

Sewerage Systems

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 sewerage systems usually include:

- water cycle management, including surface and groundwater quality issues and effluent management
- air quality management.

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

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

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1. Purpose and scope of the guideline

1.1 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 the matters which an EIS for a sewerage system proposal may need to include to fulfil this function. In particular, the details in the EIS should reflect the level of significance of the potential impacts on the environment.

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

1.2 Sewerage systems covered by the guideline

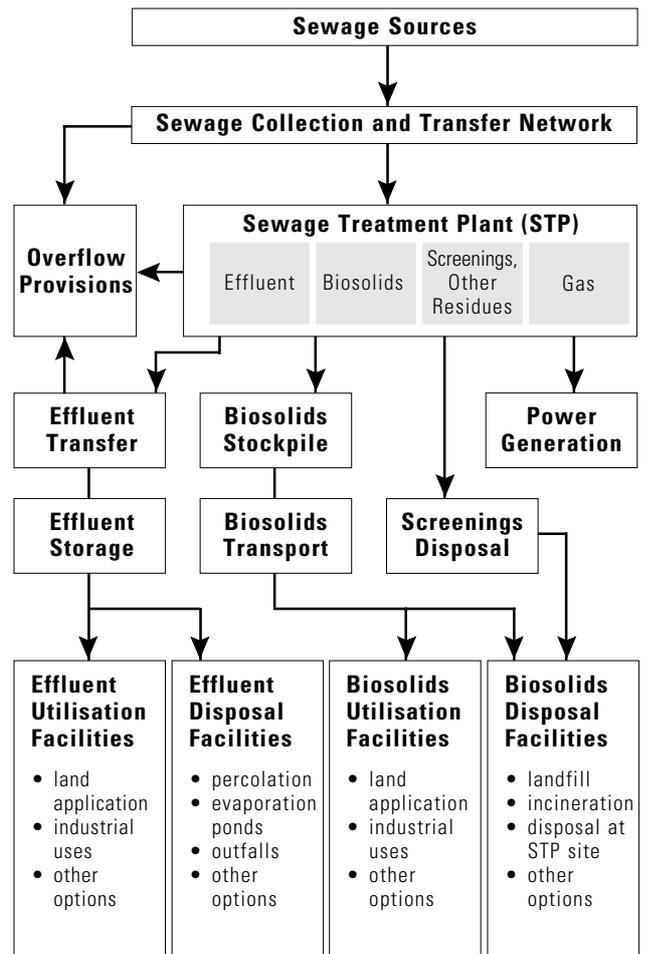
A sewerage system proposal may be for a new sewerage system, or for the upgrading of all or only certain components of an existing system. The proposal may also include decommissioning or removal of existing sewerage facilities made redundant by the new facilities.

For the purpose of this guideline:

- sewage is wastewater and waterborne wastes conveyed in a pipeline (sewer), generated principally by residential facilities; it may also include wastewater and waterborne wastes from other facilities such as industrial, agricultural, commercial, tourist or recreational facilities
- a sewerage system:
 - collects and transports sewage
 - treats sewage to a required level
 - uses, disposes of or discharges effluent, biosolids, methane or any other products from the sewage treatment process, returning them to the environment.

Figure 1 illustrates the general components of a sewerage system.

Figure 1. Sewerage System Components



a) Sewerage system operation

The operation of a sewerage system may include the following processes.

Sewerage collection and transfer

Sewage from generating sources is conveyed to a treatment plant through networks of pipelines, tunnels, pumping stations or storages. Overflow may occur if the sewage flow exceeds the hydraulic capacity of the system. The system may be vented.

Sewage treatment

Sewage is treated to meet certain target effluent standards. Biosolids, screenings and other residuals are produced. Treatment processes may range from simple physical treatment such as screening to sophisticated technology such as biological treatment, chemical treatment, advanced physical treatment using membrane technology and bioengineering methods. Overflows may occur when the hydraulic capacity of the treatment system is exceeded.

Treated effluent transfer

Treated effluent is conveyed through pipelines or tunnels, with or without pumps, to the sites of its use, temporary storage or final disposal.

Treated effluent storage prior to use

Before treated effluent is used or applied to land, it may be stored temporarily to cater for the users' demand variation or inability of the land to accept effluent during wet weather. Overflow may occur when the storage capacity is exceeded.

Treated effluent utilisation

Treated effluent may be used for irrigation of agriculture, landscaping, mine rehabilitation or forestry. It may be utilised as non-potable process water in industrial plants or as non-potable water in a dual domestic water system. It may also be used as a potable water supply.

Final disposal of treated effluent

Disposal options for any excess treated effluent may include evaporation basins, sand exfiltration or discharge into waterbodies such as rivers or oceans at purpose-built outfalls.

Biosolids processing and stockpile

Biosolids are produced from various sewage treatment processes. Depending on the utilisation or disposal options, the biosolids may be treated to meet certain quality requirements by processes such as composting. If the treated biosolids or other solid residues from the sewage treatment processes are to be used or disposed of off-site, they may be stockpiled before being transferred.

Biosolids and other solid residues transport

If biosolids, screenings and other solid residues of the treatment processes are not disposed of or used on-site at the treatment plant, they are often transported off-site in a semi-liquid form in tankers, or in a drier sludge form in covered dump trucks.

Use of treated biosolids

Treated biosolids can be used as soil conditioner and applied to land, for example, in agriculture, forestry, mine rehabilitation or landscaping. Certain industrial processes may also use the material.

Final disposal of biosolids, screenings and other solid residues

Some of the disposal options are:

- landfill — screenings, residues and excess biosolids may be disposed of at landfills licenced to receive sewage material
- on-site disposal — excess biosolids may be disposed of at approved on-site disposal facilities
- incineration — screenings, residues and excess biosolids may be burnt in an approved incineration facility.

Gas collection and utilisation

Methane and other gases generated during the process of treatment of the sewage may be collected and used to generate power. If utilisation of the gases is not feasible, they may be incinerated.

b) Sewerage System Construction

The construction of a sewerage system may include the following:

- site clearance; site formation; drainage; landscape and access road construction; rehabilitation of disturbed areas
- laying pipelines; constructing or upgrading tunnels, pumping stations, chambers, pipe bridges, manholes and other pipeline associated structures; constructing outfalls
- constructing sewage treatment facilities including ponds and chemical storage facilities; connecting the new facilities with any existing system

- preparing specific areas or facilities to manage the products of the treatment process, for example effluent storage, use or disposal facilities; biosolids processing; stockpiling and handling facilities such as odour control facilities; constructing landfill, disposal sites and incinerators; methane collection facilities and power generating
- disconnecting and removing redundant pipe works, pumps, treatment facilities and structures.

1.3. When is an EIS required?

An EIS must be prepared for proposals which have the potential to significantly affect the environment.

Part 4 and Part 5 of the *Environmental Planning & Assessment (EP&A) Act 1979* specify the legal requirements for environmental impact assessment.

The assessment and approval process is summarised in the flow chart in Appendix 2 of the guideline.

a) EIA under Part 4

Under Part 4 of the EP&A Act, sewerage proposals or components of the proposal may require development consent under the provisions of a local environmental plan or other environmental planning instruments. If this is the case, then Schedule 3 of the EP&A Regulation 1994 applies. Schedule 3 introduces designation thresholds based on the volume of sewage, biosolids or effluent to be handled, the sensitivity of the affected environment, and whether the sewage or sewage products are incinerated (See Appendix 6 for full designation).

In addition, environmental planning instruments may designate sewerage systems and may specify different thresholds to those in Schedule 3.

If a development is designated, then an EIS must be prepared and lodged with a development application. If a sewerage system proposal (which requires development consent) is not designated, a statement of environmental effects (SEE) for the proposal must be submitted with the development application. The practice guideline is equally applicable for identifying the range of issues which may need to be addressed in a SEE.

b) EIA under Part 5

For proposals or components of proposals which do not require development consent and are not prohibited under the provisions of an environmental planning instrument, Part 5 of the EP&A Act applies. Under Part 5, a government authority, before approving a sewerage system proposal which does not require development consent, must first consider whether the proposal has the potential to significantly affect the environment. If significant impacts are likely, an EIS must be considered before an approval is granted.

The document *Is an EIS required?* (Department of Planning, 1995) provides guidance on how to determine whether an EIS is required under Part 5 of the EP&A Act. Criteria include the size of the proposal; the sensitivity of the environment; the duration, reversibility and predictability of the potential impacts and the level of public concern.

