Affairs and Planning**
- **Roads and Traffic Authority**
- **Department of Transport**
- **Environment Protection Authority**
- **Department of Land and Water Conservation**
- **National Parks and Wildlife Service.**

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. Route or site selection procedures

Principles of route or site selection for road proposals

Consideration must be given to whether:

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

4.1 Overview

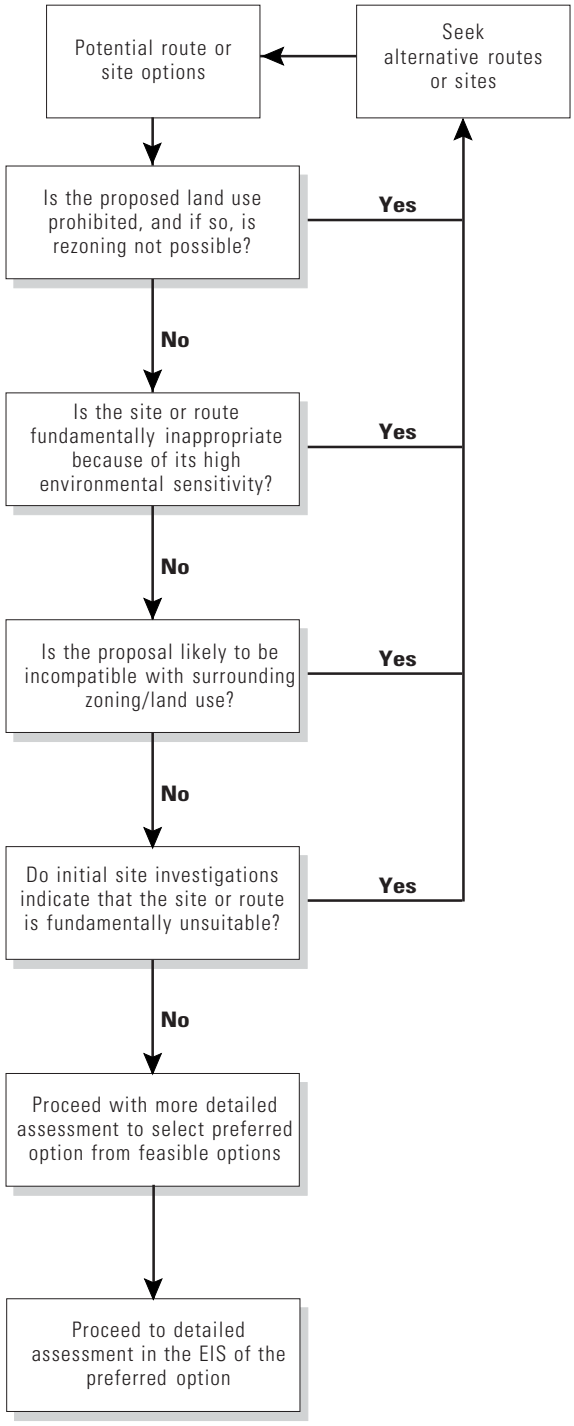
The route or site selection is usually undertaken in two stages, a preliminary assessment to eliminate unsuitable routes or sites followed by a more detailed assessment to select a preferred option from a number of potentially feasible options. When selecting potentially feasible options and the preferred option, broader environmental, social, economic and land use constraints and opportunities must be considered along with operational, financial and engineering factors.

The greater the potential for adverse effects on the environment or the community, the more important the route or site selection process. Appropriate route or site selection studies can avoid or reduce many of the environmental problems with road proposals and:

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

A route/site selection study should be objective, transparent and avoid unsupported or unsubstantiated opinions biased towards a predetermined option. The level of detail in a route selection study should be commensurate with the scale of the proposal, the potential environmental risks associated with the proposal

Figure 1. Principles for Route or Site Selection



and the potential sensitivity of the location. All route/site selection studies should involve an appropriate level of consultation with the government, community and potential road users throughout stages of the interactive process. A systematic and rigorous approach to route or site selection is recommended as set out in Figure 1.

It should be noted that the selection methodology outlined to assess the suitability of a new route or site, can also be applied to assessing the appropriateness of an existing route for upgrading or augmentation (for instance from a regional road to a restricted access motorway).

4.2 Preliminary route or site selection

The first stage of the selection study can be a cost-effective device to exclude fundamentally unsuitable routes or sites from further consideration. Most route selection studies for new road corridors should involve some form of desktop study involving techniques such as constraints and opportunities mapping along with limited site investigations. Techniques such as constraints or opportunity mapping allow locations with serious environmental incompatibilities or which are likely to result in major community conflicts to be eliminated as early as possible.

It is important that a scale appropriate to the complexity of the constraints in the study area be used. As a general guide, a scale of 1:25 000 will normally be considered as a minimum for non-urban areas whilst 1:10 000 or larger is likely to be more appropriate for urban areas. Aerial photography, orthophoto maps, topographic maps and GIS are extremely valuable tools in the analysis and assist both the assessment and also the community understanding of the issues at stake. Other techniques may be more appropriate for roads in urbanised areas where route options may be restricted to existing road corridors. Nevertheless, each case should be assessed on its own merits.

Consideration must be given to:

a) Permissibility of land use

At an early stage in the route or site selection process it is essential to check with the local council to determine where roads are not permissible under the provisions of the LEP or other planning instruments. If roads are not permissible in an area proposed for the road, discussions should be held with Council to determine its attitude towards rezoning the site.

b) Environmentally sensitive areas

Areas of high environmental value should be identified and wherever possible, excluded from any further consideration as site selection options. Table 1 provides examples of areas to be avoided.

c) Compatibility with land uses

Another important consideration is the compatibility of the proposal with existing or proposed surrounding land uses. Conflicts commonly arise when the community's amenity is seriously threatened, particularly by increased noise or reduced air quality. Any potential conflicts and possible options for reducing or preventing conflicts during the site selection process should be considered. In some circumstances, increased separation distances from sensitive land uses can significantly reduce impacts. The need for and extent of 'buffer' areas should be determined on a case specific basis. Table 2 suggests land uses which might require separation from nearby road proposals and suggests performance objectives. If the proposal is potentially incompatible with surrounding land uses, consideration should be given to providing sufficient land to provide adequate on-site separation from nearby land uses. As the establishment of 'buffer' areas around road facilities can lead to unacceptable land sterilisation, separation distances should not be viewed as a primary means of ameliorating impacts. In addition, the EPA does not accept impact reduction by separation distances for air or water pollution. Instead, separation distances should be seen as a last resort option to ensure the amenity of existing land uses can be maintained. The role of site separation as an impact mitigation measure should simply reinforce the impact mitigation measures provided by other means.

d) Initial site investigations

The purpose of preliminary site investigations is to provide an early evaluation of the suitability of the proposed route or site in terms of management, engineering and environmental

Table 1. List of Environmentally Sensitive Areas to be Avoided

Area	Objective
Areas of significant environmental or conservation value identified under relevant legislation or environmental planning instruments, including: • national parks; reserves for environmental protection e.g. marine, aquatic, nature, karsts; other areas protected under the *National Parks and Wildlife Act* 1974; areas covered by a Conservation Agreement • world heritage areas, other historic and heritage areas, buildings or sites • wilderness areas identified or declared under the *Wilderness Act,* 1987 • SEPP 14 — Coastal Wetlands, SEPP 26 — Littoral Rainforests • areas zoned under a LEP or REP for environmental protection purposes, e.g. high scenic, scientific, cultural, wetlands or natural heritage.	To avoid the risk of damaging areas of high environmental value
Sites within an identified drinking water catchment (surface water or groundwater) including any lands nominated or mapped as 'special or protected areas' by water supply authorities or in the vicinity of a drinking water bore	To avoid the risk of polluting drinking water

