

APPENDIX E2

Ecological sustainability

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E2 ECOLOGICAL SUSTAINABILITY

Section 4 of the joint government EIS guidelines requires that the EIS:

- Provide a framework in which decision makers may consider the environmental, economic and social aspects of the proposal
- Specifically address all relevant matters under the requirements of the EPBC Act.

E2.1 INTRODUCTION

The principles of Ecologically Sustainable Development (ESD), including the precautionary principle, have played an integral role in BHP Billiton's decision making processes in respect of the expansion project during the selection of preferred alternatives and the design, planning and assessment phases. BHP Billiton is committed to continuing to take into account the principles of ESD throughout the construction and commissioning, operational and decommissioning phases of the project.

This appendix examines the role of the principles of ESD in the assessment and approval process, as relevant to the project under the EPBC Act. This appendix complements the Draft EIS, which sets out a wide array of environmental, social and economic considerations, and analyses the likely impacts of the project on various aspects of the environment.

In recognition of the importance of ESD, the design, planning and assessment phases of the project have been conducted in accordance with the principles of ESD, through:

- incorporation of risk assessment in the decision making process
- adoption of high standards for environmental and occupational health and safety performance
- ongoing consultation with regulatory and community stakeholders.

E2.2 THE CONCEPT OF ESD

E2.2.1 Background

Over the last three decades, there has been increasing global awareness of the concept of sustainable development. In 1987, the United Nations World Commission on Environment and Development, through the Brundtland Report *Our Common Future*, adopted what has become a popular definition of sustainable development, being:

Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

In recognition of the importance of sustainable development, in June 1990, the Australian Government released the document *Ecologically Sustainable Development: A Commonwealth Discussion Paper* which introduced the term 'ecologically sustainable development' and aimed to institute a process of discussion on what Australians needed to do to embrace ESD. From this, the Australian Government developed a National Strategy for Ecologically Sustainable Development (NSED), which was adopted by all levels of Australian Government in 1992. The NSED defines ESD as:

Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.

The NSED has the goal of:

Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The core objectives of the NSED are to:

- enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations
- provide for equity within and between generations
- protect biological diversity and maintain essential processes and life support systems.

The NSED recognises that the participation of all levels of government, business, unions and the community is essential to facilitate the implementation of ESD in Australia. Part 1 of the NSED provides:

Private enterprise in Australia has a critical role to play in supporting the concept of ESD while taking decisions and actions which are aimed at helping to achieve the goal of this Strategy. Many have already been active participants in the ESD process, including taking significant individual steps to ensure that Australia's economy and production base are put on an ecologically sustainable footing.

The principles of ESD have been adopted on a federal level in Australia by the EPBC Act.

E2.2.2 ESD under Commonwealth legislation

The objects of the EPBC Act are identified in Section 3 of the Act as being:

- (a) to provide for the protection of the environment, especially those aspects of the environment that are matters of national environmental significance; and*
- (b) to promote ecologically sustainable development through the conservation and ecologically sustainable use of natural resources; and*
- (c) to promote the conservation of biodiversity; and*
- (ca) to provide for the protection and conservation of heritage; and*
- (d) to promote a co-operative approach to the protection and management of the environment involving governments, the community, land-holders and indigenous peoples; and*
- (e) to assist in the co-operative implementation of Australia's international environmental responsibilities; and*
- (f) to recognise the role of indigenous people in the conservation and ecologically sustainable use of Australia's biodiversity; and*
- (g) to promote the use of indigenous peoples' knowledge of biodiversity with the involvement of, and in co-operation with, the owners of the knowledge.*

The principles of ESD are set out in Section 3A of the EPBC Act as being:

- (a) decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;*
- (b) 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;*
- (c) the principle of inter-generational equity - 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;*
- (d) the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making;*
- (e) improved valuation, pricing and incentive mechanisms should be promoted.*

The EPBC Act sets out mandatory considerations and factors the Minister must take into account in deciding whether or not to grant approval to a project. Section 136 (as it applies to the expansion project) relevantly provides:

- (1) In deciding whether or not to approve the taking of an action, and what conditions to attach to an approval, the Minister must consider the following, so far as they are not inconsistent with any other requirement of this Subdivision:*
 - (a) matters relevant to any matter protected by a provision of Part 3 that the Minister has decided is a controlling provision for the action;*
 - (b) economic and social matters.*

Factors to be taken into account;

- (2) In considering those matters, the Minister must take into account:*
 - (a) the principles of ecologically sustainable development: and*
 - (b) the assessment report relating to the action; and*
 - (c) if the action was assessed under Division 5 or 6 of Part 8 (which deal with public environment reports and environmental impact statements) – the report or statement about the action finalised by the designated proponent.*

In addition, the EPBC Act provides that the Minister must consider the precautionary principle in making decisions. In the following terms:

- (1) The Minister must take account of the precautionary principle in making a decision listed in the table in subsection (3), to the extent he or she can do so consistently with the other provisions of this Act.*
- (2) The precautionary principle is that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.*

Section 391(3) lists the decisions in which the Minister is required to take into account the precautionary principle. These relevantly include the Minister's decision whether or not to approve the taking of an action under section 133 of the EPBC Act.

E2.2.3 ESD under relevant State and Territory legislation

The principles of ESD have been adopted on a State level in South Australia by the Development Act 1993 (Development Act).