If an EIS is not required, a review of environmental factors (REF) should be prepared to assess impacts and proposed mitigation strategies. This guideline is equally applicable for identifying issues which may need to be addressed in a REF prior to granting an approval.

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 sewerage system proposal, the following organisations should be invited to a PFM or otherwise consulted:

- relevant local councils
- Department of Urban Affairs and Planning
- Environment Protection Authority
- NSW Health Department
- Department of Land and Water Conservation.

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

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

3.2 Formal consultation required under legislation

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

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

3.3 Consultation with the community

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

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

4. Site selection procedures

Principles of site selection for sewerage system proposals

Consideration must be given to whether:

- the land use is permissible
- environmentally sensitive areas are avoided
- the use is compatible with nearby land uses
- initial site investigations indicate the site is fundamentally suitable for sewerage system proposals.

4.1 Site selection

Operational and engineering considerations are important factors when selecting sites for sewerage facilities. The proximity of the site to sewage sources and potential effluent and biosolids utilisation or disposal sites needs to be considered, as it will directly affect the amount of pipework, pumping effort and cost required. However the environmental and social characteristics of the location are also important. The greater the potential for adverse effects, the more important the site selection process.

Appropriate site selection can avoid or reduce many of the environmental problems inherent in sewerage proposals and:

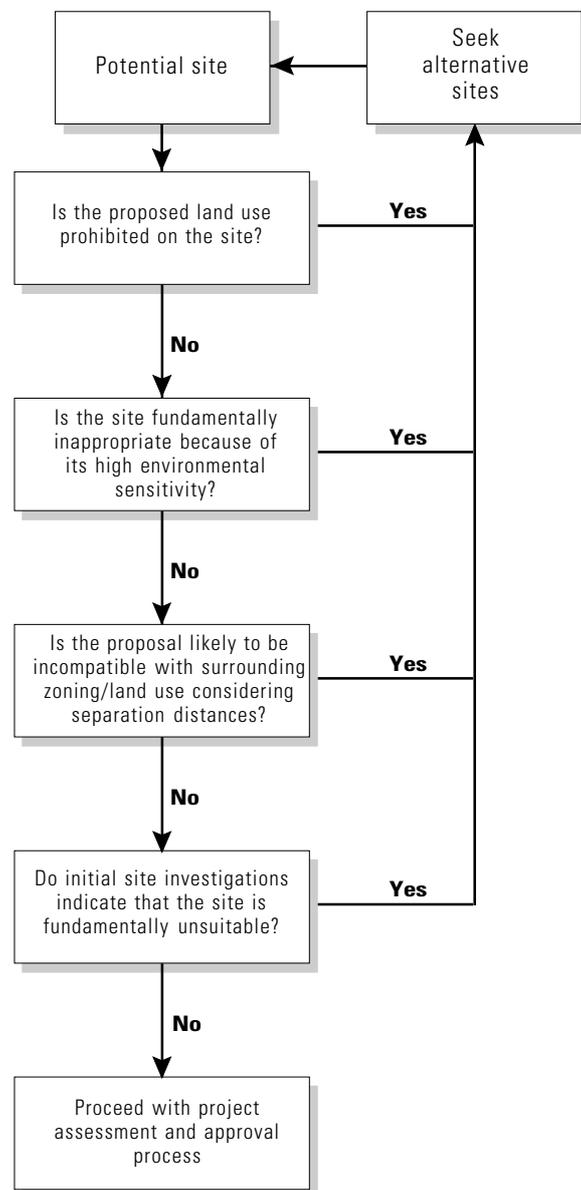
- reduce the need for technically based environmental and health risk mitigation measures and costly ongoing management measures
- result in substantial savings in establishment and operation of sewerage systems
- reduce levels of public concern
- avoid potential delays in approval processes.

A systematic and rigorous approach to site selection based on '4 principles' is therefore recommended as set out in Figure 2.

In general, if a sewage treatment plant is capable of producing high quality effluent, there will be a wider choice of utilisation and disposal options. Alternatively, if a sewage treatment plant has a

lower pollutant removal ability, there will be less choice. In selecting sites for land application of effluent or biosolids, the soil and groundwater characteristics are critical factors to be considered. If an effluent discharge point is required because

Figure 2. Site Selection



complete utilisation of effluent is not possible, the effluent quality, public health requirements and the environmental water quality objectives must be considered when selecting a site.

4.2 Permissibility of land use

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

4.3 Environmentally sensitive areas

At an early stage, the site selection process should also determine whether a potential site is likely to adversely affect areas of such high environmental value that the site should be excluded from any further consideration. Table 1 identifies areas which are considered to be inappropriate for sewage treatment plants or effluent or biosolids disposal.

4.4 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 threatened by health, safety, noise, water or air

Table 1. List of Environmentally Sensitive Areas to be Avoided

Area	Objective
<p>A site within 250 metres of an area of significant environmental or conservation value identified under relevant legislation or environmental planning instruments, including:</p> <ul style="list-style-type: none"> • national parks, reserves for environmental protection e.g. marine, aquatic, nature, karsts; other areas protected under the <i>National Parks and Wildlife Act 1974</i>; areas covered by a Conservation Agreement • world heritage areas; other historic and heritage areas, buildings or sites • wilderness areas identified or declared under the <i>Wilderness Act, 1987</i> • SEPP 14 — Coastal Wetlands, SEPP 26 — Littoral Rainforests • zones 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.
<p>Sites within an identified drinking water catchment (surface water or groundwater) including:</p> <ul style="list-style-type: none"> • lands nominated or mapped as 'Special or Protected Areas' by local water supply authorities or in the vicinity of a drinking water bore • lands within 3 kilometres from the top water level of the following storage facilities: Wingecarribee Reservoir, Fitzroy Falls Reservoir, and the Tallowa Dam 	To avoid the risk of polluting drinking water.
<p>Sites located:</p> <ul style="list-style-type: none"> • near permanent or intermittent waterbodies, lakes, bays, inlets or wetlands • within an area where the watertable is within 3 metres of the surface 	To protect groundwater and surface water resources.
Sites where the substrata is prone to land slip or subsidence	To avoid unsuitable substrata.
Sites on floodplains which may be subject to washout during major flood events (councils should be consulted for information about local flooding characteristics)	To avoid washout risk if a significant flood event occurs.

Table 2. Appropriate Separation Distances from Certain Land Uses

Land Use	Performance Objectives	Factors for Determining Appropriate Separation Distances
Residential areas, hospitals or schools	<ul style="list-style-type: none"> • Protect residential amenity and health: odour, visual amenity, noise, dust, seepage 	<ul style="list-style-type: none"> • What is the likelihood of performance objectives being achieved by mitigation measures alone? • What is the likelihood of mitigation measures failing? • What is the likelihood of an 'incident' (e.g. accident, system failure, natural disaster) which will result in a failure to meet the performance objectives?
Surface waters	<ul style="list-style-type: none"> • Ensure that surface waters are protected from pollutants in the waste • Ensure that no existing or likely future uses of surface waters are compromised • Ensure that no significant impacts occur to flora and fauna which use the waters • Ensure that the ecological value of the waters will be maintained 	<ul style="list-style-type: none"> • 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 etc)? • What is the likely geographic extent of impacts if mitigation measures fail or an 'incident' occurs taking into consideration the local environment (topography, climate etc)?
Groundwater recharge zones	<ul style="list-style-type: none"> • Ensure that there is no deterioration in the quality of the groundwater • Ensure that no existing or likely future uses of groundwater are compromised 	<ul style="list-style-type: none"> • What separation distances are required to achieve the performance objective: <ul style="list-style-type: none"> — under normal operational and mitigation performance conditions — if mitigation measures fail or an 'incident' occurs?
Environmentally sensitive areas (Table 1)	<ul style="list-style-type: none"> • Ensure that environmental qualities of the particular area are not compromised 	

quality impacts. Any potential conflicts and possible options for reducing or preventing conflicts should be considered, in particular, the adequacy of buffer zones and the potential land uses within the buffer zones.

The extent of 'buffer' areas should be determined on a case-specific basis. Factors to consider include the size of the plant, the type of ponding systems, the method of biosolids handling and storage, and if effluent or biosolids are to be used on site. Table 2 suggests land uses which might require separation from nearby sewage treatment plants and suggests performance objectives which could be used to determine an appropriate separation distance.

The Department of Urban Affairs and Planning's Circular E3 — *Guidelines for buffer areas around sewage treatment plants* recommends buffer zones of at least 400 metres surrounding sewage treatment plants. The circular recommends that local conditions should be considered when establishing buffers, particularly local

meteorological conditions. The circular suggests that compatible land uses within a buffer zone include nature reserves, agricultural areas, forests, commercial plant nurseries, recreation areas, effluent disposal areas and public road reserves. These minimum recommendations should be considered when establishing buffer zones.