Table 2. Appropriate Separation Distances from Certain Land Uses

Land use	Performance objectives	Factors for determining appropriate separation distances
Residential areas, hospitals or schools	• Protect residential amenity including health: visual amenity, noise	• What is the likelihood of the road impacts being managed to an acceptable level all of the time by the mitigation measures alone? • What is the likelihood of the mitigation measures failing? • What is the likelihood of an 'incident' (e.g. accidents, chemical discharges, fires or explosions, road collapse, natural disaster) which will result in unacceptable impacts? • What 'back-up' 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 (topography, climate)? What is the extent if the mitigation fails? • What separation distances are required to achieve the performance objective: — under normal operational and mitigation performance conditions — if mitigation measures fail or an 'incident' occurs?
Surface waters	• Ensure that surface waters are protected from pollutants or sedimentation and existing water users • Ensure that the ecological value of the waters will be maintained	
Fauna and flora habitat and environmentally sensitive areas (Table 1)	• Reduce severance and conflict between road use and fauna movements • Ensure minimum risk from accidental bushfire incidents • Ensure that environmental qualities of the particular area are not compromised	

Table 3. Matters to be Considered in Initial Site Assessment

Operational requirements	• If this is a new road reserve, is the corridor location consistent with any strategic transport plan for the area? • Does the site or corridor provide sufficient land area for present and future requirements? • Is the site efficient in relation to extractive material and other building material sources? • Are the rainfall patterns or prevailing wind directions likely to cause management difficulties? • Are there any other operational problems which may affect site selection?
Water issues	• Are there any site constraints so that on-site water is difficult (including stormwater and stream diversions)? • Are there risks of surface water pollution because of the proximity or pathways to waterbodies or wetlands? • Are there risks of groundwater problems because of shallow or rising groundwater tables, or proximity to groundwater recharge areas, or areas with a high vulnerability to pollution? • Is the site susceptible to flooding? • Any other water related issues which may affect site selection?
Flora and fauna issues	• Can clearing of native 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? • Are threatened flora or fauna species, populations and ecological communities or their habitats likely to be affected? Will a Species Impact Statement be required? • Can areas of native vegetation with associated high bushfire risks be avoided? • Are there any other ecologically related issues which may affect site selection?
Geological or soils issues	• Are the local topographic characteristics likely to result in design and management difficulties or the inefficient use of natural resources? • Are there any geological characteristics which will cause difficulties in managing impacts (subsidence, slippage, seismic)? • Are the soils highly erodible; identify any potential sediment management problems? • Are there existing soils problems e.g. contaminated soils, acid sulfate or saline soils? Are there any other soils or geological related issues which may affect site selection?
Transport issues	• Does the proposal in this location enhance the efficiency of the transport network including public transport? • Can the standard and capacity of the surrounding road network accommodate traffic likely to be generated directly or indirectly by the proposal? • If inadequacies exist, can the road network or traffic management be changed to minimise any impacts particularly on residential areas? • Are there any other traffic or transport related issues which may affect site selection?
Community issues	• Is the proposal likely to be compatible with surrounding existing or proposed land uses, particularly any residential, special uses (such as schools, hospitals, community buildings), any sites of outstanding natural, environmental, agricultural or mineral value or the location of high tech industries? • Does the corridor route avoid unnecessary dislocation of existing roads, other infrastructure or utility networks? Can dislocation of residential areas be avoided, particularly severance of communities with strong community identity? Can dislocation of the operation of agricultural, forestry, commercial or industrial activities be avoided? • Is there likely to be a problem in meeting sustained compliance with noise, air or water quality requirements due to the proximity and nature of nearby land uses? Is the proposal likely to pose health risks? • 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 the site highly visible? Can significant visual impacts be avoided? • Are there any other social, health or economic issues which may affect site selection?
Cumulative issues	• Is the proposal at the proposed location likely to contribute to any existing cumulative problems (air, noise, congestion, economic hardship, social issues)?

factors. The initial investigations can help provide confidence about including or excluding a potential route or site from the list of potentially feasible routes and when selecting a preferred option. Limited field studies at this stage can help demonstrate whether a route or site is fundamentally suitable for a road proposal prior to proceeding with a more detailed assessments.

Examples of factors which may need to be considered in the initial site assessment are listed in Table 3.

4.3 Option selection

Preliminary selection processes may establish that there are a number of feasible route, alignment or site options. In order to further eliminate alternatives and to select a cost-effective option which minimises the environmental degradation and maximises the benefits to the community, road users and the environment, further information will be required on both the proposal as well as the environment. In addition to the environmental studies, input from consultation with the community and road users should be included in the analysis and option selection process.

The option selection study should provide a comparative evaluation of potentially feasible options including the likely costs and effectiveness of mitigation measures.

At this stage, additional information will be required on the proposal parameters such as proposed standards, horizontal and vertical alignment, typical cross-sections, locations of major structures, approximate earthwork quantities or comparative costs. In some cases, three dimensional modelling may be required to aid in the definition of proposal options to enable an adequate comparison in terms of engineering, financial and environmental factors.

In addition, limited environmental field studies such as preliminary fauna, flora, soils, hydrological and social surveys or studies will be required. A parallel task involves community consultation to assess values, needs, concerns and preferences. Involvement of the community should be as broad as possible and should not be limited to specific factional interests or targeted at specific individuals. Care should be taken to ensure that any affected disadvantaged groups are given an opportunity to comment.

The details and types of factors important to the community, users and other stakeholders will depend on the specific situation. Factors important in remote rural areas may be quite broad, (for instance regional economic and transport planning issues, landscape changes or biodiversity issues) compared with more specific concerns in urban areas or the more intensive agricultural areas (for instance impacts from diversions of heavy vehicle and road safety issues, noise, air quality, community severance, pedestrian or cyclist access, public transport issues, local business disruption during or following construction).

Option selection should preferably be a staged iterative process with the number of options reduced or refined at each level of decision-making. An increasing level of detail may be required to assist in eliminating options in relation to key environmental, operational, engineering, financial and strategic planning issues. Techniques such as multi-criteria analysis, weighted factor analysis or comparisons against pre-determined performance criteria/measures can be helpful in this process. The option analysis process can be greatly strengthened when independent technical experts in key environmental areas are consulted and their inputs are considered.

A commitment to preferred options should not be made until community feedback has been considered in the analysis. In addition, the full costs and the potential effectiveness of mitigation measures should be considered. For instance, while option A may seem preferable to option B based on the level of the impacts, when the costs, effectiveness and certainty of mitigation strategies are considered the preference could be reversed. The results of the selection process, along with the reasons for eliminating options,

should be publicly available at key decision points. The selection of the preferred option should be clearly justified on the basis of environmental, social and economic goals with an overarching consideration of the principles of ecologically sustainable development.

In some circumstances, the acceptability of a preferred option may be still uncertain following a site selection study. A precautionary approach should be adopted with these types of 'environmentally marginal' routes or sites. The potential availability of impact mitigation measures alone to alleviate serious environmental deficiencies should not be used to conclude that a location is suitable. Before proceeding with these types of sites, the views of relevant government authorities and the community should be sought regarding the:

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

A balanced judgement should be made taking account of all environmental factors. If a route or site is deemed to be suitable, the EIS should include an outline of the site selection process including the results of the initial investigations and consultation process and a full explanation of the rationale for selecting the route or site.

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 road proposal 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 be more relevant than others, while others will not be applicable at all. The EIS, including the order in which the information is presented, 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. Consideration of alternatives and justification for the preferred option
3. Description of the 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. Land use issues
2. Transport and traffic issues
3. Energy issues
4. Noise and vibration issues
5. Air quality issues
6. Soils and geological issues
7. Water issues
8. Fauna and flora issues
9. Social issues
10. Landscape and visual issues
11. Heritage issues
12. Hazards issues
13. Economic 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

An executive summary should be provided in the EIS, and should be available separately for public information. The summary should give a short overview of the justification for the proposal, a description of the project and the potential environmental impacts. Maps, aerial photographs or photomontages showing the project in the context of the surrounding environment should also be included. It should be written in non-technical language to facilitate understanding of the proposal by the general public.

