Northern Territory Government
Office of Environment and Heritage

PART B

GUIDELINES

GUIDELINES FOR PREPARATION OF A PUBLIC ENVIRONMENTAL REPORT

ARAFURA RESOURCES NL MT PORTER GOLD PROJECT

OCTOBER 2004

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These guidelines have been developed to assist Arafura Resources NL in preparing a Public Environmental Report (PER) for the proposed Mt Porter Gold Mine in accordance with Clause 8 of the Administrative Procedures of the *Environmental Assessment Act* of the Northern Territory.

Administrative Procedures of the *Environmental Assessment Act* of the Northern Territory state that the Minister will specify the following in the guidelines:

- Matters relating to the environment which the proponent shall deal with;
- Number of copies of the report to be provided to Minister/other agencies; and
- Newspapers in which and on occasions when the proponent will publish a notice.

The PER should contain sufficient information to enable understanding and assessment of the scope and environmental implications of the proposal. The PER should clearly identify the main environmental impacts associated with the development and should contain a management strategy that demonstrates how these impacts will be minimised.

Information should be presented in a concise format, using maps, overlays, tables and diagrams where appropriate to clarify the text.

The PER should include the following sections, but need not be limited to these sections or inferred structure.

1 EXECUTIVE SUMMARY

The Executive Summary should include a brief outline of the project and each chapter of the PER, allowing the reader to obtain a clear understanding of the proposed project, its environmental implications and management objectives. The Executive Summary should be written as a stand-alone document, able to be reproduced on request by interested parties who may not wish to read or purchase the PER as a whole.

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

This section should describe the development proposal to allow a detailed understanding of infrastructure design and engineering and all stages of construction, operation and management of the project and include relevant plans, photos and maps. Aspects to be covered include:

- An explanation of the objectives, benefits and justification for the project. The purpose of this is to place the proposal in the local and regional context.
- A description of the project's location indicating distance from Darwin and Pine Creek, and the project in relation to the Stuart and Kakadu Highways and the Adelaide to Darwin Railway.
- An overall layout of the proposed mine site including pits, waste rock dumps, power generation, other infrastructure, waterways, access and existing features of interest.
- Comprehensive maps showing topography and all project components and land tenure.
- Project schedule.
- Location and design criteria for each component of the project including design limitations imposed by site characteristics.
- Land requirements, land tenure, acquisition requirements (permits, rezoning and Native Title), and the tenures under which the project would be held including details of relevant legislative processes required to grant proposed tenure.
- Infrastructure requirements and specifications (permanent and temporary) and ancillary activities (e.g. storage areas, waste dump areas etc).
- Employment and business opportunities (direct and indirect), including sources of workforce, skill levels required and opportunities for Aboriginal people and businesses.
- Methods for storage, handling, containment and emergency management of chemicals and other hazardous substances (including fuel and explosives).

For the development and operation of the mine the proposal description should consider, as a minimum, the following:

Site Preparation

- Outline the construction timing, methods, equipment and materials (types, sources and quantities).
- Describe water requirements, usage, source, storage, treatment and disposal. Information is to be provided on how much water is required and how this water is to be sourced.
- Describe on-site and off-site borrow material requirements, extraction methods and uses.

Mine

- Current ore reserves and mine life.
- Outline design of pits and their dimensions (including maps, plans and geological cross-sections).
- Describe mining methods, scale of operations and timetable for ore extraction and open cut operations.
- Detail drilling and blasting requirements (including frequency).

- Outline possible future extensions to the mine operation, and discuss the probability of mining satellite ore bodies.

Waste Rock Management

- Identify total amount of waste rock to be produced.
- Characterise waste rock in terms of AGP (acid generation potential) and neutralising capacity from drill core samples and in-situ assessments (kinetic tests and field trials); include sample selection methodology.
- Identify classes and amounts of waste rock for handling purposes.
- Outline proposed waste dump locations, dimensions, water catchments, surface treatment and final landform (discuss alternatives).
- Describe in detail the methods for waste rock disposal and dump construction; including strategic positioning of different waste rock types.
- Describe means of interception and management of potential acid mine drainage.

Ore Processing and Tailings Management

- Detail options for processing the ore.
- Describe capacity of proposed ore processing facility to treat the ore and safely dispose of the tailings produced.
- Indicate all input products (solids, gases and liquids) and pathways for each item in the process.
- Indicate all output products (solids, gases and liquids) and pathways for each item in the process.
- Describe proposed tailings disposal.
- Characterise the tailings in terms of AGP (acid generation potential).
- Detail any proposed stockpiling of ore on site and associated management.