If the proposal is potentially incompatible with surrounding land uses, consideration should be given to acquiring sufficient land to provide adequate on-site separation from nearby land uses. Where possible, the 'buffer' area should be owned or controlled by the owner of the sewage treatment plant or effluent/biosolid storage or disposal site.

As the establishment of 'buffer' areas around sewerage facilities can lead to unacceptable land sterilisation, separation distances should not be viewed as a primary means of ameliorating impacts. Instead, separation distances should be seen as a back-up to ensure the amenity of

existing land uses can be maintained. The EPA does not accept impact reduction by separation distances for air or water pollution. The role of site separation as an impact mitigation measure should simply reinforce the impact mitigation measures provided by other means.

4.5 Initial site investigations

The purpose of preliminary site investigations is to provide an early evaluation of the suitability of the proposed site in terms of management, engineering and environmental factors. The initial investigations can help provide confidence about a potential site's fundamental suitability for use for sewerage facilities, prior to proceeding with a more detailed assessment in an EIS. Factors to be considered are listed on the following page in Table 3.

The initial investigations can provide a basis for the comparative evaluation of several potential sites, and can help substantiate the feasibility of the proposal at a particular site. These investigations can serve as a cost-effective device to determine if any particular sites should be excluded from further consideration based on environmental factors.

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

The level of detail at the initial investigation stage should be commensurate with the scale of the proposal, the potential environmental risks associated with the proposal and the potential sensitivity of the location.

The purpose of the initial site investigations is to exclude fundamentally unsuitable sites. Results of the initial investigations should be assessed to determine if a site is fundamentally suitable or unsuitable for proceeding with a development application.

In some circumstances, the acceptability of a site may still be uncertain following an initial site investigation, and more detailed assessment will be required to establish acceptability. A precautionary approach should be adopted with these 'marginal' sites. The availability of impact mitigation measures to alleviate serious site deficiencies should not be used to conclude that a site is suitable.

Before proceeding with these 'marginal' sites, the views of EPA and any relevant authorities should be sought regarding:

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

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

Table 3. Matters to be Considered in Initial Site Investigations

Water issues	<ul style="list-style-type: none"> • Are there risks of surface water pollution because of the proximity to watercourses and natural wetlands, in particular, risks of pollution of watercourses used for drinking water or aquaculture downstream, or catchments of coastal estuary intermittently open to the sea? • Are there risks to groundwater because of shallow or rising groundwater tables, or because of the proximity to groundwater recharge areas or to areas classified as having a high vulnerability to pollution? (This will require consultation with the Department of Land and Water Conservation.) • Is the site subject to flooding? • Can any separation requirements from waterbodies (under any relevant legislation or guidelines) be complied with?
Soil issues	<ul style="list-style-type: none"> • Are the soils capable of suitable drainage and sedimentation management? • Are there risks of infiltration to groundwater because of highly permeable soils or groundwater within a coastal dune field? • Are there environmental risks associated with the underlying strata (for example significant seismic risk, landslide, subsidence or other structural instability)? • Are there existing soil problems, for example contaminated soils or where acid sulfate, sodic or saline soils are located? • If effluent or biosolids usage schemes are proposed, are the soils fertile and not highly permeable, or impermeable with a slope of less than 6 degrees?
Vegetation issues	<ul style="list-style-type: none"> • Can the clearing of natural vegetation be avoided? • Can clearing of vegetation of high significance be avoided e.g. riparian vegetation, vegetation used as corridors for the movement of fauna, vegetation communities containing endangered flora or serving as a habitat to endangered fauna or used for visual screening? • Is a development application required under SEPP 46? Is a species impact statement (SIS) required?
Transport issues	<ul style="list-style-type: none"> • Can the standard and capacity of the local road network accommodate the traffic likely to be generated by the proposal? • Can any truck traffic movements avoid residential areas? • If inadequacies exist, can the road network or traffic management be changed to meet requirements and to minimise any impacts on residential areas?
Climate issues	<ul style="list-style-type: none"> • Are the rainfall patterns or prevailing wind direction likely to cause management difficulties? • Are the local climatic conditions (e.g. air movement, rainfall) in combination with the topography likely to result in microclimatic conditions which will adversely increase impacts?
Community issues	<ul style="list-style-type: none"> • Is the proposal likely to be compatible with any surrounding existing or proposed land uses, including residential zones, dwellings and any special land uses such as hospitals or schools? • Can any separation requirements from such uses (under any relevant legislation or guidelines) be complied with? • Is there likely to be a problem in meeting sustained compliance with health, odour, noise or water quality requirements? • 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 proposal likely to pose health risks through contamination of agricultural produce? • Is the proposal likely to contribute to any existing cumulative impacts?

5. Summary of EIS requirements

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

A summary of the specific requirements for an EIS for a sewerage system 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 should be tailored to the specific proposal and should focus on the key issues.

Summary of requirements

A. Executive summary

B. The proposal

1. Objectives of the proposal
2. Description of proposed sewerage system
3. Site layout plans
4. Construction issues
5. Consideration of alternatives and justification for the preferred option

C. The location

1. Planning context
2. Site description and locality information
3. 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. Infrastructure issues
2. Water quality issues
3. Groundwater issues
4. Coastal issues
5. Flooding issues
6. Soil issues
7. Economic issues
8. Social issues
9. Health issues
10. Air quality issues
11. Noise issues
12. Visual issues
13. Hazards issues
14. Flora and fauna issues
15. Heritage issues
16. 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 proposal and the potential environmental impacts, and should include a clear map or aerial photograph of the location. 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 objectives of the proposal should be clearly stated and justified in terms of ecological sustainability. The statement should refer to:

- a) the role of the proposal in any water cycle management scheme which includes water supply and stormwater management
- b) anticipated level of performance in improving resource utilisation
- c) anticipated level of performance in meeting present and future community needs
- d) anticipated level of performance in meeting environmental and health goals
- e) any relevant government policies.

2. Description of proposed sewerage system

A description of the proposed sewerage system may include:

Review of any existing system

- a) the catchment and performance of the existing sewerage systems in terms of quantity of sewage, quality of treatment and method of utilisation and disposal of effluent and biosolids; the shortcomings of the present system in terms of meeting existing or future community needs, or environmental or health goals
- b) the future roles of the existing sewerage system in any regional water cycle or sewerage

management scheme, including any proposal for modifying, upgrading or decommissioning any component of the existing water cycle management or sewerage scheme

General parameters of the proposed system

- a) the owner and operator of the system
- b) details of any staging of the proposed sewerage system and timing for each stage; any arrangements to integrate the proposed work with any existing sewerage system
- c) components of the proposed sewerage system, including influent control, the reticulation network and the sewage treatment plant; arrangements to utilise and manage effluent, biosolids and other wastes; the design capacity and anticipated performance levels of each component of the sewerage system under different commissioning stages and sewage load scenarios; the provisions to increase the capacity of the elements
- d) catchment of the sewerage system with a brief outline of the major sewage input (e.g. domestic, industrial)
- e) the quantity of sewage to be treated and a description of its temporal flow characteristics (predicted maximum and minimum flow volumes; if the proposal is to be staged, volumes at each stage of the proposed system's development)
- f) employment (construction and operation)
- g) hours of operation (construction, operation, and transport)

Reticulation network

- a) the reticulation network for the movement of sewage, effluent or biosolids; this may include a network of pipelines or tunnels, pumping stations, overflows, vents or temporary reservoirs
- b) methods to prevent and cater for hydraulic overload and stormwater intrusion such as provisions of storm bypass or temporary reservoirs at strategic locations
- c) identification of any overflows and the emergency situations and criteria under which discharge will occur; the likelihood of

occurrence and where the overflow will discharge to

- d) procedures for leak detection and minimisation; procedures for maintenance, rehabilitation, blockage removal or cleaning of the networks

Sewage treatment plant

- a) the predicted quality of sewage entering the plant with particular reference to the presence of any heavy metals and toxic substances which may affect the design and operation of the treatment processes
- b) the methods to be used for sewage treatment including any additional treatment of biosolids, effluent or digester gases; the use of chemicals in the treatment processes
- c) anticipated performance levels of each element of the sewerage system including descriptions of the nutrient and pollutant removal ability of the technology and any chemical treatment residues in the final effluent and biosolids
- d) standby facilities or special procedures or provisions to cater for temporary overload or breakdown of the system (stormwater intrusion, power and mechanical breakdown, treatment process failure, flooding or other emergency situations)
- e) identification of any overflows, emergency situations and criteria under which discharge will occur; the likelihood of occurrence, quality and where the overflow will discharge