Section 3 of the Development Act articulates the objects of the Act as follows:

The object of this Act is to provide for proper, orderly and efficient planning and development in the State and, for that purpose –

- (a) to establish objectives and principles of planning and development; and*
- (b) to establish a system of strategic planning governing development; and*
- (c) to provide for the creation of Development Plans –*
 - (i) to enhance the proper conservation, use, development and management of land and buildings; and*
 - (ii) to facilitate sustainable development and the protection of the environment; and*
 - (iia) to encourage the management of the natural and constructed environment in an ecologically sustainable manner; and*
 - (iii) to advance the social and economic interests and goals of the community; and*
- (d) to establish and enforce cost-effective technical requirements, compatible with the public interest, to which building development must conform; and*
- (e) to provide for appropriate public participation in the planning process and the assessment of development proposals; and*
- (ea) to promote or support initiatives to improve housing choice and access to affordable housing within the community; and*
- (f) to enhance the amenity of buildings and provide for the safety and health of people who use buildings; and*
- (g) to facilitate –*
 - (i) the adoption and efficient application of national uniform building standards; and*
 - (ii) national uniform accreditation of buildings products, construction methods, building designs, building components and building systems.*

Section 46B of the Development Act provides specific requirements for the EIS process which relevantly include:

- (1) This section applies if an EIS must be prepared for a proposed development or project.*
- (4) The EIS must include a statement of –*
 - (a) the expected environmental, social and economic effects of the development or project;*
 - (c) if the development or project involves, or is for the purposes of, a prescribed activity of environmental significance as defined by the Environment Protection Act 1993, the extent to which the expected effects of the development or project are consistent with –*
 - (i) the objects of the Environment Protection Act 1993.*

Section 3 of the *Environment Protection Act 1993* (SA) defines a prescribed activity of environmental significance as an activity specified in Schedule 1. These activities relevantly include, for example, manufacturing and mineral processing works. Accordingly, the project would be subject to the provisions of Section 46B(4)(c)(i).

Section 10 of the *Environment Protection Act 1993* (SA) sets out the objects of the Act, which are concerned with promoting the principles of ESD. Section 10 relevantly states:

- (1) The objects of this Act are –*
 - (a) to promote the following principles (“principles of ecologically sustainable development”):*
 - (i) that the use, development and protection of the environment should be managed in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being and for their health and safety while –*
 - (A) sustaining the potential of natural and physical resources to meet the reasonably foreseeable needs of future generations; and*
 - (B) safeguarding the life-supporting capacity of air, water, land and ecosystems; and*
 - (C) avoiding, remedying or mitigating any adverse effects of activities on the environment;*
 - (ii) that proper weight should be given to both long and short term economic, environmental, social and equity considerations in deciding all matters relating to environmental protection, restoration and enhancement; and*

- (b) *to ensure that all reasonable and practicable measures are taken to protect, restore and enhance the quality of the environment having regard to the principles of ecologically sustainable development, and –*
- (i) *to prevent, reduce, minimise and, where practicable, eliminate harm to the environment –*
 - (A) *by programmes to encourage and assist action by industry, public authorities and the community aimed at pollution prevention, clean production and technologies, reduction, re-use and recycling of material and natural resources, and waste minimisation; and*
 - (B) *by regulating, in an integrated, systematic and cost-effective manner –*
 - *activities, products, substances and services that, through pollution or production of waste, cause environmental harm; and*
 - *the generation, storage, transportation, treatment and disposal of waste; and*
 - (ii) *to co-ordinate activities, policies and programmes necessary to prevent, reduce, minimise or eliminate environmental harm and ensure effective environmental protection, restoration and enhancement; and*
 - (iii) *to facilitate the adoption and implementation of environment protection measures agreed on by the State under intergovernmental arrangements for greater uniformity and effectiveness in environment protection; and*
 - (iv) *to apply a precautionary approach to the assessment of risk of environmental harm and ensure that all aspects of environmental quality affected by pollution and waste (including ecosystem sustainability and valued environmental attributes) are considered in decisions relating to the environment; and*
 - (v) *to require persons engaged in polluting activities to progressively make environmental improvements (including reduction of pollution and waste at source) as such improvements become practicable through technological and economic developments; and*
 - (vi) *to allocate the costs of environment protection and restoration equitably and in a manner that encourages responsible use of, and reduced harm to, the environment with polluters bearing an appropriate share of the costs that arise from their activities, products, substances and services; and*
 - (vii) *to provide for monitoring and reporting on environmental quality on a regular basis to ensure compliance with statutory requirements and the maintenance of a record of trends in environmental quality; and*
 - (viii) *to provide for reporting on the state of the environment on a periodic basis; and*
 - (ix) *to promote –*
 - (A) *industry and community education and involvement in decisions about the protection, restoration and enhancement of the environment; and*
 - (B) *disclosure of, and public access to, information about significant environmental incidents and hazards.*

The Northern Territory statute which regulates the environmental assessment of the components of the project in that jurisdiction is the *Environmental Assessment Act 1982*. This statute does not expressly incorporate the principles of ESD.

E2.2.4 Principles of ESD

The principles of ESD include five key concepts:

Long-term and short-term economic, environmental, social and equitable considerations

The principles of ESD require the effective integration of environmental considerations and resources in decision making. This may include consideration of ecosystems; people; communities; natural and physical resources; the qualities and characteristics of locations, places and areas; and the social, economic and cultural aspects of these things in the present and future.

The concept of equitable considerations may include, for example, the idea of intra-generational equity, being that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for its own generation.

The precautionary principle

Environmental assessment involves predicting what the environmental outcomes of a development are likely to be. The precautionary principle reinforces the need to take risk and uncertainty into account.

The precautionary principle is the principle that lack of full scientific certainty should not be used as a reason for postponing a measure to prevent degradation of the environment where there are threats of serious or irreversible environmental damage.

The practical application of the precautionary principle has, in recent times, been the subject of much Australian judicial and legal academic commentary, including that the precautionary principle should only be applied when two thresholds are met:

- there is a threat of serious or irreversible environment damage:
 - this requires a consideration of many factors, and consultation with experts and relevant stakeholders and right holders
 - where the threat of environmental damage is negligible, the precautionary principle cannot apply
- there is scientific uncertainty as to the nature and scope of the threat of environmental damage:
 - the degree of scientific uncertainty required is at least “considerable” scientific uncertainty.