B. The proposal

1. Objectives of the proposal

The need for the proposal and the objectives to satisfy that need should be clearly stated and justified in terms of ecological sustainability and the strategic context. Project objectives should include consideration of at least the following issues:

a) the role of the proposal in any relevant local, regional or State transport or land use planning strategies; include:
   i) the existing road facilities and, if relevant, standard, traffic capacity or road safety record of the facilities
   ii) any relevant cumulative issues or broader issues that may impinge upon the proposal such as residential or local and regional industry needs
   iii) a review of relevant State, regional or local strategic plans which provide a background for the proposal
   iv) within the strategic context, non-road solutions such as alternative modes, traffic management/demand management, pricing, public transport
b) the anticipated level of performance in meeting present and future stakeholder needs including consideration of economic and transport efficiency in relation to any identified freight and passenger needs
c) the anticipated level of performance in meeting environmental objectives.

2. Consideration of alternatives and justification for the preferred option

Alternatives that could satisfy the objectives of the proposal should be examined to ensure that the best solution has been identified. Consider the environmental impacts or consequences of adopting alternatives including as applicable:

a) the do-nothing option — the consequences of not proceeding with the proposal or any alternatives must be considered
b) alternative structural and non-structural options to remove the need for the proposal such as demand management, changes in traffic management, freight management and parking regimes, changes in interface with public transport
c) consideration of options in terms of energy balance and greenhouse implications
d) alternative locations such as new facilities in new locations compared with upgrading existing facilities; if new corridors or facilities are needed, give details of alternative locations or corridors and alignments within the corridors; alternative crossings, tunnels, over/underpasses, toll plazas, entry and exit point locations
e) alternative proposal options such as alternative size, capacity, design standards, configuration, intersections and interchanges, tunnel options, bridge options, carriageways, traffic management regimes, traffic management on surrounding roads, landscaping and fauna corridor provisions
f) alternative options for interface with public transport, pedestrians and cyclists such as dedicated bus or bicycle corridors, rail/bus/private vehicle/pedestrian/cycle interchanges, over/under passes
g) alternative construction options including low impact techniques, material sources, and management and use of recycled material such as reclaimed water or recycled construction material or road base
h) alternative environmental management options including maintenance regimes, landscaping, risk management options and site rehabilitation, and end use options of decommissioned sites
i) alternatives for financing the proposal including private sector participation and tolling and public transport implications.

Some of the issues which may need to be considered in the analysis and justification for the selection of a preferred option are the:

a) ability to satisfy the objectives of the proposal
b) acceptability of environmental impacts including biophysical, economic and social (including health) impacts
c) reliability of the preferred options to meet acceptable environmental standards and to minimise public health risks; the reliability of individual environmental impact mitigation; the acceptability of any environmental risks or uncertainties, e.g. in relation to noise and air emissions and the transport of hazardous chemicals
d) ability of the options to handle abnormal events such as fires, earthquakes, stormwater intrusion, flooding or accidental discharge of chemicals
e) efficiency with which the proposal meets present and projected needs; the flexibility of the proposal to meet future demand
f) efficient use of land, extracted material, energy, water and other resources
g) 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.

3. Description of the proposal

The description of the road proposal should be provided in sufficient detail so all the impacts can be identified and assessed. The detail will often vary between project types.

Project details

Outline:

a) the size, capacity, design features and standards of all components of the proposal which may include facilities:
   i) for the movement of vehicles and pedestrians
   ii) to cater for or facilitate the use of public transport
   iii) for crossing waterbodies or gullies or passing under or through ridges, and for the management of surface water
   iv) for traffic and parking control and regulation
   v) for the provision of fauna movement, noise and visual barriers, landscaping or recreational use
   vi) for administration, maintenance, toll collection, safety and emergency services and provisions
b) estimated project costs, including property acquisitions; any revenue from tolls including proposed toll charges
c) the proposed operational, management and maintenance regime; any use restrictions or constraints on vehicles, especially trucks (height, weight or length) or the transport of particular types of freight.

Site layout plans

Provide plans, sketches, diagrams, maps, aerial photographs or photomontages indicating (to the extent possible) the location of the following:

a) the extent of any land to be used for the road proposal including during construction; the maximum area to be disturbed by construction; any significant vegetation communities, waterbodies, buildings or features on the land to be disturbed
b) each component of the road proposal including changes in adjoining road networks, tunnels, over/underpasses, on/off ramps, interchanges, traffic control devices, water/drainage management systems, creek or river crossings, proposed landscaping and rehabilitation works, noise and visual boundaries
c) construction facilities such as access roads, construction camps, stores for fuels, chemicals and any other dangerous goods for construction; storage areas for topsoil, overburden, construction materials, pipes and wastes; quarries or borrow pits, crushing plants, bitumen or concrete plants, drainage protection and sediment control works.

Construction issues

Outline the scale and operation of the construction activities which may relate to site establishment, construction or rehabilitation.

Provide details of general issues, such as:

a) the construction program and any staging
b) the construction period and daily hours
c) the total number of construction employees, and numbers at each stage

d) volumes of construction materials, water, chemicals (including explosives), fuels and other materials to be transported to the site; proposed sources and proposed truck routes
e) major environmental controls and their maintenance
f) any requirements for temporary/interim diversions or connections during the staging of the works including the routes and duration of the diversions including temporary traffic management/control provisions.

Provide details of site establishment works, such as:

a) property acquisitions and adjustments
b) relocation and adjustment of utilities and services; diversion of drainage lines or watercourses
c) the construction of side tracks, temporary lanes and access tracks; the diversion of traffic and road closures
d) the establishment of site offices, work camps, construction compounds, crushing plant, concrete batching or asphalt plants, stockpiles of materials and excess spoil; the erection of temporary fencing, lighting and signage
e) land clearing; the demolition of unwanted buildings and structures; the removal of overburden; stockpiling and stabilisation of soil for later use; waste management activities (including reuse or disposal) such as chipping of removed vegetation, removal and grinding of old pavement material and management of contaminated soil.

Provide details of construction works such as:

a) temporary and permanent stabilisation or retaining structures, and erosion and sediment control structures
b) construction methods, volume and balance of earthworks; road formation activities including cut and fill activities including jack-hammering, drilling and blasting, tunnelling, compaction and trimming, rolling, laying of road sub-base, base and surface pavement materials; the operation of temporary concrete batching or bitumen plants
c) construction of bridges, crossings, culverts, catch drains, under/over passes, flood control embankments or elevated sections including dredging, pile driving, in-situ casting of bridge or other sections; the transport of large pre-cast structures requiring escorts and traffic control measures; the use of heavy cranes
d) the installation of signal equipment, signing and safety facilities; the relocation of services (such as power lines, gas, water, stormwater, telecommunications); the installation of visual and light screening and traffic noise control measures and road fencing
e) the construction of buildings, service and maintenance facilities.

Provide details of landscaping, site rehabilitation and end use such as:

a) the removal of the construction compound, temporary environmental controls, access roads, stockpiles and wastes
b) the rehabilitation of the disturbed area, showing final contours and drainage for the site and the staging of the rehabilitation and landscaping
c) the description of landscaping proposals including concept plans and the artist's impressions of landscape plantings designed to integrate the road with the existing landscape, maintain habitat linkages and provide visual enhancement at separations, town entry points and bridges; the visual screening of barriers and headlights; grade separation and erosion control on banks and roadside; the species to be planted and measures to ensure the long-term viability of the landscaping including weed control.

Provide details of waste management and disposal, such as:

a) volumes and types of surplus fill and demolition material; proposed transport arrangements; disposal methods and sites; recycling opportunities and stockpile requirements
b) the management strategy for contaminated spoil or materials which require special management; the treatment and disposal of this material
c) the recyclability of materials including proposals for the use of cleared vegetation as timber, firewood or mulch or recycling of old road base.

Utilise issues such as:

a) the identification of any easements or pipelines and cables that would be affected by the proposed road; contingency measures to protect utilities either temporarily or permanently

b) opportunities for the provision of shared utility facilities within the road easement; measures to accommodate any future crossings of the roadway by including conduits or any other necessary infrastructure for existing or future needs

C. The location

1. Planning context, site description and locality information

The following information should be provided:

a) local government area boundaries, zonings, permissibility
b) land tenure and title details; where Crown land is involved, any constraint associated with the form of lease or tenure, where appropriate, the Native Title status of the land and the procedures to be followed to satisfy the requirements of the Commonwealth's *Native Title Act* (1993)
c) a route description including maps, plans or aerial photographs clearly identifying the location of the proposal relative to surrounding urban or non-urban communities and land uses, important natural features, transport networks, utilities and services; sight-lines from dwellings or public places.