Effluent utilisation or disposal

- a) the estimated quantity of the treated effluent (at each stage of the plant's development)
- b) the projected quality of the effluent including biochemical oxygen demand (BOD), non-filterable residue (NFR), pH, nutrients (total nitrogen, ammonia, total phosphorus), conductivity, faecal coliforms, chlorine and toxicants, (these levels may be expressed as percentile values, typically 50th or 90th percentile, and/or upper limits)
- c) options for utilisation or disposal of the effluent considering:
 - i) its suitability for land application (for example, purpose built irrigation utilisation schemes; incidental landscaping schemes)

- ii) its suitability for utilisation in industrial, domestic or other utilisation schemes, and projected demand for effluent
- iii) the acceptability of disposal options taking into consideration the receiving environment
- d) the preferred option for utilisation or disposal, outlining the probable EPA licence requirements and controls on the quality of effluent delivered to any utilisation or disposal site
- e) when the effluent is to be stored for later use:
 - i) descriptions of storage dams or other structures designed to store effluent including capacity, type of construction and run-off returns, seepage and spillage controls
 - ii) design criteria for effluent releases from the storage, identifying any waterbodies likely to be affected by the discharges; descriptions of any triggers for the release of effluent, including an estimate of the likely frequency and magnitude of these discharges, considering weather patterns, utilisation rate and storage capacity
 - iii) management strategies for maintenance of quality of effluent in storage including control of algal growth
- f) when the effluent is to be used for land irrigation:
 - i) the size of irrigation areas at each stage of the system commissioning program
 - ii) details of the proposed plant species to be irrigated (e.g. pasture, field crops, woodlots) and the nutrient and ion intake potential
 - iii) an outline of the irrigation management program including:
 - irrigation scheduling and frequencies taking into consideration seasonal differences
 - any other irrigation water sources
 - design parameters in terms of water balance, taking into consideration effluent applied, precipitation, evapotranspiration, percolation and surface run-off; the proposed maximum hydraulic, organic and nutrient loading rates
 - any measures to avoid contamination of soil from high heavy metals or

- prevention of contamination of soil, ground or surface water (for example impervious layer, bunding, diversion drains)
- c) the proposed treatment of the biosolids for use, including the monitoring program to establish the 'contamination' grade, and treatment and monitoring to establish the 'stabilisation' grade; any blending activities to meet the required classification; the quality of the material; the analysis to be undertaken in accordance with *Draft environmental management guidelines for the use and disposal of biosolids products* (ibid)
- d) any utilisation scheme for biosolids including land application, composting or other uses including:
- i) the projected demand for the biosolids of the classification achieved
 - ii) the transportation of the biosolids to application sites and arrangement for temporary storage on-site; measures to protect the environment in accordance with the EPA guidelines
 - iii) details of the land application schemes including:
 - the criteria for site and crop selection
 - the quantity of biosolids to be used; the management of method and rate of application
 - restrictions on access or use of land following application, stock management
 - buffer distances and other measures to prevent off-site contamination
 - record keeping of application sites and rates
 - measures to mitigate any potential soil or water environmental degradation beyond the level of acceptable change
 - measures to ensure any land application scheme is consistent with the EPA guidelines
- e) options for the disposal of material not utilised; include:
- i) if disposal is to be at an off-site landfill facility, measures to be undertaken to manage impacts during transportation particularly; measures to protect the environment in accordance with *Environmental Guidelines: Solid Waste Landfills* (Environment Protection Authority, 1995c)
 - ii) if disposal is to be at an on-site facility, the measures to be undertaken to control odour and vectors and prevent contamination of soil and ground or surface water; measures to protect the environment in accordance with *Draft environmental management guidelines for the use and disposal of biosolids products* (Environment Protection Authority, 1994b)
 - iii) if disposal is to be by incineration, measures to be undertaken to prevent air pollution
- f) the monitoring program.

3. Site layout plans

Plan or plans clearly indicating the location of the following must be prepared. Describe:

- a) each component of the sewerage system including the reticulation network or tunnels, pumping stations, various sewage treatment structures, biosolids and effluent storage areas, effluent pipelines, effluent and biosolids release, disposal or utilisation locations
- b) supporting facilities such as access roads, buildings, stores for fuels, chemicals and any other dangerous goods used during both the construction and operation stages
- c) any buffer zone or reserve between the facilities and nearby developments
- d) the maximum area to be disturbed by construction
- e) any significant vegetation communities to be cleared or affected
- f) the storage areas for topsoil, overburden, fill materials, pipes and wastes etc.
- g) drainage protection and sediment control works
- h) landscaping and rehabilitation works.

4. Construction issues

Outline the scale and operation of the construction works, including:

- a) the construction program and any staging
- b) the construction period and hours
- c) details of the construction depot including storage areas for topsoil, overburden, fill materials, pipes and wastes
- d) construction methods, and the volume and balance of earthworks

- e) any construction activities which potentially have significant environmental impacts including:
 - i) any clearing, earthworks, dredging, tunnelling, blasting, disturbance to the bed or banks of waterbodies or the ocean
 - ii) any changes in drainage patterns or changes to groundwater aquifers
 - iii) any accidental or intended discharge of chemicals or petroleum products.

5. Consideration of alternatives and justification for the preferred option

Include an assessment of the environmental impacts or consequences of adopting alternatives, including:

- a) non-structural options such as water demand management and other administrative practices to reduce sewage quantity and improve quality
- b) upgrading the existing system, providing a new system
- c) providing several local or smaller sewerage systems, providing one large regional system
- d) alternative plant site locations and plant layouts; alternative reticulation routes, locations for pumping stations and management of peak loads; alternatives to overflow discharges from the system
- e) alternative sewage, effluent and biosolids treatment technology; alternative target effluent and biosolid quality
- f) alternative options for storage and utilisation of the treated effluent and biosolids (for example, land application, industrial or residential uses) before considering disposal options; include:
 - i) if effluent or biosolids are used for land application, alternative site locations, alternative application rates, cropping regimes, management of irrigation practices; temporary storage options
 - ii) if effluent is discharged at outfalls; alternative locations and configuration of any outfalls
 - iii) alternative biosolids disposal locations and management regimes
- g) the 'do-nothing' option; the consequences of not proceeding with the proposal should be considered.

Some of the issues which may need to be considered in the analysis and selection of the 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 options to treat sewage, and use and disposal of effluent and biosolids so that acceptable environmental standards are met and public health risks are minimised
- d) ability of options to handle abnormal events such as stormwater intrusion, flooding or the potential accidental discharge of chemicals into the system from industrial developments within the catchment
- e) flexibility of options to meet future demand
- f) opportunity within the options for effluent and biosolids reuse
- g) efficiency of energy and other resource issues
- h) acceptability of the hazard risk associated with the use of chemicals at the facilities
- i) the reliability of the environmental impact mitigation measures in ameliorating the undesirable impacts
- j) the relative environmental, economic and social costs and benefits of each alternative; significant non-monetary or non-quantifiable costs and benefits should be described and qualitatively assessed.

C. The location

1. Planning context

The following information should be provided:

- a) zonings, permissibility and any land use constraints; any planning approvals required
- b) the compatibility of the proposal with:
 - i) any regional strategy or plan for water cycle management, sewage service demand management, collection, treatment and disposal in the area
 - ii) provisions of any state environmental planning policy, regional or local environmental plans or development control plans for existing and proposed development
 - iii) existing land uses
 - iv) any heritage items or environmental protection areas or areas affected by conservation agreements.

2. Site description and locality information

The following information should be provided:

- a) title details; land tenure; owner's consent (if not the proponent)
- b) where Crown land is involved, any constraint associated with the form of lease or tenure; where appropriate, the Native Title status of the land should be addressed and an outline provided of the procedures to be followed to satisfy the requirements of the Commonwealth's *Native Title Act 1993*
- c) the compatibility of any existing and potential land use within any buffer zones; any plan to restrict the future uses of land within the zones
- d) an overview of land use within the catchment of the sewerage system
- e) a site description and maps, plans or aerial photographs, clearly identifying the location of the proposal relative to surrounding roads, adjoining communities or dwellings, and any land use likely to be affected by the proposal; utilities including transmission lines, pipelines, cables or easements; sight-lines from dwellings or public places such as roads
- f) an indication of the uses of the nearby land and waterbodies likely to be affected by the proposal, such as for commercial, recreational, industrial, agricultural, aquaculture, shellfish industries, conservation and water supply purposes
- g) the identification of developments or land uses with which the sewerage system has the potential to cause significant water quality, air quality, noise or other cumulative impacts.