Water Management

- Detail the site water requirements and identify sources.
- Provide a site water balance (all inputs and outputs) for the expected mine life, including rehabilitation.
- Describe the proposed management of clean, dirty and contaminated water.
- Describe the management of potential acid drainage and metal contaminated waters. Discuss management options, with the purpose of determining that the preferred option is the most effective. If a wetland filter is proposed, then provide full design specifications, including details of residence time and the management of overflow events.
- Describe the diversion of surface waters.

- Describe dewatering of the pit, including expected water quantities and qualities.
- Describe the management of high/extreme rainfall events.

Rehabilitation and Decommissioning

The rehabilitation program should be integrated into the mine plan and considered as part of the mining operation, rather than as a separate phase at the end of the mine life.

The project description should consider, as a minimum, the following:

- Identification of a post mining land use and rehabilitation objectives.
- Rehabilitation commitments and timetables (for both temporary and permanent facilities) including waste management, pollution control and stabilisation and rehabilitation plans for mined areas.
- Analysis of the feasibility of backfilling of pits with waste rock.
- In detail describe the following:
  - Progressive and final rehabilitation plans for pits, waste rock dumps, ROM pad, roads and infrastructure sites.
  - Design of rehabilitated landforms, in particular rehabilitation techniques, including methods to reconstruct the landscape using the materials available.
  - Profile reconstruction and viability for the growth of native species.
  - Collection and selection strategy for native species, e.g. native grasses and other vegetation.
  - Runoff and erosion control measures of rehabilitated areas.
  - Final topographic and drainage morphology.
  - Maintenance of water quality.
  - Revegetation procedures.

Transport

The project description should consider, as a minimum, the following:

- Description of transport systems and methods to convey all site traffic (including materials, workers and product) to and from the site (both during construction and operation) including:
  - Type, size and number of vehicles required during all phases of the proposal.
  - The estimated volumes, tonnage, composition, origin and destination of traffic generated by the proposal.
  - Estimated times of travel.
  - Additional road infrastructure works required including site access and signage.
- Description of any proposed haul roads, including length, location, land requirements, tenure and acquisition requirements.

- Description of construction methods and timeframes for any proposed private and public haul roads.
- Consultation undertaken with relevant regulatory agencies.
- Necessary approvals required.

3 ALTERNATIVES

Alternative proposals, which may still allow the objectives of the project to be met, should be discussed, detailing reasons for the selection and rejection of particular options. The selection criteria should be discussed, and the advantages and disadvantages of preferred options and alternatives detailed. The potential impacts of the alternatives should be described.

Alternatives to be discussed should include:

- Not proceeding with the project.
- Alternative locations, including process plant.
- Alternative sources of raw materials for the project, including water supply.
- Alternative transport corridors and options.
- Alternative extraction and processing technologies considered.
- Alternative environmental management technologies considered, such as treatment and disposal of byproducts and waste products.
- Alternative workforce accommodation.

4 EXISTING ENVIRONMENT, POTENTIAL IMPACTS OF THE PROJECT AND MANAGEMENT

Studies to describe the existing environment should be of a scope and standard sufficient to serve as a benchmark against which the impacts of the project may be assessed over an extended period. Control areas not impacted by the project should be included in studies and long term monitoring locations established.

This section should also include an assessment of the level of significance of the impact, be it global, regional or local (e.g. global and national implications of greenhouse gases and the localised impact of service roads or artificial water bodies).

Cumulative impacts should also be discussed. The reliability and validity of forecasts and predictions, confidence limits and margins of error should be indicated as appropriate.

Description of those areas potentially impacted by the project should, as a minimum, include:

4.1 Landform

Baseline

- Provide maps and an interpretation of the regional geology and geomorphology of the site and peripheral areas.
- Discuss the soil types and land units of the site and peripheral areas.
- Provide seismic information for the site and peripheral areas.
- Detail the existing level of soil erosion and other disturbances.

Impacts

Describe how the project will or has the potential to impact on each element with particular consideration given to the following:

- Discuss limiting properties of landform considering erosion, rehabilitation etc. This information may be provided through the development of a landform evolution model for the life of the project and beyond (this would also have benefit in assisting in progressive rehabilitation over the life of the project).
- Detail impacts of mining to landform.