2. Overview of the affected environment

An overview of the environment should be provided in order to place the proposal in its local and regional context. The description may be general, as specific details will 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 road safety, flooding, erosion, dust or noise impacts — these may include wind direction and intensity, rainfall intensity, frequency, duration and seasonal distribution
b) the geomorphological factors such as major landform features; slope gradients, geological characteristics
c) the use and vulnerability of any natural waterbodies including wetlands likely to be affected by the proposal; general hydrological characteristics
d) the use and vulnerability of groundwater; general hydrological factors
e) characteristics of land likely to be affected in terms of general soil characteristics; any existing soil problems including sodicity, salinity or acid sulfate soils; potential or erosion problems
f) predominant vegetation communities in areas to be disturbed or used (terrestrial and aquatic), their potential habitat and conservation values
g) the heritage, conservation, archaeological, historical, cultural, scientific, or scenic significance of any buildings, items, places or areas likely to be affected by the proposal.

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 may 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) EISs for similar projects, any relevant commission of inquiry reports, determination reports and conditions of approval
   iii) relevant research and reference material on road facilities
   iv) other similar projects particularly if operating in similar locations
   v) relevant transport or land use strategic plans or policies
   vi) relevant preliminary studies or pre-feasibility studies
b) the outcome of consultation including:
   i) planning focus meetings, community focus meetings, community workshops or issues groups
   ii) meetings with government agencies (particularly EPA, the Roads and Traffic Authority, Department of Transport), councils, community representatives, transport generators, transport industry, land developers

c) the use of methodology such as *Is an EIS required?* (Department of Planning, 1995) or checklists 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, though they may be addressed in the mitigation strategy; the justification for the proposed level of analysis.

E. The environmental issues

The following list of specific issues is not exhaustive and the degree of relevance of each will vary from proposal to proposal. The EIS should only deal with issues relevant to the particular proposal. The focus of the EIS should be on key environmental issues. The issues have not been ordered in this guideline to reflect any particular degree of importance.

Assessment of potential impacts

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

- **a description of the existing environmental conditions (baseline conditions)**
- **a detailed analysis of the potential impacts of the proposal 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. Land use issues

The EIS should describe existing and future land use and development forms potentially impacted upon by the proposal, and any impacts of the proposal on these land uses. Future land use may need to be considered in terms of strategic plans adopted or being considered by local or State government agencies. Specific issues which may need to be considered include:

a) compatibility of the proposal with:
   i) the provisions of any state environmental planning policy, regional or local environmental plans or development control plans
   ii) planning provisions and policies of other relevant states if the proposed road crosses State borders
b) identifying uses of nearby land, and waterbodies likely to be affected or serviced by the proposal; any potential constraints on the proposal as a result of sensitive land uses like hospitals, heritage or environmental protection areas (e.g. wilderness areas, national parks, foreshore protection zones or areas affected by conservation or international agreements)
c) assessing the impacts on existing land uses including:
   i) on residential areas with regard to severance and loss of residential land
   ii) commercial, industrial, forestry, mining and extractive industries or agricultural land uses through:
      - severance of sites or productive land which leads to direct loss of resources and productive areas, or divides areas into unproductive sizes
      - restrictions or improvements in access to businesses, industrial sites or farms
   iii) tourism and recreational land uses including any direct impacts on tourist or recreational attractions; indirect impacts on the recreational attractiveness of the area through changes in the amenity of the area, and any restrictions on access to tourist or recreational facilities
   iv) the use of community facilities including changes in amenity and accessibility
   v) opportunities to reuse land and building surplus to project requirements

d) the impacts on potential future land uses including affects on the continued use for existing purposes and the stimulation of development; the consistency of flow-on development activities with any relevant strategic plan
e) proposed measures to mitigate impacts.

2. Transport and traffic issues

If the proposal affects the road network, road safety or vehicle movement patterns, or involves dislocation or a significant number of truck movements during construction, various issues need to be included.

Construction stage issues

Identify:

a) the proposed truck routes for transport of building materials, chemicals, precast sections, large plant and equipment; possible alternative routes or transport modes (e.g. conveyer belts, rail, barge); the current traffic on the proposed routes and the impacts of use of the routes considering:
   i) proposed truck types and sizes; the average and maximum hourly, daily and weekly truck movements; the number of construction worker vehicles
   ii) provisions for ingress and egress from the site and parking, queuing and unloading
   iii) the physical condition and standard of the roads or bridges on the proposed routes and any requirement to upgrade; the implications on road maintenance
   iv) the proximity of noise, vibration or dust sensitive land uses along the route such as schools, hospitals
b) any proposed diversion or detour routes if the traffic is to be dislocated; the current traffic on the proposed detour routes; possible alternative detour routes; the potential impacts during construction:
   i) on existing traffic flow
   ii) on any alternative routes used as detours
   iii) on congestion and commerce — assess the implication of alternatives times for dislocation of traffic (hours of day, days of week, months of year)
c) road safety issues, including:
   i) potential conflicts (particularly if truck routes are used by school buses) or areas of high risk including any sight distance constraints, particularly in relation to access to the site, existing congestion or poor road standards or existing safety problems areas
   ii) potential risks associated with the transport of any hazardous substances given the road and traffic regime
   iii) the adequacy of the proposed routes to deal with the construction or detoured traffic
   iv) proposed measures to improve safety; the need for turning bays, additional traffic management devices, road upgrades; any need to restrict hours of truck movements, the number of trucks per day or the load size on certain routes.

Operational stage issues

Identify:

a) traffic impacts on existing facilities which will be affected by the proposal, including a prediction of the likely increase in traffic as a result of the proposal
b) predicted changes in usage characteristic (such as types, volumes, peak loads using measures such as Annual Average Daily Traffic (AADT), peak hourly and annual volumes) on any new and existing facilities affected by the proposal; if a toll is proposed, changes to surrounding roads with and without the toll
c) major user groups including passenger (commuter, non-commuter, major event, tourist/holiday), freight users (short and long haul), cycles, machinery, pedestrian, horses; the impact of the proposal on road users in particular periods of peak demand
d) if the proposal is likely to affect surrounding roads, the impact of a change in the usage characteristics generated as a result of the proposal, considering factors such as:
   i) increased conflicts and congestion
   ii) the need for ancillary works including realignment of roads, traffic management devices (e.g. stop lights, traffic calming); the need for additional road closures; the need to convert parking lanes to clearways, pedestrian crossings or intersections; the improvement of sight distances; the provision of breakdown areas, emergency phones or safety ramps

iii) road maintenance implications

e) if the proposal affects a potential commuter or freight route, whether the proposal is likely to generate additional road users; measures to mitigate the flow-on effect particularly in relation to commuter traffic

f) if the proposal is likely to impact on public transport; consider factors such as:
   i) direct impacts on assets, public and private bus routes, school bus routes, bus stops
   ii) public transport patronage levels and potential effects on the viability of existing services
   iii) improving public transport services by the provision of bus lanes or bus stops or the location of the road in relation to public transport services, interchanges or park/ride facilities

g) if the proposal affects a major freight route; any provisions specifically relating to truck movement (such as lane width, curve, safety provisions, signage and intersection management); any constraints on freight usage as a result of standard and height restrictions; potential conflicts with surrounding land uses or in relation to transport of particular types of freight (e.g. dangerous goods); the impact of the constraints on freight transport efficiency and the potential alternatives

h) if the proposal is likely to affect pedestrians and cyclists; the adequacy of provisions including bike lanes and footpaths; the provision and location of crossings, safety islands, traffic lights and overpasses

i) safety issues, including details of:
   i) current statistics on traffic accidents in the area to be served by the proposal
   ii) the adequacy of the design in reducing safety risks such as sight lines, horizontal and vertical geometry, breakdown provisions, signage, provisions for pedestrian and cyclist safety, reduction of potential congestion-conflict points, reduced sunlight and headlight glare
   iii) the adequacy of road emergency services and their connection to ambulance, fire brigade, police or state emergency services
   iv) predicted changes in frequency and severity of accidents as a result of the proposal.