3. 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. This overview may be general. Specific details should be provided when assessing the environmental impacts of the proposal.

General information to be provided includes an overview of:

- a) meteorological characteristics which may influence flooding, erosion, evaporation, dust, odour or noise impacts, including 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 lakes, wetlands, estuaries and oceans likely to be affected by the proposal; general hydrological and water quality characteristics
- d) the use and vulnerability of groundwater; general hydrological and water quality 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), and their potential habitat and conservation values; any record of the incidence of algal blooms
- 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) an outcome of a review of relevant sources of information on potential issues including:
 - i) any relevant guidelines produced by NSW government authorities, other relevant State 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 sewerage facilities
 - iv) other similar projects particularly if operating in similar locations
 - v) relevant strategic plans or policies (waste management, REPs, LEPs)
 - vi) relevant preliminary studies or pre-feasibility studies
- b) an outcome of consultation with stakeholders including
 - i) planning focus meetings, community focus meetings, community workshops or issues groups

- ii) meetings with stakeholders (e.g. government agencies, particularly EPA, councils, major land developers or sewage generators)
- 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.

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. Infrastructure issues

The following should be considered:

a) Energy issues:

- i) energy requirements; the electricity supply for the operation of the sewage treatment plant and pumping stations, including standby electricity supply provisions
- ii) any new or upgraded transmission facilities including lines and substations; the potential impacts from the provision of these services
- iii) an assessment of the efficiency of the processes in terms of energy use
- iv) a consideration of alternatives with respect to energy demand; management and design measures
- v) the potential for digester gas recovery and use as a power source; collection and power generation facilities
- vi) potential greenhouse implications

b) Water supply issues:

- i) the impact of the scheme on the water supply system servicing the sewerage catchment area; including:
 - the likely increase in water usage from the implementation of the sewerage proposal
 - the need to upgrade or augment the catchments water supply and reticulation system; if relevant provide an overview of the implications
 - the effect of the change of water usage on other users of the water system
 - the need to exercise water demand management in conjunction with the introduction to changes in the sewerage system
- ii) the effect of the proposal on the water balance in any natural water system
- iii) the assessment of efficient use of water in the operation of the sewerage system

c) Stormwater management issues:

- i) aspects of stormwater management in the catchment which may impact upon or be affected by the proposal
- ii) the need to undertake an integrated water management approach

- iii) the effect of any change in stormwater management on the water balance in any natural water system as a result of the proposal

d) Waste issues:

- i) the impact of the proposal on any landfill receiving material from the proposal site; the impact on the life of the landfill facility
- ii) the ability of landfill to accept construction and operation wastes (for example chemical waste) and sewage treatment residues including biosolids, grit and screenings; the impact on the management of the facility
- iii) a consideration of alternatives to landfill options

e) Transport issues:

- i) any road, rail or shipping modes and routes for the transport of construction materials, waste, sewage products or chemicals
- ii) alternative routes or transport modes e.g. barge, rail
- iii) the ability of the roads, railways or waterways to handle the additional traffic;
 - the physical condition of the roads, rail or bridges on the proposed routes
 - any upgrading proposals or requirements for additional infrastructure
- iv) the potential impact on the route maintenance program.

f) Traffic issues:

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

- i) estimated average and maximum daily and weekly truck movements
- ii) the identification of noise and odour sensitive land uses along the route such as schools, hospitals, nursing homes; the potential impacts on these land uses and proposed mitigation measures
- iii) an assessment of the need for any temporary traffic diversions during the construction stage and the impact of the diversions on the local community and businesses

- iv) road safety issues; include:

- potential conflicts (particularly if truck routes are used by school buses) or areas of high risk including any sight distance constraints or existing congestion
- proposed measures to improve safety, such as the need for turning bays, additional traffic management devices.

g) Other infrastructure issues:

- i) utility service requirements of the sewerage system, such as telecommunications, gas
- ii) measures to protect any existing easements, cables, pipelines which may be impacted by the proposal.

2. Water quality issues

This section is particularly relevant for proposals where the system is likely to discharge directly or indirectly into a waterbody or oceans, use effluent or biosolids for land application, or discharge onto land likely to be inundated with flood waters. The section is also relevant to proposals which will reduce water pollution problems caused by existing sewerage systems.

Issues to consider include:

- a) the condition of any natural waterbodies, wetlands, oceans or seas (expressed as level of compliance with relevant water quality objectives and standards), and levels of appropriate water quality parameters which could be impacted by the scheme, including nitrogen, phosphorus, chloride, faecal coliforms and salinity levels; the specific analysis requirements may be established at the planning focus meeting for the specific location
- b) a description of the potential sources of pollution and assessment of the pollution characteristics, magnitude and probable frequency of pollution events, and the assimilation capacity of the receiving environment, including:
 - i) intentional or accidental discharges, leakage, seepage, spillage, bypass or overflow of raw or treated sewage from outfalls, flood inundation, failure or overload of the reticulation system, plant

- or treatment processes, storage facilities, artificial wetlands, effluent or biosolid utilisation schemes or any other system reasons
- ii) sedimentation from construction activities and the operation of the treatment site or effluent or biosolid application sites
- iii) discharges or waste from workshops, vehicle washing facilities, plant and equipment, fuel and chemical storage
- iv) an assessment of the impacts of any change in flow regimes as a result of the proposal on water quality; if dredging or disturbance of the bed of waterbodies is required, impacts of the disturbance of sediments on the water quality and control measures to minimise impacts
- c) if the proposal involves upgrading an existing scheme, comparing the results of the performance of the existing scheme with the likely improvement in water quality due to better performance of the proposed scheme
- d) the potential impacts on other users of the waterbodies or oceans by the change of water quality
- e) an assessment of the adequacy of the design and management measures to minimise impacts including those to:
 - i) prevent the release of raw or partially treated sewage or effluent into the environment; minimise or avoid the uncontrolled release of treated sewage or effluent into the environment
 - ii) manage any leachate or stormwater run-off at the sewage treatment, biosolids storage or effluent and biosolids utilisation sites including appropriate buffers or management systems to prevent contamination of surface water, including return of any leachate or effluent to storage or treatment of water prior to release
 - iii) minimise sedimentation and erosion
 - iv) contain any algal bloom in the effluent storage facilities
 - v) prevent contamination of water from accidental spillage of petroleum products or other chemicals
- f) a plan for ongoing maintenance and monitoring of water quality controls for each component of the sewerage scheme to ensure their correct installation, operation and effectiveness
- g) a monitoring program at the proposal site as well as at nearby natural waterbodies (upstream, adjacent and downstream) or oceans

likely to be affected by point sources or non-point run-off from the site

- h) potential cumulative impacts on water quality from other activities with similar impacts.

3. Groundwater issues

This section is particularly important when the groundwater level is high, any component of the proposal is located near a recharge area or the soil is highly permeable.

Issues to consider include:

- a) depth, regional and local groundwater gradients; the location of any recharge areas, seeps or springs;
- b) overlying geology, depth and quantity
- c) the quality of groundwater and level of compliance with relevant water quality objectives and standards; (the specific analysis requirements may be established at the planning focus meeting for the specific location and may include nitrogen, phosphorus, salinity and chloride levels)
- d) the location and nature of any rising groundwater or salinisation problems in the area; an assessment of the potential for the effluent irrigation scheme to contribute to the rising groundwater levels in the area or any salinity problems
- e) an assessment of the potential risk of contamination of groundwater given the proposed design, management and location of:
 - i) the treatment plant and reticulation scheme
 - ii) effluent and biosolids storage, utilisation or disposal facilities
- f) the location of any nearby bores, current and potential users and uses of groundwater in the area; an assessment of the potential impacts on existing and future uses of groundwater in the area
- g) an assessment of the adequacy of proposed measures to prevent contamination of groundwater; the proposed monitoring program.

4. Coastal issues

For sewerage systems undertaken within the coastal zone, the following issues should be considered:

- a) any relevant issues in the *New South Wales Government Coastal Policy*
- b) any impacts from sewage treatment and

- management activities on beaches or coastal dune fields including from short-term erosion or long-term recession
- c) any potential to pollute beaches given the location and type of outfall (e.g. cliff face, deep ocean)
 - d) any potential for the effluent discharge to affect coastal sand migration or disturb sea bed ecology
 - e) any direct or indirect impacts on coastal wetlands in particular those described under SEPP 14 — Coastal Wetlands
 - f) potential impacts of the cultural, recreational, navigational, scenic, natural and tourism values/activities of the affected coastal area.