Once the two thresholds are met, the burden shifts to the proponent of a project to demonstrate that there is no threat, or that the threat is negligible. Thus the function of the precautionary principle is to shift the burden of proof to require a proponent to address the threat of serious or irreversible damage, notwithstanding that there is scientific uncertainty about the threat.

In the application of the precautionary principle, the measures adopted should be proportionate to the potential threat.

Inter-generational equity

Inter-generational equity is the concept 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.

Conservation of biological diversity and ecological integrity

Biological diversity, or “biodiversity”, is considered to be the number, relative abundance and genetic diversity of organisms from all habitats (including terrestrial, marine and other aquatic ecosystems, and the ecological complexes of which they are a part) and includes diversity within species and between species, as well as diversity of ecosystems. For the purposes of the Draft EIS, ecological integrity is considered in terms of ecological health.

Improved valuation, pricing and incentive mechanisms

This principle of ESD requires that environmental factors be included in the valuation of assets and services. This may include concepts such as:

- polluter pays – those who generate pollution and waste should bear the cost of containment, avoidance or abatement
- the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of waste
- environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

This principle reflects the idea that if the real value of natural resources is incorporated into the cost of using those resources, it is more likely that those resources will be used in a sustainable manner, adequately managed, and not wasted.

E2.3 PROPONENT’S COMMITMENT TO PRINCIPLES OF ESD

BHP Billiton has historically embraced, and continues on an ongoing basis to demonstrate a commitment to, the principles of ESD. BHP Billiton’s firm commitment to the principles of ESD is recognisable in the existing environmental initiatives in respect of Olympic Dam and other BHP Billiton projects.

As discussed in Chapter 1 of the Draft EIS, BHP Billiton is governed by a series of corporate standards including a Charter, Sustainable Development Policy, Health Safety Environment and Community Management Standards, and a Guide to Business Conduct. These standards promote a mutually beneficial relationship between BHP Billiton, the environment, the communities in which it operates and the people indigenous to these communities.

Additionally, the BHP Billiton Charter, Health Safety Environment and Community Management Standards and Guide to Business Conduct articulate BHP Billiton’s commitment to environmental responsibility and sustainable development.

BHP Billiton’s Sustainable Development Policy heralds sustainable development through consideration of social, environmental, ethical and economic aspects over time. This policy states that BHP Billiton is dedicated to:

- setting and achieving targets that promote the efficient use of resources and include reducing and preventing pollution
- enhancing biodiversity protection by assessing and considering ecological values and land use in activities.

As part of BHP Billiton's commitment to ESD, BHP Billiton has also developed a Climate Change Position. It is focused on increasing understanding of life cycle emissions of products and improving management of energy and GHG emissions from production. BHP Billiton identifies greenhouse gas (GHG) emissions as a sustainability challenge in its Sustainable Development Policy, recognising the need to mitigate the potential impact of GHG emissions. Correspondingly, BHP Billiton has fashioned an action plan to address this challenge, comprising a commitment to:

- use energy as efficiently as possible
- control the emissions produced at BHP Billiton sites
- work on ways to reduce emissions produced in customer consumption of BHP Billiton products both now and in the future.

In accordance with the principle of inter-generational equity, the BHP Billiton Sustainable Development Policy contains an aspirational goal of zero harm to people, host communities and the environment, with particular focus on eliminating BHP Billiton environmental impacts over time.

As part of BHP Billiton's Sustainable Development Policy, and in recognition of its commitment to biodiversity, BHP Billiton sites are required to maintain land management plans, and many are actively engaged in biodiversity related programs. As part of BHP Billiton's environmental commitment, BHP Billiton has identified a long-term opportunity beyond its site specific activities to engage in regional biodiversity issues. BHP Billiton will continue to work with the communities in which it operates and with other stakeholders to develop its approach to biodiversity offsets, with its primary aim being to avoid or minimise harm to biodiversity.

E2.4 GLOBAL CONTEXT OF THE EXPANSION PROJECT

E2.4.1 Increased demand for electricity

Minerals-based industrial materials and the provision of adequate, reliable and affordable energy are essential to meeting the needs and aspirations of people in both developed and developing countries. Overall, the increase in world energy demand from 2004 to 2030 is expected to be in excess of 50%. In this same period, electricity growth is expected to double, particularly having regard to the fact that currently approximately two billion people (concentrated in the developing world) have no access to electricity.

The 2007 United Nations Intergovernmental Panel on Climate Change has identified the "supply of secure, equitable, affordable and sustainable energy [as] vital to future prosperity". The 2007 UNIPCC further observed:

- demand for all forms of energy continues to rise to meet growth in economies and world population
- security of energy supply together with GHG reduction goals are co-policy drivers for many governments seeking to ensure that future generations will be able to provide for their own well-being without their need for energy services being compromised
- a mix of energy sources (including fossil fuels, renewable energy and nuclear power) is highly likely to be required to meet the growing demand for energy services globally.

E2.4.2 Climate change and greenhouse effect

The relationship between the emission of GHGs and global warming is well established. The increase in global average air and surface temperatures and the widespread melting of ice and rising sea levels evidences the undeniable warming of the global climate system. These impacts are especially pronounced in the Australian context, with the annual mean temperature in Australia increasing by 0.9 °C since 1910. Climate change is likely, in turn, to intensify existing environmental problems. Research indicates that even if all GHG emissions ceased today, Earth would still be committed to an additional warming of 0.2–1.0 °C by the end of the century. The momentum of the world's fossil fuel economy precludes the elimination of GHG emissions over the near-term, and thus future global warming is likely to be above 1 °C.

The Garnaut Climate Change Review Draft Report released in July 2008 reinforced the widespread view that the failure to curtail global greenhouse gas emissions will impact heavily upon climate change. Natural ecosystems are considered to be vulnerable to climate change, and projected changes in climate are likely to have diverse ecological implications. In the absence of appropriate mitigation strategies to combat global climate change, there will potentially be serious ecological repercussions stemming from rising temperatures, changes in rainfall patterns and rising sea levels. The different responses of various flora and fauna populations to the impacts of climate change in Australia may result in a decline in biodiversity, increased prominence of weed and pest species, and changes in the geographical range of habitable areas for various species. The expansion and contraction of habitable areas with changing climate could prove challenging, particularly for species that are threatened or endangered.