3. Energy issues

Issues that may need to be considered include:

a) energy requirements for the construction, operation and maintenance of the facility; any new electricity lines, substations or fuel storage depots and the potential impacts from the provision of these facilities; alternative energy sources including solar

b) if the road proposal is replacing or changing an existing road facility or network, the change in energy usage as a result of the proposal considering issues such as changes in congestion, travel time, road standards, the potential for increased vehicle usage

c) design and operational features which will minimise energy usage during construction and operation and improve efficiency of energy usage; measures to conserve energy including energy efficient construction techniques, equipment, lighting, maintenance.

4. Noise and vibration issues

Where noise and vibration will potentially cause significant concern, a detailed noise impact study should be undertaken with reference to the *Environmental Noise Control Manual* (EPA, 1994a) and *Environmental Manual Volume 2 — Interim Traffic Noise Policy and Guidelines* (RTA, 1992). Issues which may need to be considered include:

a) the existing acoustic environment, taking into consideration any relevant meteorological conditions and topographic features which may influence noise or vibration impacts; sensitive nearby land uses including residential dwellings, businesses, hospitals, schools, heritage items, high tech industries or other establishments likely to suffer from construction or traffic noise

b) if major construction activities are to be undertaken:
   i) levels and types of noise and vibration from the use of machinery and equipment including safety and security systems; the proposed hours, location and duration of noise and vibration generating activities
   ii) predicted noise and vibration levels at potentially affected facilities

iii) all mitigation strategies to control noise and vibration including noise control measures such as:
- noise barriers/shields, suppressers or silencers on equipment, limitations on hours of operation of particular equipment and constraints on blasting and vibration
- the proposed monitoring program for noise and vibration including monitoring locations

c) operational issues, such as:
i) any change in noise or vibration levels due to changes in traffic volume, type, behaviour or peak periods as a result of the proposal (consider the project area and the adjacent road network)
ii) predicted noise and vibration levels at sensitive establishments likely to be affected by traffic noise
iii) mitigation strategies to reduce the generation or transmission of noise or vibrations in acoustically sensitive areas including:
- design features to reduce the generation of noise such as reduction of gradients and elevated road sections, use of tunnels or cuttings, pavement treatment, location of traffic lights or other traffic management devices requiring braking and gear changes, lining of tunnels, location of ventilation systems, acoustic barriers/ earth embankments
- measures to reduce impacts such as traffic and speed control, acoustic treatment to affected buildings
- the proposed monitoring program for noise and vibration including monitoring locations

d) the acceptability of impacts and the adequacy of mitigation strategies during construction and operation of the proposal to control noise and vibrations and to meet appropriate standards or goals.

5. Air quality issues

If the proposal is likely to affect traffic volumes or patterns, the impacts of the proposal on local and regional air quality should be assessed with reference to regional and national air quality goals where appropriate. If the proposal is likely to significantly contribute to air impacts, a detailed assessment may be required including:

a) a review of local air quality with particular reference to carbon monoxide, oxides of nitrogen, total hydrocarbons, dust and particulate matter and air toxins (such as benzene, ozone and lead); any existing cumulative air quality issues, the prevailing meteorology and any topographic features that may influence the dispersion of air pollutants; any land use likely to be sensitive to air quality impacts such as residences, schools, nursing homes, hospitals, high tech industry, crops and bodies of water
b) if major construction activities are to be undertaken:
i) likely sources of emissions from all construction activities including:
- demolition and clearing including woodchipping, burning
- earthworks including any blasting, quarrying, crushing, tunnelling
- pavement construction including odour and hydrocarbon emissions from sealing, wind erosion from unsealed surfaces, vehicle movement on unsealed roads
- operation of crushing, concrete or bitumen plants, wind erosion from storage of material

ii) air quality impacts on receptors taking into consideration prediction of odour emission drift and dust fallout downwind of the construction works with assumption of worst case meteorological conditions
iii) mitigation measures to control dust and odour generation and minimise impacts on sensitive receptors, such as:
- dust suppression techniques; cessation of work during high winds; air quality control systems on crushing, concrete and bitumen plants or temporary vents from tunnels
- the proposed monitoring program for dust, airborne particulates or odour and monitoring locations
- any proposed public information programs to inform nearby residents of impending activities which will affect air quality

c) operational issues, including:
   i) potential sources of air quality impacts considering the types of vehicles, the facility design and capacity
   ii) if impacts are likely to be significant, appropriate air dispersion modelling for the first, fifth and tenth year of operation including consideration of worst case meteorological conditions; consider
      - traffic generated pollutants at sensitive receptors such as residences, schools, hospitals or other community facilities
      - potential changes to regional air-shed quality as a result of the proposal
      - if there are tunnel or major underpass components, emissions from portals and other ventilation outlets and the air quality within the structure taking into consideration the proposed ventilation systems
   iii) consideration of greenhouse/global warming impacts due to increased emissions as a result of the proposal with reference to any regional greenhouse gas inventory programs
   iv) proposed mitigation measures and safeguards to reduce emissions and to minimise impacts, such as:
      - measures to reduce emissions and congestion and increase public transport use, or the efficiency of private vehicle use such as transit lanes, dedicated bus lanes, truck routes, electronic tolling, differential speed zones, congestion pricing, vehicle emission controls, node interchanges
      - a proposed air quality monitoring program and monitoring locations
d) the acceptability of impacts and the adequacy of the mitigation strategies during construction and operation of the proposal to control air quality impacts and to meet appropriate air quality standards or goals

6. Soils and geological issues

This section is particularly important if major earthworks are to be undertaken; if hazardous chemicals have previously been used on the site; if acid sulfate soils are to be disturbed; or if the soils are highly erodible. Issues which may need to be considered include:

a) existing surface, geological and soil characteristics including a soils survey of the areas to be affected by the proposal, indicating profile characteristics which may be relevant to the sustainable management of the proposal, including:
   i) a review of contours, terrain stability, slope gradient and length
   ii) a survey of the physical and chemical properties such as soil depth, particle size distribution, permeability, dispersibility, pH, salinity; their suitability for revegetation or susceptibility to erosion or landslip (the Department of Land and Water Conservation (DLWC) has soil landscape maps for some parts of the State)
   iii) a review of the site history to identify likely contaminated sites (refer to the EPA's contaminated land register, council's unhealthy building land list and previous land use); naturally occurring contaminants such as asbestos, arsenic, pyrite; the existing level of site contamination including the type and extent of contamination if possible
   iv) reviewing DLWC's Acid Sulfate Soil Risk Maps to determine if acid sulphate soils are likely to occur on the site — if this is likely, undertake a soil survey in accordance with *Environmental Guidelines: Assessing and Managing Acid Sulfate Soils* (EPA, 1995)
   v) any commercial rock or mineral deposits, in particular extractive material resources suitable for road construction
b) a description of potential direct or indirect effects on soils and any constraints on the proposal due to soil or geological characteristics including:
   i) the potential for erosion having regard to the soil characteristics, landform and meteorological characteristics; issues relating to bed and bank stability at creek crossings
   ii) potential subsidence, settling, slippage or structural problems due to shear planes, fault lines or other structural weaknesses
   iii) the suitability of the topsoil for landscaping purposes considering soil fertility

iv) the potential for acid related issues due to the presence of acid sulfate soils; consider:
- the disturbance of sulfidic material or extracted material containing sulfidic material
- impacts from alteration of watertable levels
- acid run-off from stockpiles or the acidification of sulfidic fines
- the sale or use of material containing pyritic material (refer to the guideline *Environmental Guideline: Assessing and Managing Acid Sulfate Soils* (EPA, 1995) and *RTA Acid Sulphate Soils Policy* (RTA, 1995b)

v) if contaminated soils are on the site, the need for remediation prior to construction

c) proposed measures to mitigate soils impacts including:
i) a proposed erosion management plan including:
- measures to prevent wind and water erosion including programming of works to minimise the need for soil stockpiling and to minimise the area denuded at any one time
- stabilisation works for cuttings, embankments, river beds and banks, trenches and open channels
- surface drainage and sediment control measures; control of run-off on to, through and from the construction site; measures to dissipate energy and for scour protection
- revegetation and rehabilitation measures
- a maintenance program of all erosion control works

ii) if relevant, the proposed management program to mitigate the potential impacts from disturbance of acid sulfate soils, including minimisation of disturbance of the material or the watertable, treatment of disturbed soils or acid water, monitoring program and response strategies should deleterious impacts be observed

iii) if relevant, the level of remediation; proposed methods for remediation; measures to prevent contamination of surrounding areas during decontamination works; the monitoring program to track the decontamination progress

iv) if relevant, measures to avoid causing site contamination during the construction and operation of the facility and remediation measures if contamination occurs

d) the acceptability of impacts and the adequacy of the mitigation strategies, during construction and operation of the proposal, to control soil and geological impacts.