Management

Detail the safeguards, management and monitoring strategies that will be used to minimise impacts of construction and operation phases, including:

- Measures to avoid or minimise impacts.
- Management of topsoil.
- Erosion and sediment control procedures and associated erosion and sediment control management plan.

4.2 Hydrology/Hydrogeology

Baseline

- Describe the site and regional surface water systems including:
  - rivers;
  - creeks; and
  - streamlines.
- Describe the site and regional ground water systems including:
  - confined aquifers;
  - unconfined aquifers; and
  - ground soaks, expressions etc.
- For both ground water and surface water systems, discuss:
  - their significance;
  - current uses;
  - beneficial uses;

- flows (including flood contours) and discharge rates;
- water quality;
- release or seepage of heavy metals; and
- characterisation of all water sources (both surface and groundwater).

Impacts

Describe how the project will or has the potential to impact on each element with particular consideration given to the following:

- Impacts on surface and groundwater from mining, ancillary activities and associated infrastructure requirements, including impacts on:
  - water quality;
  - changes to/ diversion of surface waters; and
  - aquatic flora and fauna.
- Impacts associated with dewatering of the pits (including water disposal).
- Possible acidification of groundwater due to aerial exposure in the pit void.
- Possible chemical constituents in drainage, specifying test methods (provide all test information).
- Current downstream users and their requirements.

Management

Detail the safeguards, management and monitoring strategies that will be used to minimise impacts of construction and operation phases, including:

- Treatment, storage and disposal of waste water, including stormwater run off.
- Management of clean, dirty and contaminated water.
- Management of high/ extreme rainfall events.
- Protection of beds and banks of watercourses.
- Means of interception and management of potential acid mine drainage.
- Management of pit water.
- Need for a waste discharge licence.
- Protection of surface water from potential contamination.
- Protection of groundwater from potential pollution sources.
- Proposed monitoring of surface and ground waters.
- Continued water monitoring and discharge requirements following decommissioning.
- Ongoing water requirements for the maintenance of wetlands or other water management structures.

Include a map of water management system showing all structures and routes. Details of surface water sampling points and groundwater investigation bores should also be included.

4.3 Ecology

Baseline

- Specify the extent of clearing (proposed annual and total amounts).
- Survey flora and fauna species (including migratory species) and biological communities.
- Survey methodology should:
  - follow best practice and advice from relevant agencies;
  - consider seasonality, species rarity, potential for occurrence of significant species and sensitivity of species to disturbance;
  - be included in appendices; and
  - identify rare, threatened and endangered species against NT and Commonwealth legislation, and species with indigenous conservation values.
- Special consideration should be given to the following:
  - ecologically outstanding areas;
  - vegetation that is the habitat of rare, threatened or endangered species or has outstanding diversity;
  - communities that are exceptional examples of their type; and
  - vegetation outside its normal distribution or of other biogeographical significance.
- Timeline to obtain any permits and meet other statutory obligations under NT legislation (IDCO No12. – *Planning Act 1999* and *s.38 Pastoral Land Act 1992*) for vegetation clearing.

Impacts

Describe how the project will or has the potential to impact on each element identified above with particular consideration given to the following:

- Impacts of clearing.
- Impacts on species or communities or habitats of local or regional or national significance. Detail this with reference to the inputs and outputs from the mining and processing operations.
- Rate the risk and seriousness of each impact.
- Identify noxious weeds that may result from the project activity.

Management

Detail the safeguards, management and monitoring strategies that will be used to minimise impacts of construction and operation phases, including:

- Minimisation of disturbance.
- Rehabilitation methods including revegetation strategies and flora selection.

- Weed management plan (to be included in the Environmental Management Plan and to follow best practice and advice from advisory agencies).
- Vegetation Clearing Plan (to be developed as part of the Environmental Management Plan).
- Actions to prevent the development of mosquito and other biting insect breeding habitats.
- Detail proposed feral animal control.

4.4 Air Quality and Noise

Baseline

- Provide background dust, air quality, noise and dispersion levels.
- List all meteorological conditions including but not limited to:
  - prevailing wind directions and strengths;
  - maximum wind gusts;
  - precipitation data (maximum, minimum, average, design rainfall intensities);
  - temperature data; and
  - evaporation data.