5. Flooding issues

For sewerage systems undertaken on flood prone areas, the following issues should be considered:

- a) flooding status including the likely frequency of flooding
- b) if flood liable:
 - i) the direction of flood flow
 - ii) the vulnerability of the plant, biosolids or effluent storage facility or chemical stores to inundation or damage; consideration of the impact of flooding during construction
 - iii) potential impacts from inundation or damage of facilities
 - iv) the potential for the proposal to increase the flood liability of surrounding land by any land formation or levelling, construction of dams or bunding; an assessment of potential impacts of any increased flooding levels
- c) any future proposed flood mitigation systems that may influence the impacts of the proposal on the environment.

6. Soil issues

This section is particularly important if major earthworks are to be undertaken; if hazardous chemicals have previously been used on the site or are to be used on site; if effluent and biosolids are to be applied to the land, if acid sulfate soils are to be disturbed or if the soils are highly erodable. Issues to consider include:

- a) a brief description of existing surface characteristics including contours, terrain stability, slope gradient and length, susceptibility to erosion or landslip

- b) a description of the potential direct or indirect effects on soils
- c) a soil survey of areas to be affected by the proposal indicating any soil profile characteristics (including any subsoil characteristics); if applicable, include a map of soil units (as a minimum coring should be to 1.3 metres) and soil landscape maps (the Department of Land and Water Conservation has soil landscape maps for some parts of the State)
- d) identifying any constraints on the proposal due to soil characteristics, including:
 - i) the existing level of contamination of the proposed site, with identification of the type and extent of contamination if possible
 - ii) the potential for erosion or structural damage
 - iii) the permeability, potential for run-off; surface sealing characteristics; the potential for lateral or vertical movement to groundwater
 - iv) nutrient deficiencies, soil infertility; phosphorus fixing incapacity; characteristics which could affect root growth
 - v) the presence of sodicity in subsoils
 - vi) the potential to develop salinity
 - vii) the presence of acid sulfate soils (refer to EPA guideline *Assessing and Managing Acid Sulfate Soils* 1995); if relevant, issues to be considered include:
 - identifying the extent of acid sulfate material
 - assessing potential impacts from disturbance of sulfidic material, acid run-off from stockpiles, sale or use of material containing sulfidic material; any change in the watertable from the construction and operation of the scheme; the mobility of metals in effluent or biosolids applied in any utilisation or disposal scheme
- e) if relevant, sustainability of the proposed effluent or biosolids land application scheme given the soil characteristics, any levelling, climate, biosolid or effluent characteristics, proposed application rates and management regime, transpiration rates of crops and rotation regimes; sustainability should be considered in terms of nutrient balances, salinity, chemical contaminants, sodium

- adsorption ratios and organic loadings (see EPA guidelines for the use of effluent and biosolids)
- f) if relevant, an assessment of the likelihood of vertical or lateral seepage or flow of run-off containing effluent and biosolids to affect neighbouring properties or natural waterbodies
- g) if proposals are to be undertaken on sites where there was previous soil contamination, issues to consider include:
- i) the suitability of the sites to be used for the proposed use without any further remediation
 - ii) the level of remediation required before the sites can be used; if existing sewerage facilities are to be decommissioned and removed, any remediation work required before the sites can be used for other purposes
 - iii) the proposed methods to be used to remediate the site
 - iv) if contaminated spoils will be removed, the identification of sites for disposal of contaminated spoils and any remediation work required before disposal
 - v) the measures to prevent contamination of surrounding areas during decontamination works; a monitoring program to track decontamination progress
- h) proposed measures to manage or mitigate any adverse impacts and a proposed monitoring regime including:
- i) the proposed management program to mitigate potential impacts from erosion and sedimentation, including:
 - measures to minimise the area denuded at any one time
 - stormwater drainage and sediment control
 - stabilisation works for cuttings, embankments, trenches and open channels
 - earth material management measures including wind and water erosion control measures or minimising the stockpiling of soil
 - the maintenance program of all erosion control works.
 - ii) if relevant, the proposed management program to mitigate potential impacts

from disturbance of acid sulfate soils including:

- the minimisation of disturbance including changes to the watertable
 - the treatment of disturbed soils to neutralise or prevent acidity
 - the testing and treatment of all discharge from the site
 - the monitoring program and a description of response strategies should deleterious impacts be observed;
- iii) if relevant, the proposed management program to mitigate potential impacts from any biosolid or effluent land application scheme, including:
 - the management of product characteristics to be used on site, storage and application rates
 - the monitoring program of soil and crop responses
 - response strategies should deleterious impacts be observed
 - iv) if relevant, the proposed management program to minimise and mitigate adverse impacts from sodicity and salinity related problems including monitoring of groundwater levels
 - v) measures to avoid causing site contamination during the construction and operation of the proposal; remediation measures if contamination occurs.

7. Economic issues

Issues to consider include:

- a) the cost of providing, operating and maintaining the sewerage system; environmental and social costs and benefits should be considered as well as the project factors, and significant non-monetary costs and benefits should be described and qualitatively assessed; if relevant the analysis should consider:
 - i) possible economic benefits from the utilisation of the effluent, biosolids and digester gas
 - ii) the costs and benefits from any change in water quality resulting from the proposal
 - iii) flow-on costs from the need to augment the water supply

- iv) any additional employment, as a result of the proposal
 - v) the potential impact on property values; the economic impact of establishing 'restricted use' buffer zones around any facilities
 - vi) any impacts on economic activities, such as industrial development, agriculture (effluent utilisation), aquaculture or fishing in waterbodies likely to be affected by the proposal
 - vii) any economic benefits from the rehabilitation and use of land surplus after decommissioning existing facilities as a result of the proposal
- b) the proposed funding arrangement for the scheme; the financial implications per person or household of implementing the proposal.

8. Social issues

Issues to consider include:

- a) an assessment of the affect of the proposal on future development in the catchment; the potential impact on settlement patterns, community structure or cohesion
- b) the potential impacts of the construction or operation on the amenity of the area considering factors such as noise, dust, sewage fumes, disruption to any existing services, recreational areas, temporary loss of access and disruption of traffic
- c) social equity considerations such as means to offset any inequities for the host community;
- d) any other relevant issues raised in community consultation.

9. Health issues

Issues to consider include:

- a) an overview of the public health risk associated with the existing sewerage system
- b) an assessment of the potential health implications of the proposal considering impacts on air quality, water quality, soil contamination, road safety and the potential for the transmission of viral, parasitic and bacterial pathogens including:
 - i) an assessment of potential exposure pathways from the release of raw or unsatisfactorily treated sewage or from the proper or improper management or use of the effluent and biosolids

- ii) where appropriate, a full health risk assessment taking into consideration all potential pathways, including:
 - direct exposure to or aspiration of the sewage, effluent or biosolids
 - the use of effluent in any 'reclaimed' water scheme or in any drinking water scheme
 - consumption by humans or animals of vegetation irrigated with the effluent or from land where biosolids have been applied
 - consumption by humans or animals of fish or shellfish affected by sewage or effluent discharges
 - recreational exposure to effluent or sewage, such as swimming
 - iii) assessment of the adequacy of buffer zones from dwellings, recreational areas and public roads given the potential health risk
 - iv) an assessment of the adequacy of management and mitigation technology proposed, and the proposed monitoring program
- c) an assessment of potential improvements to community health as a result of implementing the scheme.

10. Air quality issues

Issues to consider include:

- a) identifying fixed and mobile sources of odour, dust, fume, greenhouse gases, ozone depleting gases, air toxins, aerosols of a pathogenic nature and other types of air pollution — the sources may include treatment of sewage and biosolids, accidental release of chemicals, storage of effluent and biosolids, incineration of biosolids or solid waste and digester gas, and biosolids transport
- b) the likely impact of the proposal on the local and regional air quality; if a significant issue, then include:
 - i) baseline data on the ambient quality of the air
 - ii) the projected quantity, frequency and times of emissions
 - iii) a consideration of the relevant advice in SEPP No. 33 — Potentially Hazardous and Offensive Industries with regard to potentially offensive industries

- c) meteorological conditions under which nearby dwellings and sensitive land are likely to be affected, and the frequency of occurrence of these conditions
- d) mitigation and management measures to control the generation and impacts of odour, fumes, dust, aerosols and other air pollutants including:
 - i) the use of site layout design including screens, installation and provision of buffer zones to reduce impacts
 - ii) the housing of odour and fume generating processes inside buildings; the installation of odour or pollutant control equipment to manage gaseous emissions
 - iii) the use of management practices such as ceasing dust generating activities during certain meteorological conditions; control measures on open stockpiles, processing and loading areas; sealing or watering of roads; algal management on effluent storage dams
- e) monitoring programs for dust, odour, and if incineration is proposed, stack emissions.