E2.4.3 The Stern Review

The Stern Review on the Economics of Climate Change, a review conducted by Sir Nicholas Stern for the British Government and published in October 2006, analysed the effects of climate change and global warming on the global economy and concluded that strategies must be developed to reduce GHG emissions in response to the threat of global climate change. In particular, the Stern Review noted that:

- the risk of the worst impacts of climate change can be substantially reduced if GHG levels in the atmosphere are stabilised between 450 and 550ppm CO₂ equivalent by 2050
- global emissions from the power sector comprise 24% of total global GHG emissions
- under business as usual conditions, total power sector GHG emissions are expected to have a three-fold increase above current levels by 2050
- the countries expected to experience the fastest growth in emissions are those expected to have the most economic growth. China may account for over one third of the global increase in GHG emissions expected to occur by 2030 in the absence of climate change mitigation policies
- in order to adhere to the 2050 stabilisation trajectory range of 450–550ppm CO₂ equivalent, the power sector will need to rely on electricity production that is up to 60% decarbonised.

The Stern Review identified four main ways in which GHG emissions could be reduced. They are:

- to reduce demand for emission-intensive goods and services
- to improve energy efficiency, by getting the same outputs for fewer inputs
- to switch to technologies which produce fewer emissions and lower the carbon intensity of production
- to reduce non-fossil fuel emissions, particular land use, agriculture and fugitive emissions.

E2.4.4 Increased demand for uranium

BHP Billiton, like many other participants in the global energy market, including international governments and theorists, recognises the inevitable growth in the role of uranium in the global energy market. In order to meet global energy demand, and in particular to cater for the rapidly increasing energy needs of Asia's productive industries and growing population, nuclear power is increasingly being viewed as either the preferred primary energy option or secondary energy option to conventional fossil fuels.

The Garnaut Draft Report identified a recent global surge in demand for uranium, with countries such as China expanding their capacity for nuclear power. Based on projected strong growth in global demand for energy of all types, uranium will be an essential part of the world's energy supply for the future. The increased role for uranium in the global energy market has largely arisen as a result of:

- the increasing economic viability of nuclear power when the rising costs of conventional fossil fuels are taken into account
- the relatively low GHG emissions associated with nuclear power in comparison to the use of traditional fossil fuels such as coal.

Nuclear energy is progressively emerging as an economically competitive option for electricity generation. The recent sustained increases in fossil fuel prices have resulted in greater interest in nuclear energy due to the significant role that fuel costs play in fossil energy generation costs compared to nuclear energy. Future advancements in nuclear reactor and fuel cycle technology will further increase the economic viability of nuclear power, and considerably enhance the efficiency with which uranium resources are utilised. Once established, nuclear power plants may have low operating, maintenance and fuel costs.

There is little doubt that coal and other traditional fossil fuels will continue to play an integral role in the global supply of electricity in the coming decades. There is, however, widespread awareness of the need to reduce the extent, and mitigate the effects, of GHG emissions and associated climate change. Nuclear power has been repeatedly identified, and increasingly come to be accepted, as a realistic means of reducing GHG emissions from electricity generation.

The Stern Review identified the use of a mix of energy sources as the preferred approach to reducing greenhouse gas emissions in order to tackle climate change. The Stern Review expressly stated that to meet the recommended stabilisation trajectory of 450-550ppm CO₂ equivalent by 2050, the electricity sector will have to be decarbonised through a combination of measures including the use of renewable energy, carbon capture and storage, and nuclear energy. The 2007 UNIPCC identified the expanded use of nuclear power as one of a range of potentially cost effective mitigation options for GHG emissions which may lead to a diverse range of co-benefits including:

- mitigation of air pollution impacts
- energy supply security (through increased energy diversity)
- technological innovation

- reduced fuel costs
- increased employment.

These co-benefits have the potential to be detectable on a local, regional and global level, by the current as well as future generations.

In the context of sustainable development, the question is not whether uranium will play a role, but rather how humankind can realise the economic benefits associated with its use, while at the same time preventing harmful environmental impacts.

Australia has significant uranium deposits, including 38% of the world's low cost uranium deposits. This places Australia in a position to benefit from the global increase in demand for uranium.

E2.4.5 Regulatory provisions applying to uranium mining

The mining, transport, export and sale of uranium products is extensively regulated on an Australian domestic and international level. BHP Billiton is committed to safe handling and transport of uranium, and compliance with its obligations in this area. To that end, BHP Billiton complies with the *Code of Practice for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing 2005*. A summary of the regulatory provisions is provided below with Draft EIS Appendix E3 providing further details.

Mining and milling of uranium ore

Generally, to carry out mining operations in South Australia for any radioactive mineral (a term which is defined to include uranium), a mining company must be the holder of a mining lease or retention lease upon which the Minister has endorsed an authorisation to carry out mining operations for that purpose pursuant to the *Mining Act 1971 (SA)*. BHP Billiton's mining operations of radioactive minerals in connection with the Olympic Dam project are, however, subject to authorisation under specific legislation: the *Roxby Downs (Indenture Ratification) Act 1982*.

In addition, a licence is required under the *Radiation Protection and Control Act 1982 (SA)* to carry out operations for the mining or milling of radioactive ores (defined to mean an ore or mineral containing more than the prescribed concentration of uranium or thorium). The Radiation Act also prohibits the handling of a radioactive substance without a licence and requires registration of any premises in which an unsealed radioactive substance is kept or handled as well as sealed radioactive sources.

A licence is also required under the *Australian Radiation Protection and Nuclear Safety Act 1988 (Cwlth)*.