Impacts

Describe how the project will or has the potential to impact on each element with particular consideration given to the following:

- Potential air emissions.
- Dust, including projected particle size and distribution.
- Noise, including levels, timing and duration and comparison to current levels (with respect to any nearby receivers).
- Information on ore toxicity in terms of human health and Occupational Health and Safety.

Management

Detail the safeguards, management and monitoring strategies that will be used to minimise impacts of construction and operation phases, including:

- Dust suppression and monitoring, including during ore transportation;
- Noise mitigation.

4.5 Cultural Environment

Baseline

This section should describe the anthropological, archaeological and heritage values of the development area, including sites and objects of Aboriginal significance.

As a minimum, information should be provided on the following:

- Historical uses of the site (Aboriginal and non-Aboriginal).
- Current use by Aboriginal people.
- Descriptions of the cultural values that could be impacted by the project. These should include:
  - places nominated for listing or listed on the Register of the National Estate or the Interim list of the Register of the National Estate;
  - places nominated for listing or listed on the Commonwealth or National Heritage list;
  - nominated, proposed and declared heritage places and objects under the NT *Heritage Conservation Act 1991*;
  - prescribed archaeological and heritage places and objects (Aboriginal) under the NT *Heritage Conservation Act 1991*;
  - areas with special values to indigenous and non-indigenous people, e.g. traditional land use, landscape, visual environment, recreational, commercial, tourism, scientific and educational;
  - areas of significance to the Aboriginal population and culture, including sacred sites within the meaning of the *Aboriginal Land Rights Northern Territory Act 1976* and the *Northern Territory Aboriginal Sacred Sites Act*;
  - National Parks, conservation reserves or any other category of Territory Park or Reserve;
  - Consultation arrangements and any agreements with Local Aboriginal Groups or the Northern Land Council (NLC) under the *Native Title Act 1993*; and
  - local society and regional centres.

For each of these cultural values, indicate: importance, conservation status, national and international treaty obligations, and clearance permits required or obtained.

The methodology by which these sites and areas were identified, and their importance assessed, should include survey details such as dates, consultants, survey area and methods.

In relation to prescribed archaeological places and objects protected under the *Heritage Conservation Act*, the proponent should seek advice from an archaeologist and document the precise location of such places and objects in relation to the proposal.

The archaeologist should undertake a desktop review of the previous archaeological survey, provide a significance assessment and recommendations for previously recorded sites. The review may also require relocation of these sites to assess their current condition and integrity.

Further survey of areas not covered by the previous survey should also be undertaken to ensure that unrecorded sites, which are also protected by the Act, are not included in the development area. Contact Heritage Conservation Services for advice regarding an appropriate scope of works.

The protocol to be followed in the event of discovery of new archaeological or heritage sites or objects during the construction phase should be documented and included in the Environmental Management Plan (see section 6). The proponent should seek advice on this from Heritage Conservation Services of the Office of Environment and Heritage.

The proponent should describe the significance of the places and objects which are to be impacted by the proposal; and options for mitigation of loss of heritage value of places and objects that lie within the area of impact.

This section of the PER should also include:

- Results of the inspection of the Register of Sacred Sites maintained by the Aboriginal Areas Protection Authority.
- Details of the application lodged with the Aboriginal Areas Protection Authority for an Authority Certificate within the meaning of Part 3, Division 1 of the *Northern Territory Aboriginal Sacred Sites Act*.
- A copy of the Certificate issued by the Authority as a result of that application containing conditions, if any, relating to the protection of sacred sites on, or in the vicinity of, the project area.
- Status of any negotiations with native title claimants/NLC or other requirements under the *Native Title Act*.

Impacts

This section should describe the anticipated or potential impacts the project will have on each cultural value indicated in the previous section. Consideration is to be given to the impact of the proposal on local Aboriginal employment levels and the influx of additional workers into local centres. Describe how these potential impacts are to be mitigated or managed.

4.6 Waste Management

- Identify and describe all sources of waste (note that waste rock issues are dealt with separately);
- Details of effluent disposal from the mine site;
- Outline proposed waste dump locations and dimensions (discuss alternatives).

Management

Detail the safeguards, management and monitoring strategies that will be used to minimise impacts during development and operation of the mine, including:

- Waste management program including reuse, recycling, storage, transport and disposal.
- Details of any pollutants that are likely to be released into the environment and measures to prevent or minimise this release of pollutants.
- Management of listed waste as per the *Waste Management and Pollution Control Act*.
- Management of hazardous materials such as chemicals, fuels, oils and explosives.