7. Water issues

Water quality issues

This section is particularly relevant for proposals impacting directly or indirectly on natural waterbodies. Issues which may need to be considered include:

a) the characteristics and existing water quality of natural waterbodies or wetlands which could be affected by the operation or construction of the proposal

b) description of the potential sources of pollution and assessment of the pollution characteristics likely to be impacted by the scheme; the magnitude and probable frequency of pollution events and the assimilation capacity of the receiving environment, including:
i) sedimentation and increased turbidity from run-off from stockpiles, access roads, disturbed areas, landscaping activities, creek crossings, bridge footings, dredging works, tunnelling works during construction and maintenance activities

ii) contaminated discharges from workshops, vehicles washing facilities, temporary concrete, bitumen or crusher plants, equipment, fuel and chemical storage and refuelling areas

iii) use of reclaimed water for dust settling and wash-down

iv) run-off containing oils, greases, heavy metals, rubber and asbestos deposited on the road surface during normal vehicular operation

v) accidental spillage of chemicals, fuels and other potential pollutants, litter and dumping of rubbish

c) the impacts on water quality as a result of road construction, operation and maintenance, including impacts on water users (e.g. drinking water, aquaculture or irrigation)

d) the design and management measures to mitigate impacts, including:
   i) measures to manage stormwater and to minimise on-flow onto the facility
   ii) measures to minimise sedimentation, erosion and nutrient run-off including wet and dry basins, artificial wetlands, grass filter strips and buffer zones
   iii) measures to prevent contamination of water from accidental spillage of chemicals or waste material or accidental discharge of reclaimed water
   iv) measures to manage water and run-off from concrete, bitumen or crush plants
   v) a maintenance program of water quality controls and, if appropriate, monitoring their effectiveness; proposals for remedial action if pollution occurs
e) the acceptability of impacts and the adequacy of mitigation strategies during construction and operation of the proposal, to control water quality impacts and to meet appropriate water quality standards or goals.

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, issues which may need to be considered include:

a) baseline information on groundwater aquifers including its quality, movement patterns, users
b) potential sources of pollution from designed and accidental sources as well as potential pollution pathways including contamination from seepage from fuel or chemical storage facilities or from contaminated surface water
c) any use of groundwater or drawing down of aquifers during construction activities or in any quarry associated with the proposal
d) the potential impacts on the groundwater and any users from the potential contamination, change in the watertable or use of the groundwater
e) management measures to manage adverse impacts including measures to
   i) prevent groundwater contamination including the bunding/sealing of fuel and chemical storages and concrete and bitumen plant areas, monitoring the integrity of all sealed surfaces, bunding systems and maintenance of fuel and chemical storage facilities; take remedial action if pollution occurs
   ii) prevent instability because of changes in the watertable
f) the acceptability of impacts and the adequacy of the mitigation strategies during construction and operation of the proposal to control groundwater impacts and to meet appropriate water quality standards or goals.

Stormwater management and flooding issues

If the road facility is located to affect stormwater management in the area or in flood-prone areas, issues which may need to be considered include:

a) reviewing those aspects of stormwater management in the catchment which may impact upon or be affected by the proposal, including:
   i) the need to undertake an integrated EP&A management strategy in conjunction with the local stormwater management authority
   ii) the effect of any change in stormwater management as a result of the proposal on the water balance in any natural water system
b) flooding status including the likely frequency of flooding; consideration of the local designated flood standard; if flood liable:
   i) assessing the vulnerability of any facilities or construction staging areas to flooding given the direction of flood flow and timing of the construction works
   ii) the potential impacts of inundation of the facility both on- and off-site during construction and on completion; the security of the road during periods of high flows including consideration of impacts of floating debris
   iii) measures to minimise these impacts including signage and the degree of flood-proofing of facilities necessary during construction
c) the potential for the proposal to alter natural flood or overland flows or change the flood liability of the surrounding area both upstream and downstream from works such as land formation, elevation sections, levees or the location of culverts, drains or underpasses or

the design of crossings; if the proposal has the potential to significantly affect local flooding behaviour:
  i) the hydraulic modelling of likely major flood flows
  ii) an assessment of the potential to alter existing flooding behaviour or the flood liability of surrounding lands in the vicinity of the proposal including;
    - flood flow patterns (levels, velocities, flow direction)
    - flood scour and deposition behaviour
    - flood sediment transport
  iii) the potential for the proposal to change the existing flow regime through creation of side or cutoff channels, to increase sediment mobility or to encourage scouring downstream of the site

d) the potential for the proposal to provide flood mitigation benefits; any proposed flood mitigation schemes that may influence the impact of the proposal
e) the acceptability of impacts and the adequacy of the mitigation strategies during construction and operation of the proposal to control flooding impacts and to be compatible with the NSW Government's *Floodplain Development Manual* (NSW Public Works Department, 1986) and any local Council flood policy.

Water supply issues

Consider the impact of the proposal on the water supply system including:

a) the likely water usage and source of the water supply; the effect of the proposal on the water balance in any surface or groundwater water system
b) the assessment of the efficient use of water and the option to reuse recycled water
c) if recycled water is to be used, the potential impacts of transport and use.

8. Fauna and flora issues

The protection of biodiversity and the maintenance of ecological processes is one of the key principles for achieving ecologically sustainable development. 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 which may need to be considered include:

a) identifying potential sources of impacts on flora or fauna such as disturbance or killing of species or habitat from:
  i) clearing, dredging or from traffic conflicts
  ii) changes in water quantity, quality or groundwater regime
  iii) noise, light or dust
b) identifying terrestrial and aquatic plant, animal or fish habitats and, where appropriate, ecological communities, populations and species in areas that may be directly or indirectly affected by the proposal; identifying the local and regional scarcity of habitats, ecological communities, populations and species and their potential scientific, historic or cultural significance; if relevant, identifying 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) areas protected under SEPP 14 — Coastal Wetlands, SEPP 19 — Bushland in Urban Areas, SEPP 26 — Littoral Rainforest, SEPP 44 — Koala Habitat Protection or other environmental planning instrument
  iii) vegetation or fish species protected under the *Fisheries Management Act 1994*; the economic significance of any potentially affected fish species
  iv) trees listed in councils' Significant Tree Registers
c) the potential impacts of the proposal on the number, size, distribution, interrelationships or health of species, populations or ecological communities or their habitats; consider:
  i) the sensitivity of species, populations or ecological communities to disturbance, particularly considering the timing of the disturbance relative to the breeding and migratory cycles of species
  ii) the potential for recolonisation following rehabilitation and the time required for re-establishment
  iii) the impacts on remnant vegetation, for example, wildlife corridors
  iv) the impacts on any existing weed, vermin or pest problems, including on their numbers and distribution

v) if relevant, the significance of the area for koalas under the provisions of SEPP 44 — Koala Habitat Protection
vi) if relevant, the potential impacts on the commercial and recreational value of fish stock and on any aquaculture activities; compatibility with the provisions of *Habitat Protection Plans* (NSW Fisheries)
vii) if relevant, the impact on species or habitat protected under international agreements /treaties/conventions/ protocols (e.g. Japan Australia Migratory Birds Agreement (JAMBA), China Australia Migratory Birds Agreement (CAMBA), world heritage listings)

d) the potential impacts on biodiversity including the cumulative impacts of the proposal on communities in the region; the significance of any disturbed vegetation or fauna for other biota not directly affected by the proposal but which interact with potentially disturbed vegetation
e) the mitigation or management strategy and the role of landscaping and rehabilitation plans such as:
   i) provision of new habitats, or compensatory rehabilitation or restocking of indigenous species; opportunities for re-colonisation
   ii) details of any proposed methods to protect species or their habitats from accidental damage during construction or operation of the proposal
   iii) timing of major disturbances to minimise impacts on breeding and migration cycles
   iv) a description of measures to control and prevent infestations at or adjacent to the site
   v) proposed monitoring to determine the effectiveness of mitigation and to verify predictions
f) the acceptability of impacts and the adequacy of the mitigation strategies during construction and operation of the proposal to control impacts on flora, fauna and to meet biodiversity goals.