Transport of uranium within Australia

The Commonwealth legislation governing the transport of uranium is the *Nuclear Non-Proliferation (Safeguards) Act 1997 (Cwlth)*. BHP Billiton currently holds a permit to possess nuclear material or associated items, a permit to possess nuclear material or an associated item for the purposes of transporting the material or item, and a permit to establish a facility.

There is no specific transportation permit or approval required in South Australia to transport nuclear material but the *Radiation Protection and Control (Transport of Radioactive Substances) Regulations 2003* requires consignors and carriers to comply with certain requirements in the *Code of Practice for the Safe Transport of Radioactive Substances*. In addition, the *Code of Practice for Radiation Protection and Radioactive Waste Management in Mining and Mineral Processing 2005* applies to the existing operation and would apply to the proposed expansion.

A licence is required under the *Radioactive Ores and Concentrates (Packaging and Transport) Act 1980 (NT)* for the transport of nuclear materials through the Northern Territory.

Export and sale of uranium

To export uranium, permission is required pursuant to regulation 9 of the *Customs (Prohibited Exports) Regulations 1958*.

Transport of dangerous goods by sea is governed by the *Navigation Act 1913 (Cwlth)*.

Australia's international obligations concerning the safe handling and transport of uranium

Australia's international obligations relating to the handling and transport of uranium are complex. There are myriad conventions that bear upon the safe handling and transport of uranium. Key treaties that apply to the export of uranium from Australia are:

- The Treaty on the Non-Proliferation of Nuclear Weapons. As required, Australia has entered into an agreement with the International Atomic Energy Agency (IAEA) for the application of safeguards. The agreement provides that in the case of export out of Australia, nuclear material subject to safeguards is regarded as Australia's responsibility up until the time at which the recipient State assumes responsibility and no later than the time at which the material reaches its destination. The point at

which the transfer of responsibility takes place is determined in accordance with suitable arrangements to be made by the States concerned. The relevant reporting obligations are also set out in the agreement.

- The Convention on the Physical Protection of Nuclear Material sets out levels of physical protection that must be applied to nuclear material during international transport and during storage incidental to international transport.
- The Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter bans dumping of radioactive and industrial waste at sea.
- The Convention on Early Notification of a Nuclear Accident requires parties to notify IAEA of an accident or emergency involving the transboundary release of radioactive materials.
- The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency facilitates prompt provision of international assistance following a nuclear accident or radiological emergency.
- The Convention for the Safety of Life at Sea specifies minimum standards for construction, equipment and operations of merchant ships carrying dangerous goods such as nuclear material. Flag states are responsible for ensuring that ships under their flag comply with the requirements of the Convention.
- The United Nations Convention on the Law of the Sea provides that ships carrying nuclear substances shall carry documents and observe special precautionary measures established for such ships by international agreements.

E2.5 PROJECT SUSTAINABILITY

The design, planning and assessment processes associated with the expansion project have been carried out applying the principles of ESD, through:

- incorporation of risk assessment and analysis at various stages in the project design and environmental assessment and within decision-making processes
- adoption of appropriate, best in class, standards for environmental and occupational health and safety performance
- consultation with regulatory and community stakeholders
- optimisation of the economic benefits to the community and wider Australian economy arising from the development of the expansion project.

The following subsections describe the consideration and application of each of the principles of ESD to the project.

E2.5.1 Long-term and short-term economic, environmental, social and equitable considerations

In the course of preparing the Draft EIS, BHP Billiton examined the potential long-term and short-term environmental, social, cultural and economic impacts of the project. In doing so, BHP Billiton developed and implemented a clear, transparent and repeatable framework to identify the possible impacts, benefits and risks associated with the construction, ongoing operation and decommissioning of the project.

The potential impacts of the project have been assessed by leading experts in a number of fields through the carrying out of specialist studies on soils, surface water, groundwater and geochemistry, air quality, noise and vibration, terrestrial ecology, the marine environment, cultural heritage, social environment, visual amenity, uranium and radiation, and rehabilitation planning. The outcomes of each of these studies are summarised in the chapters of this Draft EIS which relevantly deal with each of these issues and where appropriate are provided in full in the supporting appendices.

E2.5.2 The precautionary principle

The impact and risk assessment procedures designed and implemented for the project have evaluated the potential for harm to the environment arising out of development associated with the project. Where potential for harm to the environment has been identified, BHP Billiton has identified measures which may be implemented, where practicable, to manage and minimise this potential harm.

An extensive range of measures has been adopted as components of the project design to minimise the potential for either serious or irreversible damage to the environment, including the development of environmental management and monitoring and compensatory measures that would be implemented during construction and operation of the project.

The application of the precautionary principle to the project is reflected in:

- Adoption by BHP Billiton of external and internal codes of practice, guidelines, standards and principles covering exploration, environmental management, rehabilitation and community relations activities.
- Examples of such codes, guidelines, standards and principles that have been adopted by BHP Billiton include:
 - BHP Billiton's Charter