4.7 Traffic and Transport

Baseline

Describe the existing transport infrastructure at locations likely to be impacted by the project.

Impacts

Describe how the project will, or has the potential to, impact on transport infrastructure during construction and operational phases. In addition, describe possible transport impacts as a result of the proposal including issues such as dust and road traffic noise.

Management

Describe proposed safeguards, management and monitoring strategies that will be implemented to minimise potential transport impacts during construction and operation including, but not limited to:

- Methods for complying with any relevant road vehicle axle limits.
- Methods for securing loads.
- Measures to prevent sediment transport off-site via transport vehicles including shakedown areas or properly controlled truck-wash facilities.

- Measures to reduce any road traffic noise impacts.
- Consultation with local communities affected by transport impacts.
- Traffic management.
- Management of driver fatigue.

4.8 Greenhouse Gas Emissions

The Northern Territory Government's objective for managing greenhouse gas emissions from new and expanding operations is to reduce emissions to a level that is as low as practicable. An assessment of greenhouse gas emissions for the project should be undertaken.

The assessment should outline, as a minimum, the following:

- Energy requirements for the project.
- Fuel sources for the project.
- Estimated greenhouse gas emissions.
- A comparison with the national levels of greenhouse gas emissions.

Details should also be provided on the projects commitment to:

- Greenhouse gas emissions inventory and benchmarking.
- Measures to minimise greenhouse gas emissions.
- Minimising emissions over the life of the project.
- Benefits of this project to abatement of greenhouse gas emissions on a national or global scale.

Refer to the attached Greenhouse Unit Guidelines for further information.

5 HAZARDS AND RISKS TO HUMANS AND FACILITIES

The PER should include a preliminary hazard analysis and assessment of the risks to people, the environment and nearby facilities from potential accidents associated with the construction, operation and maintenance of the various components of the proposal, storage and transport of materials to and from the complex.

The preliminary hazard analysis and risk assessment should outline and take into account emergency plans that detail strategies, response procedures and staff responsibilities in the event of an emergency or accident. Issues such as floods, bush fires, lightning strikes, mine collapse and landslip should be considered. Contingency plans for dealing with spillage of any hazardous materials should be detailed. The risks in relation to open pit rescue should also be discussed.

The hazard and risk analysis will identify the critical areas that need to be addressed in management plans, monitoring programs, contingency and emergency plans.

6 PROJECT ENVIRONMENTAL MANAGEMENT

A draft Environmental Management Plan (EMP) should be provided in a form suitable for inclusion in a Mining Management Plan as required under the *Mining Management Act*. The draft EMP should be strategic, describing a framework for environmental management. Where possible specific management policies, practices and procedures should be included in the draft EMP. A final EMP would be prepared at the conclusion of the assessment, taking into consideration comments on the PER and incorporating the Assessment Report recommendations.

The draft EMP should:

- Define the management structure of both the construction and operational phases and the relationship to the environmental management of the site.
- Describe the proposed measures to minimise adverse impacts and the effectiveness of these safeguards (e.g. provide performance indicators by which all anticipated and potential impacts can be measured).
- Describe monitoring to allow early detection of adverse impacts.
- Describe remedial action for any impacts that were not originally predicted.
- Detail how monitoring will be able to determine the differences between predicted and actual impacts.
- Include a summary table listing undertakings and commitments made in the PER, including performance indicators, with cross-references to the text of the report.
- Provide for the periodic review of the management plan itself.

Reference should be made to relevant legislation and standards, and proposed arrangements for necessary approvals and permits should be noted. The agencies responsible for implementing and overseeing the management plan should be identified. Proposed reporting procedures on the implementation of the management plan, independent auditing or self auditing and reporting of accidents and incidents should also be described.

7 PUBLIC INVOLVEMENT AND CONSULTATION

Public involvement and the role of government organisations should be clearly identified. The outcomes of surveys, public meetings and liaison with interested groups should be discussed, and any resulting changes made to the proposal clearly identified. Details of any ongoing liaison should also be discussed including any negotiations with native title claimants.

Negotiations and discussions with local and community government, the Territory Government and the Commonwealth Government should be detailed, and any outcomes referenced. Details of any ongoing negotiations and discussion should also be presented.