***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.

9. Social issues

For proposals with potentially significant community impacts, the following issues may need to be considered:

a) an overview of the community likely to be affected, in particular identifying any sectors which may be disadvantaged
b) a review of the community consultation process identifying any issues raised in the community
c) properties to be acquired (whole or portion) and any residents or businesses requiring relocation; any resulting potential social impacts from relocation of place of residence, business or employment
d) the impacts from construction or operation of the proposal as a result of changes in air quality or from noise or vibration, lighting, overshadowing or visual impacts, safety hazards (i.e. heavy vehicles carrying hazardous goods) or from severance or disruption of the community; if relevant consider:
   i) impacts on community identity and cohesion or the cultural or physical character of the location
   ii) disruption to the community including loss of easy access to community facilities, links to other communities or recreational and leisure opportunities
   iii) loss of amenity including public safety, security, privacy or a sense of wellbeing
   iv) impacts on health, in particular in relation to air, noise and vibration impacts on residents living adjacent to the facility, and road safety implications for pedestrians, cyclists, vehicular traffic as well as residents living adjacent to the facility
   v) social implications of impacts on local businesses, industries, agricultural activities, tourism and employment
e) the affect of the proposal on future development in the area; impacts on demographic make-up due to redevelopment, changes in land use or changes in land values; potential flow-on effects in terms of demand on community services
f) social equity issues including means to offset any inequities for the affected community or sectors in the community being significantly disadvantaged
g) the acceptability of social impacts and the

adequacy of the mitigation strategies including design, management and monitoring measures during construction and operation of the proposal.

Note: *Techniques for Effective Social Impact Assessment* (Social Policy Directorate, 1995) provides a useful general guide for assessing community issues. The assessment of social issues should draw from information from other sections of the guideline (such as sections on noise, air, health, visual, traffic or economic issues) which may have implications for community wellbeing.

10. Landscape and visual issues

For proposals which are located in areas where visual impacts are likely to be a concern or if there is major land clearing or cutting, issues which may need to be considered include:

a) the visual significance of the landscape to be affected from the fore, middle and background; the visual quality of the area including unique visual aspects, land use and the extent of existing visual degradation; the consideration of the proposal in relation to any landscapes or features of local or regional significance or sensitivity
b) potential sources of visual impacts from the proposal, such as significant built forms like bridges, overpasses, signage, noise barriers, lighting, interchanges, land clearing, cuttings, or temporary construction facilities
c) assessment of the visibility from surrounding areas and the potential visual impact including:
    i) visual absorption capacity of the area, including the compatibility of the proposal with the existing visual environment and scale of the proposal relative to existing land uses
    ii) the viewing catchment; the visibility of the road or any associated infrastructure from adjoining properties and surrounding areas
d) proposals for the mitigation of visual impacts including:
    i) the landscaping and rehabilitation of constructions areas and road verges or corridors; the location, layout and composition of intended screening species
    ii) landscape management and maintenance
    iii) location, design, surface treatment and colour of built features
    iv) lighting design
e) the acceptability of impacts and the adequacy of the mitigation strategies during construction and operation of the proposal to manage visual impacts.

11. 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 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.

12. Hazards issues

Consider the following potential hazards:

a) accidental release of toxic chemical substances or explosions (including methane gas or any explosive chemicals used on site)
b) natural events (including seismic activity, landslip, flooding, subsidence, bushfires).

All potential hazards and associated scenarios should be identified, and the significance of their consequences assessed; if risks are likely to be significant, they should be quantified where possible. Hazard mitigation measures should be described.

Accidental chemical releases or explosions

For road facilities with a risk of accidental chemical releases or explosions during construction, or if hazardous materials are likely to be transported on the facility, the following issues may need to be included:

a) where hazardous materials are to be used on site, a list of hazardous materials and anticipated rates of usage, details of quantities stored, storage and transport arrangements; the identification of possible causes of potentially hazardous incidents, the likelihood of occurrence and their consequences to public safety or the environment; the operational and organisational safety controls to reduce hazard risk, and environmental impacts
b) where hazardous materials are likely to be transported on the facility, road related hazards which may lead to incidents (including road standard, design, ice, fog, sunlight glare); the likelihood of occurrence of an incident and the consequences for public safety or the environment; all operational and organisational safety controls to reduce hazards and risks; route alternatives for transport of dangerous goods and associated hazardous risks
c) any relevant advice in SEPP 33 — Potentially Hazardous and Offensive Industries and *Hazardous Industry Planning Advisory Paper*

(HIPAP) No 4 — Risk Criteria for Land Use Safety Planning, (Department of Planning, 1992)

d) the adequacy of operational and emergency procedures involving dangerous and hazardous goods.

Natural hazards

For road proposals with the risk of natural hazards, the following issues may need to be considered:

a) given the climate, location or geological formation, the likely performance of the facility during exposure to natural hazards such as earthquakes, subsidence, land slip, flooding or severe storms; the likelihood of occurrence of an incident and the consequences to public safety or the environment; design, operational and organisational safety controls to reduce the hazard risk and environmental impacts
b) for facilities located in areas of high bushfire risk, the likelihood of occurrence of an incident given the climate, surrounding topography, vegetation and management practices and the consequences to public safety or the environment; the adequacy of the fire management protocols.

13. Economic issues

Issues which may need to be considered include:

a) the costs and benefits of providing, operating and maintaining the road facility relative to alternatives (including the do nothing option) — significant non-monetary costs and benefits should be described and qualitatively assessed; if relevant, the analysis should consider:
   i) construction and maintenance costs; flow-on costs from the need to augment or increase the maintenance budget for local or regional road networks
   ii) operational costs and benefits such as travel time savings, accident savings, savings in vehicle operating costs (i.e. fuel and maintenance), parking restrictions
b) environmental and social costs and benefits such as the affects on air quality, noise, health, habitat value, scenic qualities and amenity
c) where the road proposal is likely to have an impact on a particular region, community or local economy, economic studies which consider impacts on existing and future development, and settlement patterns such as:
   i) the potential impact on property values
   ii) any economic benefits from the use of land surplus or land no longer required for road facilities as a result of the proposal
   iii) impacts on public transport use and the viability of existing services
   iv) the stimulation of residential, rural residential and tourism developments
   v) impacts on agricultural or forestry industries including potential severance impacts or loss of productive land
   vi) sterilisation of or impacts on access to significant extractive material or mineral deposits
   vii) impacts on commercial and industrial industry from changes in freight transport options, changes in haulage costs, and accessibility
   viii) any additional employment, as a result of the proposal
   ix) town bypasses resulting in the loss of passing trade for retail businesses
d) the proposed funding arrangement for the scheme; the financial implications of implementing the proposal if user tolls or charges are to be applied.