- BHP Billiton's Sustainable Development Policy (a component of the existing Olympic Dam operation's AS/NZS ISO 14001:2004 certified environmental management system)
 - BHP Billiton's Health Safety Environment and Community Management Standards
 - BHP Billiton's Climate Change Position
 - BHP Billiton's Guide to Business Conduct
 - the Olympic Dam Environmental Management Program (a component of the existing Olympic Dam operation's AS/NZS ISO 14001:2004 certified environmental management system)
 - the Olympic Dam Monitoring Program (a component of the existing Olympic Dam operation's AS/NZS ISO 14001:2004 certified environmental management system)
 - Enduring Value – the Australian Minerals Industry Framework for Sustainable Development (an initiative of the Minerals Council of Australia).
- Comprehensive study, planning, evaluation and development of the project proposal. The planning and design of the project has taken place over several years, and is currently at selection phase. BHP Billiton has made substantial efforts, through a team comprising more than 200 professional engineers, scientists and planners from BHP Billiton, and more than 400 local, national and international consultants, to identify potential short and long-term effects of the project. The Draft EIS was prepared considering many years of site specific baseline environmental studies in respect of Olympic Dam and the region surrounding it. Project planning and environmental impact assessment was conducted on an iterative basis, with the outcomes of environmental studies and modelling being fed back into option selection, project planning, design of mitigation measures and the environmental assessment process.
 - Extensive consultation has taken place with a wide range of individuals and organisations, including government, industry, service providers, key community stakeholders and the general public. The stakeholder consultation and engagement process, and its results, are discussed in detail in Chapter 7 and Appendix H of the Draft EIS. A variety of consultative and assessment mechanisms were used to engage stakeholders in relation to the project. These included:
 - the creation and distribution of fact sheets on key elements of the project
 - holding public meetings and focus group meetings
 - conducting one-on-one discussions with stakeholders
 - creating a website (www.olympicdameis.com)
 - establishing an email address, 1300 telephone line and fax line to facilitate inquiries and information sharing
 - conducting community consultation and engagement events
 - consultation with the Kokatha, Barngarla and Kuyani Aboriginal groups
 - consultation and engagement team members attending major public events, including the Royal Adelaide Show and the Cleve Field Days
 - conducting telephone surveys.
 - Objective and comprehensive environmental impact and risk assessment of the project. A team of recognised experts, with extensive relevant experience, was formed to conduct the detailed assessment of key issues for the Draft EIS. The process and outcomes of these studies are discussed in various chapters of the Draft EIS and its accompanying appendices.
 - Comprehensive environmental management systems (EMS). BHP Billiton is committed to implementing an EMS which adequately addresses substantive risks of harm to the environment associated with the various components of the expansion project. Chapter 24 of the Draft EIS examines the areas of the existing Olympic Dam EMS that require review and amendment to address components of the expansion project for the planning and design, construction and operation phases, and identifies proposed EM Programs to address each of these issues. Chapter 24 also identifies review mechanisms and auditing procedures which will be implemented as part of the project EMS.

Each of these aspects have been incorporated into the project through the environmental assessment process.

E2.5.3 Inter-generational equity

The goal of inter-generational equity will continue to play an integral role in the decisions made, and actions undertaken, by BHP Billiton in the context of the expansion project.

The concept of inter-generational equity has been addressed in the design and planning phase, and will continue to be relevant to the construction and commissioning, operation, and decommissioning phases of the project through:

- Assessment of the likely social impacts of the project, including the distribution of impacts between stakeholders (see Chapter 19 of the Draft EIS).
- Design and implementation of monitoring initiatives and management measures, where required, in relation to the potential impacts of the project during construction and commissioning, operation and decommissioning on land, water, flora, fauna and

other affected aspects of the environment (see Chapters 10–24 of the Draft EIS). These measures aim to mitigate impacts and risks of environmental degradation in order to, amongst other things:

- ensure biodiversity and ecological integrity are not compromised during the project
- retain options for future generations with respect to the use of natural resources.
- Development and continuing refinement of a comprehensive rehabilitation strategy (see Chapter 23 of the Draft EIS), ecological offsets strategy (see Chapter 15 and Appendix N of the Draft EIS), and flora and fauna management and monitoring measures to be implemented to manage the short-term ecological impacts of the project (see Chapters 15 and 16 of the Draft EIS).
- Responding to concerns expressed by the community during public consultations, through consideration of issues raised during stakeholder consultation as part of the project alternative selection process (see Chapter 7 of the Draft EIS).
- Undertaking investigation and assessment of heritage values represented in the project area, and adopting strategies to minimise impacts on Aboriginal and non-Aboriginal cultural heritage sites where required (see Chapters 17 and 18 of the Draft EIS).
- Implementation of responsible waste management strategies which will promote safety and mitigate the risks of environmental degradation of natural resources on site (see Chapters 2, 5, 23 and 26 of the Draft EIS).

The analysis undertaken by BHP Billiton, together with numerous experts, for the Draft EIS identified material benefits to current and future generations which are likely to come about as a result of the construction and operation of the project. These include the following:

- The generation and maintenance of employment:
 - The project would benefit the current and future generations through the generation and maintenance of employment. The proposed expansion of Olympic Dam would give rise to substantial new employment opportunities locally, regionally and state-wide. The Olympic Dam workforce currently consists of approximately 3,200 employees, split between permanent employees (about 1,500) and contractors (about 1,700). An additional short-term contract workforce is engaged periodically on an as needs basis (such as for smelter shutdowns).
 - The project is expected to require an increase in the operational workforce at Olympic Dam from about 100 in 2009 to about 3,900 by 2016. In addition, a construction workforce averaging about 6,000 workers over the six year period from 2010 to about 2015 and reaching a peak of more than 7,000 by 2013 is predicted.
 - The size of the total Olympic Dam workforce (including shutdowns and the existing workforce) would peak at over 14,000 in 2015. Figure 19.10 of the Draft EIS shows the total Olympic Dam workforce numbers (existing and proposed), including the maintenance shutdown and other short-term contractors.
 - The approximate number of jobs created by the construction and operation phases of the offsite water, energy and transport infrastructure required for the project are listed in Table 19.13. These total over 1,000 construction employees and 240 operational employees.
 - The project is expected to provide significant indirect employment opportunities which are discussed in Section 19.5.1 of Chapter 19 of the Draft EIS.
- Environmental offsets: As discussed in Chapter 15 of the Draft EIS, BHP Billiton will set aside significant portions of land for conservation, and make payments to the Native Vegetation Fund, in order to offset vegetation clearance associated with the project. The conservation and revegetation areas will result in long-term environmental gains in terms of wildlife habitat values, securing land and soil structures, and an increase in carbon sequestration capacity.
- BHP Billiton will incur the costs of the mitigation measures: BHP Billiton will incur the costs of the mitigation measures and current and future generations will not therefore be required to bear the economic cost to carry out measures necessary to manage and maintain the state of the environment.
- Creation of infrastructure: The desalination plant, water supply pipeline, power station, gas supply pipeline, electricity transmission line, rail line, port facilities, and villages established for the purposes of the project have the potential to be used for the benefit of future generations after the completion of mining operations at Olympic Dam (see Chapter 23).
- Short and long-term economic benefits: The project will stimulate the local, regional and national economy, and provide valuable export earnings. This, in turn, is likely to result in benefits such as improved social welfare and improvements to infrastructure for the current and future generations (see Draft EIS Chapter 21 for details).