8 INFORMATION SOURCES, REFERENCE LIST, BIBLIOGRAPHY

The PER should contain a comprehensive reference list or bibliography. Any source of information such as studies, research, maps and personal communications used in the preparation of the PER should be clearly identified, cited in the text and referenced in the bibliography.

9 APPENDICES, GLOSSARY

Information and data related to the PER, but unsuitable for inclusion in the main body of the statement, should be included as appendices. This may include detailed analyses, monitoring studies, baseline surveys, and raw data.

A glossary should be provided, defining the meaning of technical terms, abbreviations and colloquialisms. (Note: throughout the PER, technical terms and jargon should be minimised).

10 ADMINISTRATION

- Prior to the report being distributed for comment, a preliminary draft of the PER should be lodged with the Office of Environment and Heritage (OEH), Department of Infrastructure, Planning and Environment (DIPE) for review and comment.
- Once the PER is ready for comment, 25 copies of the draft PER should be submitted to OEH for distribution to NT Government advisory bodies.
- The PER is to be publicly advertised for review and comment in the NT News and the Katherine Times. The PER is to be made available for public comment for 28 days.
- The PER should be placed on public review at DIPE and the Department of Business, Industry and Resource Development (DBIRD) offices in Darwin and Katherine, council offices and the NT Library, Parliament House, Darwin.
- If possible the PER should be on CD ROM disc so that the PER can be placed on the Department's Internet site. The CD ROM copies should be in ABODE® *.pdf format for placement on the Internet.
- The OEH action officer for this project is David George, telephone (08) 8924 4049, facsimile (08) 8924 4053, email: david.george@nt.gov.au.

NT Environmental Impact Assessment Guide
Greenhouse Gas Emissions

1 PURPOSE

1.1 This Guide has been developed by the Office of Environment and Heritage (the Office)[1]. It provides advice to proponents about the minimum requirements for environmental management which the Office expects to be met when considering a proposal during the assessment process.

1.2 This Guide primarily addresses the minimisation of greenhouse gas emissions from new or expanding operations where greenhouse gas emissions are considered to be a relevant environmental factor in an assessment of a proposal under the *NT Environmental Assessment Act 1994*.

1.3 This Guide provides advice only. Proponents are encouraged to consider their proposals in the light of this advice. A proponent wishing to deviate from the guidance provided would be expected to put a well-researched and clear justification to the Office, rationalising the need for that deviation. In practical terms this means that the proponent would need to show that the intent of this Guide has been understood and given serious consideration.

2 THE GUIDANCE

2.1 Overview

While there is a range of views within the scientific community over the climatic and environmental effects that can be expected as a result of the increasing atmospheric concentration of greenhouse gases, the majority view held in the scientific community is that global warming is occurring and that future climate change is inevitable.

The Northern Territory Government recognises that it has a role to play in addressing this complex and challenging problem. It is committed to greenhouse policies that are guided by scientific consensus and that take into consideration the Territory's current and future environmental, social and economic needs.

The Government's objective for managing greenhouse gas emissions from new and expanding operations is to reduce emissions to a level that is as low as practicable. To achieve this, the Office will ensure that potential greenhouse gas emissions from proposed projects are adequately addressed in the planning, design and operation of projects. Specifically the Office will ensure that:

[1] This Guide has been based on a similar document produced by Western Australia's Environmental Protection Agency.

- best practice is applied to maximise energy efficiency and minimise emissions;
- proponents undertake an ongoing program to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time;
- comprehensive analysis is undertaken to identify appropriate emission offsets; and
- due consideration is given to preparing for possible climate change impacts.

Emission offsets include activities that sequester carbon or reduce the greenhouse gas output or intensity per unit product from current or future activities. Examples may include but are not limited to:

- establishment and maintenance of perennial vegetation;
- sequestration of carbon by geological, chemical, biological or other means;
- reducing the carbon intensity of existing activities;
- replacing fossil fuels with renewable fuels;
- trading emission permits in a nationally approved system;
- synergistic linking of enterprises to reduce net greenhouse gas outputs; and
- development of new greenhouse gas efficient technologies.

Measures that offset emissions within the Northern Territory are encouraged, however, the Office recognises global nature of climate change and proponents are also advised to consider national and international offset options.