11. Noise issues

Issues to consider include:

- a) existing acoustic environments including the meteorological conditions, topographical features and buffer zones which will influence noise impacts
- b) potential fixed and mobile noise sources during construction and operation of the proposal including heavy vehicle movement and pumping facilities, and the proposed hours of operation
- c) for proposals involving blasting or tunnelling during the construction stage, a prediction of vibration impacts; areas or properties likely to be affected; mitigation and management measures to ensure compliance with relevant blast overpressure and ground vibration standards, and minimise potential damages to nearby structures or infrastructure
- d) a prediction of noise levels at potentially affected dwellings; an assessment of the ability to meet appropriate noise and vibration guidelines such as the *Environmental Noise Control Manual* (EPA, 1994a)
- e) mitigation and management measures to control the generation of noise and to ensure compliance

with relevant noise standards including details of noise control measures such as:

- i) alternative locations of noise generating equipment and its operations to reduce impacts
 - ii) design or management strategies to reduce impacts such as bunding (size, type and location) or noise barrier proposals, control of hours of operation and use of equipment with silencers
- f) the proposed monitoring program.

12. Visual issues

For sewage treatment plants, pumping stations, incinerators, biosolids storage, irrigation and reclaimed water schemes (including dams) or outfalls located in areas where visual impacts are a concern, issues to consider include:

- a) visibility from the surrounding areas; consideration of the site in the context of any landscapes of local or regional significance
- b) potential visual impacts caused by the clearing of vegetation, the treatment plant, biosolids stock piles or other structures, or by lights for security and night operations
- c) proposed mitigation and management measures to reduce visual impacts such as landscaping, location, layout or visual treatment plans.

13. Hazards issues

Chemical hazards

For sewerage systems which use, store or generate potentially hazardous chemicals such as chlorine, alum, lime, nitric or sulphuric acid, methane, fuels or explosives on the site during either the construction or operation stages, the following issues should be considered:

- a) a list of dangerous goods/hazardous chemicals to be used or generated and their quantities and rate of usage or generation
- b) an identification of possible causes of potentially hazardous incidents, the likelihood of occurrence and their consequences to public safety or the environment
- c) any relevant advice in SEPP 33 — Potentially Hazardous and Offensive Industries with regard to potentially hazardous industries;

details of storage, usage and transport arrangements for the hazardous materials, with an outline of operational and organisational safety controls to reduce their hazard risk and environmental impacts

d) a brief description of operational and emergency procedures involving dangerous and hazardous goods.

Dam safety hazards

For sewerage systems that store effluent in dams for irrigation or other reclaimed water utilisation schemes, assess:

- a) the performance of the dam during exposure to natural hazards such as flooding and severe storms
- b) the impacts of subsidence or earthquakes on the integrity on any proposed dam
- c) the impacts on the biophysical and human environment should the dam be inundated or ruptured.

Bushfire hazards

For sewerage systems located in areas of high bushfire hazard risk, the following issues should be considered:

- a) measures to reduce the risks of bushfire during the construction and operation of the proposal
- b) provision for firefighting on the site including access and water supply.

14. Flora and fauna issues

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

- a) identifying 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
- b) indicating the local and regional scarcity of these habitats, ecological communities, populations and species and their potential scientific, historic or cultural significance
- c) 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, SEPP 46 — Protection and Management of Native Vegetation or other environmental planning instruments
- 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
- d) potential impacts on the number, size, distribution, interrelationships or health of species, populations or ecological communities or their habitats as a result of killing or disturbance from:
 - i) clearing, dredging or traffic conflicts
 - ii) changes in water quantity, quality or groundwater regime
 - iii) noise, light or dust
- e) the sensitivity of species, populations or ecological communities to disturbance, particularly considering the timing of the disturbance relative to breeding/migratory cycles of species; the potential for recolonisation following rehabilitation, the time required for re-establishment; the impacts on remnant vegetation, for example wildlife corridors;
- f) if relevant, the potential impacts on the commercial and recreational value of fish stock and on any aquaculture activities; compatibility with the provisions of the *Fisheries Management Act 1994*
- g) if relevant, assessing the significance of the area for koalas under the provisions of SEPP 44 — Koala Habitat Protection
- h) if relevant, consideration of issues outlined in SEPP 46 — Protection and Management of Native Vegetation
- i) an assessment of the potential impacts on biodiversity including the cumulative impacts of the proposal on communities in the region; significance of any disturbed vegetation or fauna for other biota not directly affected by the proposal, but which interact with potentially disturbed vegetation or fauna

- j) details of any existing weed, vermin or pest problems; the impact of the proposal on their numbers; a description of measures to control and prevent infestations at or adjacent to the site; if the proposal involves artificial wetlands, assessing the potential impact from the introduction of any non-indigenous plant species; the potential for species to become 'weeds'; if an irrigation or biosolid application scheme is proposed, the potential to increase weed problems
- k) landscaping and rehabilitation proposals and their role in any mitigation strategy
- l) the mitigation of impacts, such as the provision of new appropriate habitats or compensatory rehabilitation or restocking of indigenous species; the opportunities for re-colonisation; timing of major disturbances so as to minimise impacts; details of any proposed methods to protect species or their habitats from accidental damage during construction or operation of the proposal; timing of major disturbances to minimise impacts on breeding and migration cycles
- m) proposed monitoring to determine the effectiveness of mitigation and to verify predictions.

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

15. 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.

16. 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. These may be due to the temporal and/or spatial characteristics of the activities and impacts. Issues to consider that relate to sewerage system proposals include:

General

- a) the potential for cumulative impacts from
 - i) other existing or planned sewerage systems in the area or region
 - ii) other industries in the vicinity with similar impacts

- b) any advantages or disadvantages from clustering industry and sewerage facilities in this area
- c) any likely long-term and short-term cumulative impacts having regard to 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

Reticulation network

- a) any other existing or planned pipelines or utilities reserves within the catchment and any cumulative impacts because of the reserve restrictions
- b) any other existing or planned percolation facilities, land application sites or sewage pipelines which leak, which may affect the groundwater or surface water quality
- c) any likely cumulative impacts such as traffic disturbance, spoil disposal, and noise and dust emissions during the construction of the reticulation network

Effluent and biosolids utilisation or disposal

- a) any other point or non-point sources of nutrients or other pollutants in the immediate river or ocean catchment
- b) any other existing or planned sewage treatment facilities adopting similar effluent or biosolids utilisation or disposal options; consideration of any cumulative impacts due to oversupply of effluent or biosolids
- c) the potential cumulative impacts of land application practices on any sites where effluent or biosolids are proposed to be used or within any catchment
- d) consideration of the receiving environment's ability to achieve and maintain the water quality 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 (Appendix 4). This list also identifies for the community the relevant authorities involved in the assessment and regulation of the proposal.

G. Compilation of mitigation measures

A critical component in the EIS is the mitigation strategy. This demonstrates how the proposal and its environmental safeguards can be implemented and managed in an ecologically sustainable manner. At this stage of the process, it is essential that the proponent can demonstrate that the proposal is capable of complying with statutory obligations under other licences or approvals.

The mitigation strategy should include the environmental management principles which would be followed in the planning, design, construction and operation of the proposed system, and include:

- specific locational, layout, design or technology features (which are described under each of the key issues) and
- an outline of ongoing management and monitoring plans.

An environmental management plan (EMP)

This outline in the EIS should form the basis for an environmental management plan (EMP) for the proposal. An EMP is a tool to ensure that the commitments in the EIS, subsequent assessment reports and approval or licence conditions are fully implemented. 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.

The outline should provide a framework for managing or mitigating environmental impacts for the life of the proposal. Mitigation strategies for the construction and operation stages of the project should be distinguished. In some circumstances, it may be appropriate to prepare separate construction and operational environmental management plans.

With projects with potentially controversial environmental impacts, it may be appropriate to:

- consult with government authorities, council and the community in the preparation of 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.