E2.5.4 Conservation of biological diversity and ecological integrity

The project site and its surrounding area have some recognised ecological values, which include listed or otherwise significant flora and fauna species, habitat for migratory birds and an endangered ecological community.

Chapter 15 of the Draft EIS details the existing terrestrial ecology, the proposed location and extent of vegetation clearance associated with the project, the effects of this clearance, and related management and compensatory measures. Chapter 16 of

the Draft EIS details the existing marine environment, the potential impacts of the construction and operation of the proposed desalination plant and port facilities on the marine environment, and proposed management measures. In addition, in accordance with ESD principles, the project addresses the conservation of biodiversity and ecological integrity by proposing a comprehensive environmental management framework designed to conserve ecological values and long-term species diversity as far as practicable (see Chapter 24).

Throughout the design and planning of the project, BHP Billiton has taken into account the need to conserve biological diversity and ecological integrity as far as practicable. This ideal will remain at the forefront of BHP Billiton's decision making and actions in the construction and commissioning, operation and decommissioning phases of the project.

BHP Billiton's awareness of the need to conserve biological diversity and ecological integrity as far as practicable is evidenced by:

- The project infrastructure having been designed to minimise impacts on the existing environment where practicable. For example, BHP Billiton intends to minimise the project's impact on birds by ensuring that no new evaporation ponds are established at the Olympic Dam site for the purposes of the expansion project, and by covering the central decant ponds with netting (or similar) in order to prevent access by birds (see Chapter 15).
- The implementation of proven operating systems and pollution control structures for the project. The potential for environmental degradation will be minimised through training of personnel, environmental auditing and the development of contingency plans in case of an emergency which is likely to impact on the environment (see Chapter 24).
- The adoption of environmental offset strategies and compensatory measures designed to augment the range and extent of native vegetation and fauna habitat resources in the project region. These initiatives will lead to a residual environmental benefit to the project region (see Chapter 15).
- The existence of BHP Billiton's monitoring programs for listed threatened species (see Chapter 15).

E2.5.5 Improved valuation, pricing and incentive mechanisms

One of the most common broad underlying goals or concepts of sustainability is economic efficiency, including improved valuation of the environment. Resources should be carefully managed to maximise the welfare of society, both now and for future generations. Consideration of economic efficiency, with improved valuation of the environment, aims to overcome the underpricing of natural resources and has the effect of integrating economic and environmental considerations in decision making, as required by ESD.

By identifying and adopting appropriate strategies and measures to minimise the potential for damage to the environment as integral components of the project, the cost of those measures forms part of the total project cost, thereby enabling the value and price of environmental resources, and their protection, to be more accurately reflected.

E2.5.6 Climate change and greenhouse effect

The greenhouse effect is the phenomenon whereby certain gases, known as greenhouse gases (GHGs), capture heat radiated from the earth and re-radiate it back to earth. This mechanism affects the thermal balance that controls the earth's climate. It is now widely accepted that the thermal balance may be disturbed by steadily increasing concentrations of certain GHGs, principally CO₂, which is the inevitable product of the combustion of fossil fuels. Other GHGs are much less by volume than CO₂ but their effect in the atmosphere is significant because they are more effective as GHGs. To overcome this, the *National Greenhouse and Energy Reporting Act, 2007* (Cth) specifies that GHGs are to be measured in carbon dioxide equivalents (CO₂-e), a process achieved by using a value commonly known as the global warming potential of a GHG.

The greenhouse gas assessment of the project (see Chapter 13 of the Draft EIS) includes Scope 1 emissions (direct emissions from the project) and Scope 2 emissions (indirect emissions from the consumption of purchased electricity). It also includes transport related emissions generated within Australia as Scope 3 emissions. The assessment shows that total greenhouse gas emissions for the existing Olympic Dam operation are around 1.1 Mtpa CO₂-e. The assessment goes on to show that total greenhouse gas emissions for the project will peak at around 5.8 Mtpa CO₂-e. Potential greenhouse gas emissions attributable to the expansion project are therefore some 4.7 Mtpa CO₂-e.

For the purposes of providing global emissions context, an indicative calculation of the abatement potential of the uranium oxide produced at Olympic Dam has been undertaken. Uranium oxide production would be up to 19,000 tonnes in some years. This would be used by countries to produce around 756,000 GWh of electricity, more than three times Australia's average consumption. If, for example, this was used to substitute electricity supplied by typical fuel mixes in Australia, China and the United States of America, it would reduce carbon emissions by 615 Mtpa, 687 Mtpa and 438 Mtpa of carbon dioxide equivalents, respectively.

E2.6 MATTERS OF NES AND ESD CONSIDERATIONS

The principles of ESD have influenced the manner and extent to which possible impacts on the matters of National Environmental Significance (NES) that are the subject of the controlling provisions applicable to the project have been assessed and addressed in the planning and design of the project (see Draft EIS Appendix E1 for details). The principles of ESD will continue to guide BHP Billiton in the context of matters of national environmental significance in the construction and commissioning, operational and decommissioning phases of the project.

E2.6.1 Project impact on Ramsar wetlands

The Minister nominated Sections 16 and 17B of the EPBC Act as controlling provisions for the purpose of the expansion project. Consequently, the Minister will be obliged to consider matters relevant to the ecological character of any declared Ramsar wetlands in deciding whether or not to approve the project and what conditions to attach to the approval.