2.2 Guidance on greenhouse gas emissions

Proponents should indicate the following in their environmental assessment documentation:

(a) Greenhouse gas emissions inventory and benchmarking

Using the methodology developed and periodically updated by the National Greenhouse Gas Inventory Committee[2] or another nationally agreed methodology:

(i) Estimate the gross emissions of greenhouse gases that are likely to be emitted from the proposed project for each year of its operation in absolute and in carbon dioxide equivalent figures. The estimate of gross emissions should include on site and upstream sources, such as the production and supply of energy to the site. Emissions should be detailed on a gas by gas and a process by process basis.

(ii) Detail the project lifecycle greenhouse gas emissions and the greenhouse gas efficiency of the proposed project (per unit of product and/or other agreed performance indicators). The parameters should be compared with similar technologies producing similar products. Reductions in emissions due to improvement in industry practice since 1990[3] should also be described.

[2] Up to date methodology information can be obtained by contacting the Australian Greenhouse Office.
[3] The year 1990 has been selected because it is the base year against which the Kyoto Protocol's emission abatement targets are calculated.

(iii) Estimate any removals of greenhouse gases due to carbon sequestration activities (see (c) below), in carbon dioxide equivalent figures for each year of operation.

(b) Measures to minimise greenhouse gas emissions

Consider a wide range of options (including, innovative options) and then indicate the intended measures and efficient technologies to be adopted to minimise total greenhouse gas emissions in the proposed project. This should include:

(i) Identifying improvements in energy efficiency, conservation measures and the reduction of fugitive emissions where applicable; and

(ii) Indicating where potential savings in greenhouse gas emissions can be made through the use of renewable energy sources. This should take into account fossil fuels used for supplementary power generation.

(c) Carbon Sequestration

Consider a wide range of carbon sequestration options and include intended measures for research and adoption. Options include:

- forestry or other revegetation;
- geological re-injection;
- chemical methods;
- soil uptake; and
- re-use.

(d) Minimising emissions over the life of the project

The design measures to minimise emissions, and the sequestration and sink enhancement actions to offset emissions, identified in points (b) and (c) above should, at a minimum, represent best practice at the time of seeking project approval.

Within the proponent’s Environmental Management Plan, consistent with the principles of continuous improvement, the Office expects commitment to an ongoing program of monitoring, investigation, review and reporting of internal and external greenhouse gas abatement measures.

Proponents should also advise whether they will join the Commonwealth Government's "Greenhouse Challenge" voluntary cooperative agreement program (whether on a project-specific basis, company-wide arrangement or within an industrial grouping, as appropriate).

(e) Benefits on a national or global scale

This section provides the opportunity for proponents to place the proposal in a national and global context so as to provide an understanding of where broader offset benefits might occur. It provides the opportunity for the proponent to provide a statement in support of the proposal indicating where positive outcomes would be

achieved in relation to greenhouse gas emissions, regardless of where these measures are located.

The Office looks to proponents to provide the best possible outcome within the Northern Territory but also recognises the potential for benefits to accrue at the national and global scale. If a proponent has adopted best practice to reduce greenhouse gas emissions in the Northern Territory, the Office then acknowledges that benefits may also accrue through actions taken by the proponent elsewhere in Australia or internationally.

2.3 Preparedness for climate changes

Proponents should demonstrate due consideration of the risk of climate change impacts. Relevant variables may include, but are not limited to:

- increasing average temperature and evaporation rates;
- variation in rainfall and the incidence of floods;
- sea level rise;
- increased frequency and intensity of cyclones and storm surge events; and
- altered distribution of pests and disease.

In assessing climate change risk, proponents should be guided by recent projections published by organisations such as the CSIRO or the Intergovernmental Panel on Climate Change.

3 LIMITATIONS

This Guide has been prepared by the Office of the Environment and Heritage to assist proponents and the public. While it represents the contemporary views of the Office of the Environment and Heritage each proposal which comes before the Office of the Environment and Heritage for environmental impact assessment will be judged on its overall merits.

4 GLOSSARY OF TERMS

Abatement: Limiting, abating, avoiding or sequestering greenhouse gas emissions through source reduction, fuel displacement or switching, carbon stabilising techniques or sink enhancement.

Absolute Emissions: Refers to the total emissions of greenhouse gases expressed in terms of the actual mass of each individual gas emitted over a specified time period.