The EMP should measure and monitor the effectiveness of the proposed environmental management and protection measures and procedures. Two sections should be included, one setting out the program for managing the proposal (section a. below) and the other outlining the monitoring program with a feedback loop to the management program (section b. below).

a) Environmental management outline

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

- i) management of construction impacts; if appropriate include:
 - erosion and sedimentation management plans
 - rehabilitation and revegetation plans for any terrestrial or aquatic communities disturbed by construction activities
- ii) management of operation impacts; if appropriate include:
 - maintenance plans
 - plans to respond to emergencies and operational abnormalities
- iii) strategies to feed information from the monitoring program back into the management practices and action plans to improve the environmental performance and sustainability of all components of the scheme
- iv) training programs for operational 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 (including health) performance.

b) Monitoring outline

This program should be carefully designed and related to the predictions made in the EIS and to 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) raw and treated effluent and biosolids quantity and quality
- ii) parameters which can indicate occurrence of critical operational problems or abnormalities
- iii) the quantity and quality of effluent and biosolids in storage facilities, used in various utilisation schemes, or released to the environment
- iv) soil characteristics at any effluent and biosolids land application sites; nutrient uptake by plants; evidence of ponding, erosion or any other land degradation; if lateral seepage occurs, any changes in soil characteristics on adjacent land
- v) if relevant, groundwater quality and levels
- vi) water quality and ecology of waterbodies receiving the effluent or incidental discharges of raw sewage
- vii) the nutrient removal capacity and ecological conditions of natural or constructed wetlands receiving the effluent
- viii) noise, odour and air pollutants emissions
- ix) public health indicators, especially when treated effluent is to be used in the community.

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 and link 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 meeting the short- and long-term community requirements
- 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 soil, surface waters, groundwater and the associated ecosystem
- d) the ability of the proposal to safeguard public health
- e) social equity considerations.

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:

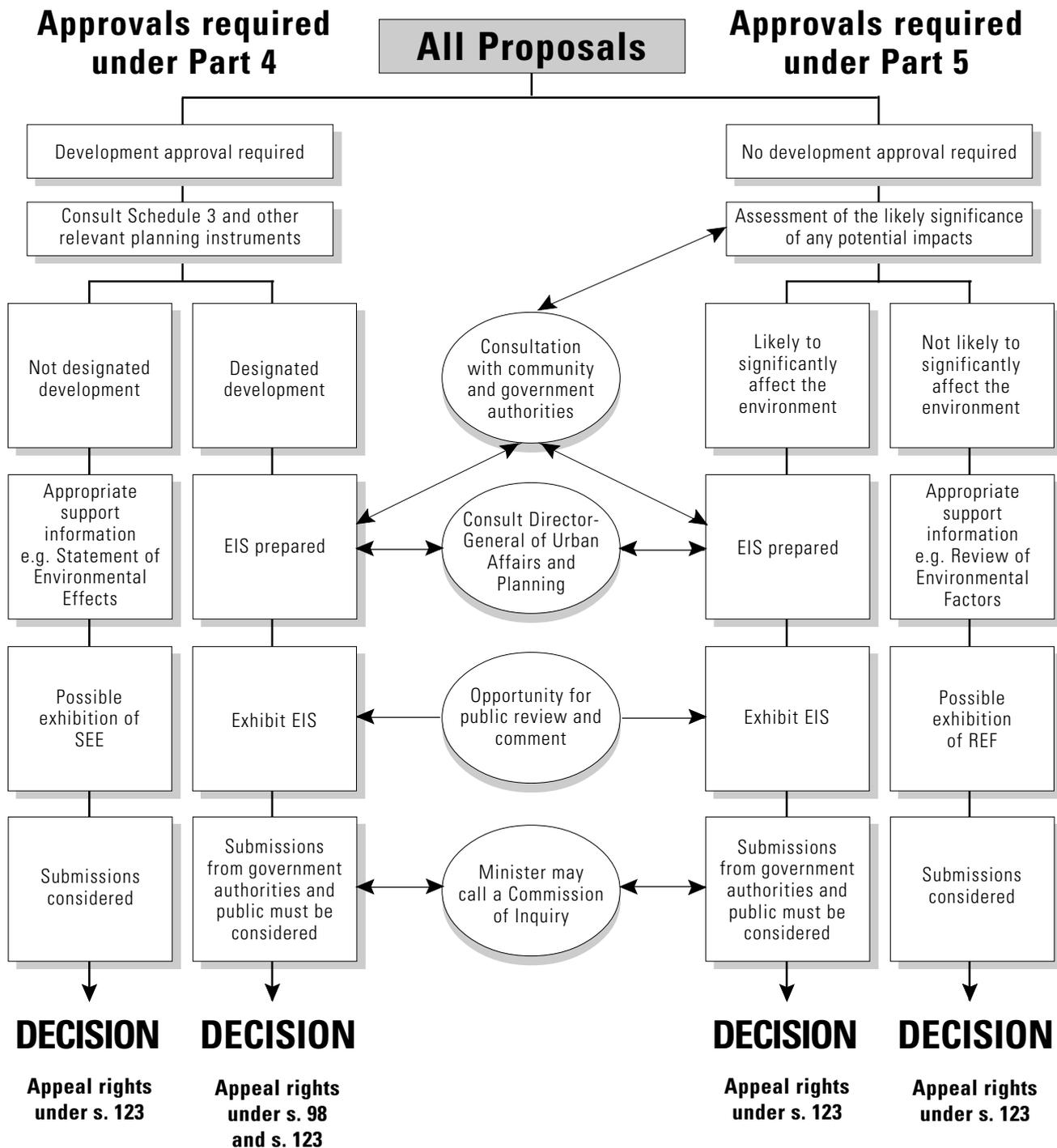
- a) The precautionary principle — namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- b) Inter-generational equity — namely, that the present 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.

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

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

Environment Protection Authority (1995a) *The utilisation of treated effluent by irrigation: Draft environmental guidelines for industry*, EPA, Sydney

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Hazelton P. A. and Murphy B. W. (ed.) (1992) *What do all the Numbers Mean?* NSW Department of Conservation and Land Management

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

Ross A. D., Lawrie R. A., Whatmuff M. S., Keneally J. P. and Awad A. S. (1991) *Guidelines for the use of sewage sludge on agricultural land*, NSW Agriculture

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

Appendix 6. Schedule 3 — Designated development

This appendix is an extract from Schedule 3 of the EP&A Regulation 1994 and prescribes sewerage systems and works which are designated under Part 4 of the EP&A Act. This designation only applies to proposals which require development consent under the provisions of a planning instrument.

Sewerage systems or works that:

- 1) treat sewage and:
 - a) have an intended processing capacity of more than 2,500 persons equivalent capacity or 750 kilolitres per day; or
 - b) have an intended processing capacity of more than 20 persons equivalent capacity or 6 kilolitres per day and are located:
 - i) on a floodplain; or
 - ii) within a coastal dune field; or
- 2) incinerate sewage or sewage products; or
- 3) temporarily or permanently store sewage, sludge or effluent:
 - a) with a capacity of more than 1,000 tonnes of material; or
 - b) at a location:
 - i) within 100 metres of a natural waterbody or wetlands; or
 - ii) in an area of:
 - high watertable; or
 - highly permeable soils; or
 - iii) within a drinking water catchment; or
 - iv) on a floodplain; or
 - v) within 250 metres of a dwelling not associated with the development; or
- 4) release or reuse more than 20 persons equivalent capacity or 6 kilolitres per day of sewage, effluent or sludge at a location:
 - a) in or within 100 metres of a natural waterbody, wetlands, coastal dune fields or an environmentally sensitive area; or
 - b) in an area of:
 - i) high watertable; or
 - ii) highly permeable soils; or
 - iii) acid sulphate, sodic or saline soils; or
 - c) on land that slopes at more than 6 degrees to the horizontal; or
 - d) within a drinking water catchment; or
 - e) within a catchment of an estuary where the entrance to the sea is intermittently open; or
 - f) on a floodplain; or
 - g) within 500 metres of a residential zone or 250 metres of a dwelling not associated with the development.

This designation of sewerage systems or works does not include development for the pumping out of sewage from recreational vessels.

Are alterations or additions designated development?

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

- 1) Development involving alterations or additions to development (whether existing or approved) is not designated development if, in the opinion of the consent authority, the alterations or additions do not significantly increase the environmental impacts of the total development (that is the development together with the additions or alterations) compared with the existing or approved development.

Factors to be taken into consideration

- 2) In forming its opinion, a consent authority is to consider:
 - a) the impact of the existing development having regard to factors including:
 - i) previous environmental management performance, including compliance with:
 - conditions of any consents, licences, leases or authorisations by a public authority;
 - any relevant codes of practice;
 - ii) rehabilitation or restoration of any disturbed land;

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