BHP Billiton has specifically integrated the principles of ESD into its environmental assessment and design of the project in the context of declared Ramsar wetlands by way of conducting desktop studies to identify the two declared Ramsar wetlands in the EIS Study Area, their ecological characteristics and values, and assessing potential impacts based on their location. In response, the project has been designed to avoid the infrastructure associated with the project intersecting with, or otherwise adversely affecting, identified Ramsar areas.

E2.6.2 Project impact on listed threatened species and ecological communities

The Minister nominated Sections 18 and 18A of the EPBC Act as controlling provisions for the purpose of the project. Consequently, the Minister will be obliged to consider matters relevant to various categories of listed threatened species and listed threatened ecological communities in deciding whether or not to approve the project, and what conditions to attach to the approval.

BHP Billiton has specifically integrated the principles of ESD into its environmental assessment and design of the project in the context of listed threatened species and ecological communities by way of:

- Conducting a desktop review and compilation of relevant data from the past 25 years of published reports and databases associated with the EIS Study Area.
- Carrying out field surveys to identify and map vegetation associations and to identify flora and fauna species and their preferred habitats, and conducting an iterative process of risk and impact assessment and project design refinement in response.
- Conducting a literature review of desalination plants and the effects of salinity on marine species, additional marine surveys to assess the distribution and composition of the marine communities in the EIS Study Area, ecotoxicity studies to assess the tolerance of marine species to various toxicity levels, hydrodynamic modelling to assess the dispersion of the brine plume from the proposed desalination plant, and conducting an iterative process of risk and impact assessment and project design refinement in response.
- Establishing appropriate management measures to address the risk of impacts to threatened terrestrial and marine species or ecological communities, a comprehensive rehabilitation strategy, and ecological offsets strategy which includes, for example, the establishment of a significant environmental benefit strategy in accordance with guidelines provided by the South Australian Native Vegetation Council (see Chapters 15, 23 and 24 of the Draft EIS).
- Establishing a program of ongoing monitoring. BHP Billiton will undertake further vegetation surveys as detailed design refines and confirms the disturbance footprint of the project. In the event that threatened species are identified during these surveys, BHP Billiton will adhere to the following management protocol (based on the circumstances):
 - where clearance of listed threatened plants cannot be avoided, seeds or clippings of the plants will be collected for subsequent propagation and planting as part of the rehabilitation of the disturbed area
 - where clearance of threatened plants can be avoided, the area containing the plants will be marked as a no-go area on construction design drawings and in the field with flagging tape and or hazard fencing, so as to avoid disturbance during construction works.

E2.6.3 Project impact on listed migratory species

The Minister nominated Sections 20 and 20A of the EPBC Act as controlling provisions for the purpose of the project. Consequently, the Minister will be obliged to consider matters relevant to listed migratory species in deciding whether or not to approve the project and what conditions to attach to the approval.

BHP Billiton has specifically integrated the principles of ESD into its environmental assessment and design of the project in the context of listed migratory species by way of:

- Conducting desktop reviews of previous monitoring records (as part of the terrestrial and marine ecology assessments undertaken) and ongoing monitoring studies (including regular monitoring of GAB spring fauna, monitoring of birds on the TRS, and field sampling of small mammals and reptiles).
- Designing the project infrastructure to minimise impacts on migratory species which visit the project area. For example, BHP Billiton intends to minimise the project's impact on migratory bird species by ensuring that no new evaporation ponds are established at the Olympic Dam site for the purposes of the expansion project, modifying the design of the proposed processing plant to increase the volume of liquor recycled back into the plant, and covering the central decant ponds with netting (or similar) in order to restrict access by birds.
- Establishing suitable management measures throughout the construction and operational phases of the project, a comprehensive rehabilitation strategy and an appropriate ecological offsets strategy (see Chapters 15, 23 and 24 of the Draft EIS).

E2.6.4 Impact of the project on the environment

The Minister nominated sections 21 and 22A of the EPBC Act as controlling provisions for the purpose of the project. Consequently, pursuant to section 136(1)(a) of the EPBC Act, the Minister will be obliged to consider matters relevant to the environment in deciding whether or not to approve the project and what conditions to attach to the approval. The environment which is required to be considered, is relevantly confined to the environment in Australia: see section 5(2) of the EPBC Act.

The Draft EIS considers in detail the likely impacts of the project on the environment. The extent to which the principles of ESD have been taken into account in the design, planning and assessment processes associated with the project in relation to the various aspects of the environment is explained in Section 2.5 of this appendix.

E2.6.5 Impact on the environment of activities on Commonwealth land

The Minister nominated Sections 26 and 27A of the EPBC Act as controlling provisions for the purpose of the project. Consequently, the Minister will be obliged to consider matters relevant to the environment and, specifically, the environment on Commonwealth land, in deciding whether or not to approve the project and what conditions to attach to the approval. The extent to which the principles of ESD have been taken into account in the design, planning and assessment processes associated with the project in relation to the various aspects of the environment is explained in Section 2.5 of this appendix.

The Defence establishments of Woomera Prohibited Area and the Cultana Training Area, and land owned by Australian Rail Track Corporation Pty Ltd, account for the Commonwealth land within the EIS Study Area for the project. The principles of ESD have been taken into account specifically in the context of Commonwealth land through detailed consideration of the existing land use, and the likely impact of the project on the Woomera Prohibited Area, Cultana Training Area and land owned by Australian Rail Track Corporation Pty Ltd, through a desktop review, relevant local government plans, aerial photographs and land use maps, information from various governmental and private organisations (including the Department of Defence), numerous field visits, two helicopter reconnaissance surveys over the EIS Study Area, and the stakeholder consultation and engagement program. While about 50 ha of Commonwealth land would be disturbed, the assessment of impacts in the Draft EIS concludes this would have an insignificant impact in the context of the local environment.