14. Cumulative issues

Cumulative impacts may result from a number of activities with similar impacts interacting with the environment in a region. 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' impacts. If cumulative issues have been identified and considered in a relevant transport, land use or air quality study, these should be referred to in the analysis. Issues to consider that relate to the particular road proposals may include:

a) the potential for cumulative impacts from:
   i) other existing or planned transport facilities in the area/region
   ii) other industry in the vicinity with similar impacts
b) any advantages or disadvantages from clustering development and road facilities in this location

c) whether the road would prevent, inhibit or improve:
   i) the development of other forms of transport now or in the future
   ii) the viability of other transport modes now or in the future
d) identification of potential future activities and the influence the proposal would have on other development (i.e. would the proposal attract other development which would have adverse or beneficial environmental impacts which would not otherwise have occurred?)
e) any likely long-term and short-term cumulative impacts such as surface water and groundwater quality issues, soil degradation, air quality, noise or traffic disturbance, public health, visual impacts or loss of heritage items, vegetation or fauna habitat.
f) consideration of the receiving environment's ability to achieve and maintain any environmental objectives established for that system.

F. List of approvals and licences

All approvals and licences required under any legislation must be identified. This is to alert other 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 identifies for the community the relevant authorities involved in the assessment and regulation of the proposal. Appendix 4 may assist in the development of this list. This may not be comprehensive and it is the responsibility of the person preparing the EIS to establish what approvals will be required.

G. Compilation of mitigation measures

A critical component in the EIS is the mitigation strategy. This demonstrates that the proposal and its environmental safeguards can be implemented and managed in an integrated and feasible manner, and that it is capable of complying with statutory obligations under other licences or approvals.

The mitigation strategy should include:

a) the environmental management principles which would be followed when planning, designing, constructing and operating the proposed system — include specific locational, layout, design or technology features (which are described under each of the preceding 'issues' sections) and
b) an outline of an environmental management plan (EMP) which provides a framework for the ongoing management and monitoring of potentially significant impacts — in some circumstances, it may be appropriate to prepare separate construction and operational environmental management plans.

An environmental management plan (EMP)

This outline in the EIS should form the basis for an environmental management plan (EMP) for the proposal. The EMP manages or mitigates environmental impacts for the life of the proposal, and ensures that the commitments in the EIS, subsequent assessment reports and approval or licence conditions are implementable. It is usually a comprehensive technical document which is finalised during or following detailed design of the proposal. This level of detail is not considered necessary for the EIS.

Two sections should be included in the outline of the EMP, 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) Outline of environmental management strategy

The management strategy should demonstrate sound environmental practices during the construction, operation and decommissioning of the proposal, including:

i) the management of construction impacts; if appropriate include:
   - erosion, sedimentation, noise and vibration management
   - rehabilitation and revegetation management for any terrestrial or aquatic communities disturbed by construction activities

ii) the management of operation impacts; if appropriate, include:
   - traffic management
   - maintenance
   - landscape management

- contingencies for emergencies and operational incidents management

iii) strategies to feed information from the monitoring program back into the management practices and actions to improve the environmental performance and sustainability of all components of the scheme
iv) training programs for staff and incentives for environmentally sound performance
v) an indication of how the plan can be integrated into the organisation's broader environmental management framework
vi) an indication of how compliance with licensing and approval requirements will be achieved and due diligence attained
vii) if applicable, a reporting mechanism on environmental performance.

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) parameters which can indicate occurrence of critical operational issues or abnormalities such as traffic flow levels and usage rates, congestion, accidents or incidents
ii) noise, vibration (if relevant) and air pollutants emissions
iii) ecological related parameters (if relevant) relating to revegetation rates, traffic conflicts, use of corridors or underpasses

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 intervals and duration
iii) procedures to be undertaken should the monitoring indicate 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 or determining authority and the community.

H. Justification for the proposal

Reasons justifying undertaking the proposal in the manner proposed should be outlined taking into consideration potential health, biophysical, economic and social impacts, including costs and benefits and the compliance with the principles of ecologically sustainable development.

The principles of ecologically sustainable development include:

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:

a) the ability of the proposal to demonstrate economic efficiency in the context of the short- and long-term community requirements and broader strategic transport objectives
b) the ability of the proposal to meet broad environmental performance requirements including improved conservation or protection of resources, and reduced environmental costs
c) the ability of the proposal to meet site specific environmental performance requirements considering the vulnerability of the air quality, soil, surface waters, groundwater and the associated ecosystem
d) social equity considerations and the ability of the proposal to 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;

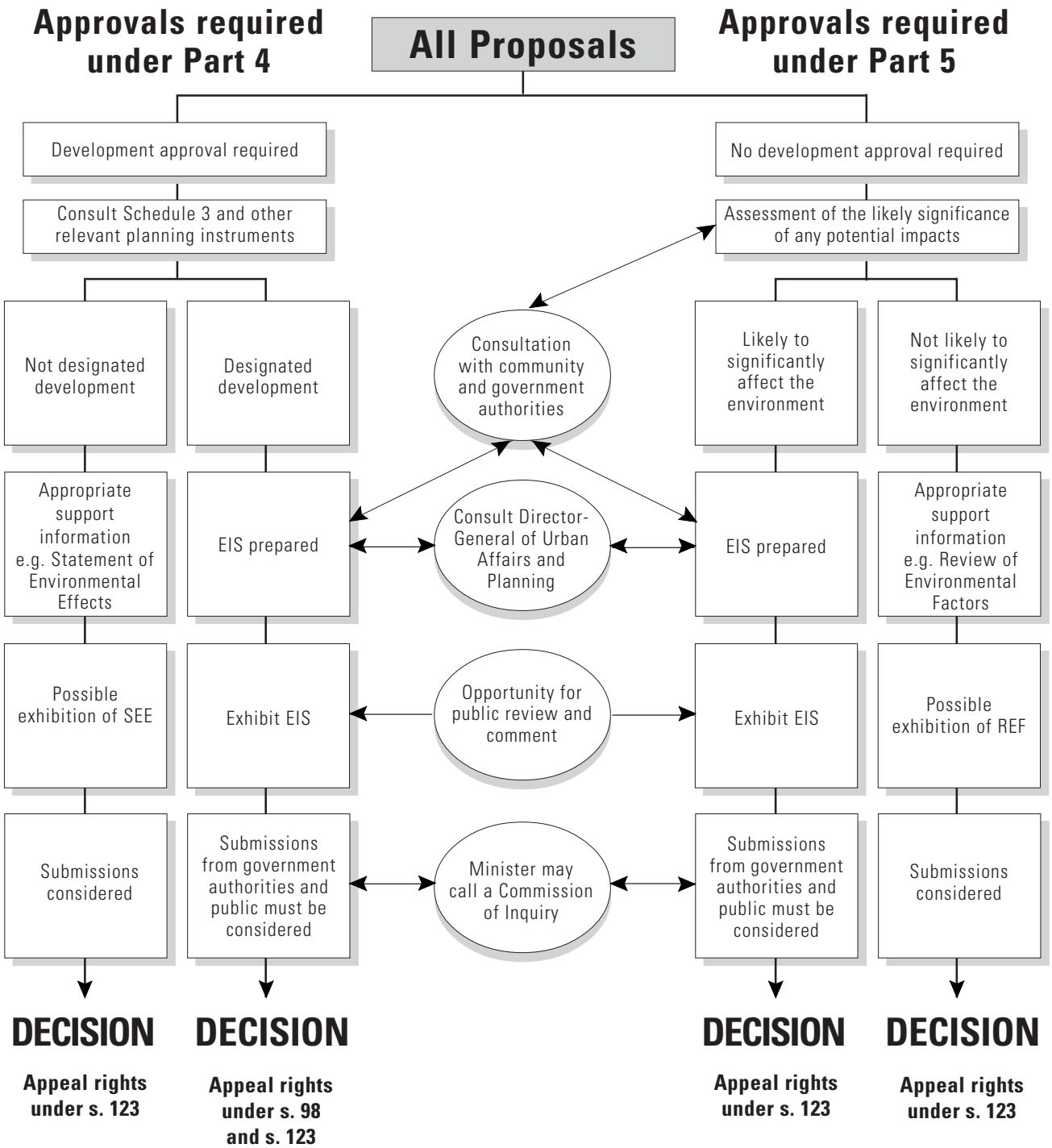
h) the social and economic impact of the development or activity;

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 to those preparing EISs. This list is by no means exhaustive.

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