Best Practice: A Best Practice is a process, technique, or use of technology, equipment or resources that has a proven record of success in minimising energy use and greenhouse gas emissions. A commitment to use Best Practice is a commitment to use all available knowledge and technology to ensure that greenhouse gas emissions are minimised.

Carbon Dioxide Equivalent: This is calculated by multiplying the actual mass of emissions by the appropriate Global Warming Potential (GWP) factor. This will enable emissions of different gases to be added together and compared with carbon dioxide.

Commonwealth Government's "Greenhouse Challenge" Voluntary Cooperative Agreement Program: The Greenhouse Challenge is a cooperative effort by industry and Commonwealth Government to reduce greenhouse gas emissions through voluntary industry action. Participation in the challenge will be through 'cooperative agreements' between the Commonwealth Government and industry participants.

The objective of these agreements is to capture the capacity of industry to abate its greenhouse emissions, mainly by improving its efficiency in energy use and processing. A successful program will mean that Australia is developing sustainable strategies that respond effectively to climate change, while maintaining or enhancing Australian industry competitiveness.

The following features form the basis for cooperative agreements between industry and the Commonwealth to abate greenhouse gas emissions and enhance sinks, as part of a comprehensive approach.

Cooperative agreements include the following:

- an appropriate emissions inventory;
- specific greenhouse action plans;
- a commitment to regular monitoring and reporting of performance against action plans;
- provision for verification of performance; and
- a public statement, as agreed by the parties, on the undertakings contained in the agreement.

Greenhouse Gases: Proponents would be required to report on the emissions of:

- carbon dioxide (CO_2),
- methane (CH_4),
- nitrous oxide (N_2O),
- perfluorocarbons (CFx)
- hydrofluorocarbons (HFCs), and
- sulphur hexafluoride (SF_6)

Emissions must be reported in terms of their absolute emissions and their “carbon-dioxide equivalent” (CO_2-e). The “carbon dioxide equivalent” is calculated by multiplying the actual mass of emissions by the appropriate Global Warming Potential (GWP) factor published by the Intergovernmental Panel on Climate Change.

Gross Emissions: The actual mass of the greenhouse gases emitted. These emissions should be expressed as both absolute and “carbon dioxide equivalent” emissions.

Global Warming Potential: Global Warming Potential (GWP) is the warming potential of a gas. GWPs are revised from time to time as knowledge increases about

the influences of different gases and processes on climate change. GWPs also vary with the time horizon being considered. The 100 year horizon is generally used in policy analyses. At the time of the publication of this document the published GWPs were 1 for carbon dioxide (CO_2), 21 for methane (CH_4), 310 for nitrous oxide (NO_2), 23,900 for sulphur hexafluoride (SF_6), 6,500 for the PFC perfluoromethane (CF_4), and 9,200 for the PFC perfluoroethane (C_2F_6). GWPs are not yet available for other greenhouse gases.

Project lifecycle greenhouse gas emissions: Project lifecycle greenhouse gas emissions are those measured cumulatively over a defined period. Typically this period is from the point of extraction of the raw materials to either the beginning of the consumer phase of the product or the final disposal or recycling stage of the exhausted product, depending on its nature. Proponents should justify their choice of the defined period.

Measures: Refers to the range of possible actions that could be undertaken which directly or indirectly contribute to the abatement of greenhouse gas emissions through source reduction or sink enhancement.

National Greenhouse Gas Inventory Committee: The National Greenhouse Gas Inventory Committee consists of representatives of the Commonwealth, State and Territory Governments and oversees the development of greenhouse gas inventory methods and compilation of inventories for Australia. Up-to-date methodology information may be obtained by contacting the Australian Greenhouse Office.

Net Greenhouse Gas Emissions: The actual mass of the greenhouse gases emitted minus any emissions that may have been removed through sequestration or sink enhancement.

Sequestration: Removal of greenhouse gases from the atmosphere by vegetation or technological measures. Sequestration is not yet precisely defined for the purposes of recognised trading or offset schemes. Accordingly, the Office will need to take a common sense approach on a case by case basis in the interim. To assist proponents, the Office regards sequestration as a process that results in the isolation of carbon dioxide from the atmosphere for a period which is significant in terms of influencing the global warming effect.

Sink: A pool or reservoir that absorbs and stores carbon, lowering the amount of carbon dioxide in the atmosphere.

Source: Any process or activity that releases a greenhouse gas into the atmosphere.